FINAL AMENDMENT 3 TO THE

FISHERY MANAGEMENT PLAN (FMP)

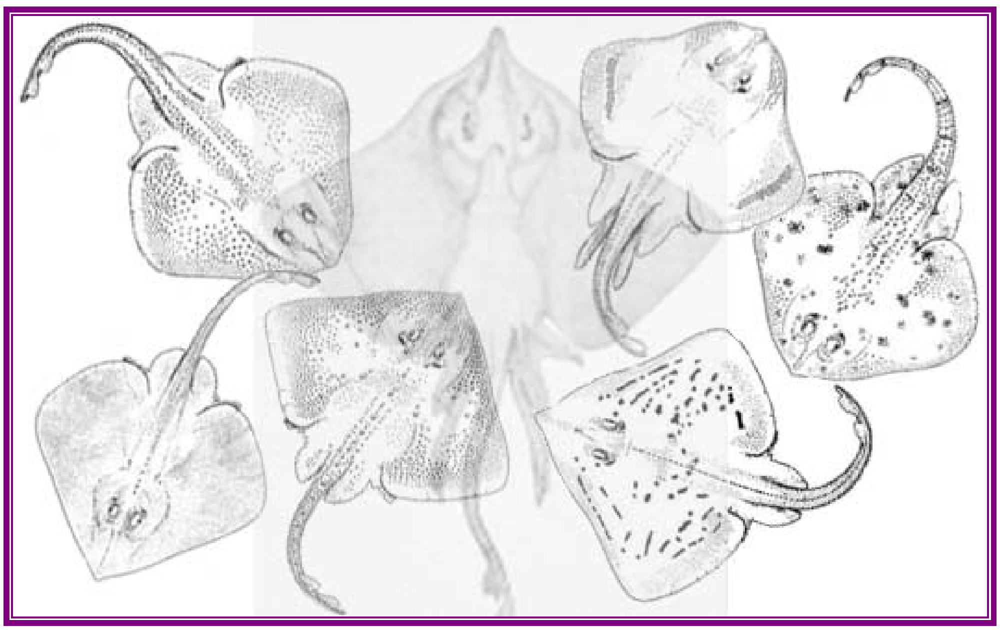
FOR THE NORTHEAST SKATE COMPLEX

And

FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS)

With an

INITIAL REGULATORY FLEXIBILITY ACT ANALYSIS



Prepared by the
New England Fishery Management Council
in consultation with
National Marine Fisheries Service

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1.0 EXECUTIVE SUMMARY

This document serves as Final Amendment 3 to the Skate FMP, the Final Environmental Impact Statement (FEIS) which updates and supplements the original EIS for the skate fishery (available at http://www.nefmc.org/skates/fmp/fmp.htm), and a Stock Assessment and Fishery Evaluation (SAFE) Report (Section 7.0 of this document). The purpose of the amendment is to propose and consider modifications of existing management measures or new skate fishery management measures to address the following issues:

- Overfished status of thorny skates
- Overfishing of thorny skate
- Implementation of annual catch limits (ACLs) and accountability measures (AMs), a new mandate of the reauthorized Magnuson-Stevens Act, and
- A baseline review process that has become obsolete and less meaningful.

The amendment also includes a new discussion and quantification of maximum sustainable yield (MSY; Section 4.1.2) and optimum yield (OY; Section 4.3). Quantification of these variables was not previously possible in the Skate FMP, due to problems with catch data and missing life history information about skates. Some of these issues have been resolved, but others have not. However the analysis of rebuilding potential in Section 8.3.1.1 has implications for sustainable catches. The estimated values at the biomass targets can serve as interim estimates or proxy values for MSY and OY, at least until better information comes forth about the population dynamics of skate species and catch reporting improves.

1.1 Document organization

This is an integrated document that complies with the requirements of the Magnuson-Stevens Act, the National Environmental Policy Act, and the FMP. The SAFE Report updates the description of the skate fishery and the environment that is affected by the skate fishery. The SAFE Report is included as Section 7.0 of this document, which also serves as the Affected Environment section of the FEIS. This section describes the Biological Environment (Section 7.2 including a description of the biology and population dynamics of the seven managed skate species), the Physical Environment (Section 7.3), and the Socio-economic Environment (Section 7.5).

The document also includes a discussion of the Management Background (Section 4.1), the Purpose and Need for action (Section 3.0), a description of Proposed Alternatives (Section 5.2.8) and Considered And Rejected Alternatives (Section 5.3), an analysis of Environmental Consequences of the proposed alternatives (Sections 8.3 to 8.8), and a Cumulative Effects analysis (Section 8.1; including an evaluation of past, present, and reasonably foreseeable future actions). The Environmental Consequences evaluation includes an analysis of the direct and indirect impacts on skates and the skate fishery (Section 8.3), on protected species (Section 8.5), on habitat, including essential fish habitat (EFH; Section 8.6), on the economy (Section 8.7), and on social and community factors (Section 8.8).

1.2 Alternatives

In addition a status quo alternative, Amendment 3 and the FEIS include six alternatives (labeled 1A, 1B, 2, 3A, 3B, and 4) that were developed to achieve the goals and objectives (described in Section 3.0). No preferred alternative was proposed in the DEIS, because the alternatives achieve similar objectives and one is not clearly superior to the other. Thus, public comment was very important for the purposes of choosing a final alternative (See Section 1.3).

The proposed alternatives (Section 5.2.8) include various combinations of measures, which are comprehensively described in Section 5.2.1 (Management measures). Except for the proposed skate possession limits and the baseline review process, the proposed alternatives are intended to augment rather than substitute for existing skate management measures. All of the alternatives are intended to achieve the same skate catch limits (TALs) through a combination of skate possession limits (Section 5.2.6), time/area management (Section 5.2.5), and seasonal fishery quotas (Section 5.2.7). In addition, alternatives 1A, 3A, and 4 include a "Hard TAC" approach to manage annual catch limit (ACL) and implement accountability measures (AMs). The "Hard TAC' approach is described in Section 5.2.1.3. Alternatives 1B and 3B are exactly like Alternatives 1A and 3A, respectively, but would use a "Target TAC" (Section 5.2.1.4) approach to prevent the skate catches from exceeding the ACLs and for invoking AMs. Alternative 2 is similar to Alternative 3B, but uses time/area closures as an AM.

The No Action alternative is the same as the status quo and is described in Section 5.2.8.1. The No Action/status quo alternative would be a continuation of current management policies, which are a combination of multispecies regulations, exempted fisheries, a skate bait letter of authorization, a 10,000 lbs./day/ 20,000 lbs./trip skate possession limit, and a baseline review process. It does not include any numeric catch or landings limits, nor any accountability measures.

Each alternative also has two fishery allocation options and skate possession limits to achieve the associated TALs. One alternative is based on historic landings in the wing and bait fishery from 1994-2006, which includes most of the time since limited access and DAS management were introduced in the Multispecies, Monkfish, and Scallop FMPs. Since skate wing landings have been increasing in recent years, this option allocates more landings to the bait fishery (and conversely less to the wing fishery) than the second allocation option. This option is also more conservative for winter skate which has more landings and catch in the skate wing fishery than in the skate bait fishery. The second alternative is based on relative landings in the wing and bait fishery from 2005-2007 and as a result allocates a greater fraction of the landings to the wing fishery. This may have some economic advantages because the price derived from landing skate wings is greater than the price derived from landing whole skates for bait.

The table below summarizes the measures included in each alternative and a general approach or philosophy behind each alternative.

Table 1. Synopsis of proposed alternatives in Section 5.2.8.

Alternative	Proposed measures	Philosophy or rationale
No action/ Status quo (Section 5.2.8.1)	1. Unless fishing in an exempted fishery defined by the Multispecies FMP, vessels fishing for skates must be on a Multispecies, Monkfish, or Scallop DAS. 2. Landings of barndoor, smooth, and thorny skates are prohibited. 3. A 10,000 lbs./day or 20,000 lbs./trip skate possession limit applies to all trips, except for vessels that obtain 4. A bait letter of authorization to allow vessels fishing for skates to exceed the skate possession limit (3) but must land whole skates not exceeding 23 inches (58 cm) in total length.	These measures were intended to rebuild barndoor and thorny skates, while preventing overfishing particularly on larger skates (e.g. winter skate) that are targeted to supply the wing market.

Alternative	Proposed measures	Philosophy or rationale
1A (Section 5.2.8.2)	1. Annual catch limit (ACL) of 30,643 mt; annual catch target (ACT) of 22,982 mt; total allowable landings (TAL) of 9,427 mt 2. Accountability measures via a "Hard TAC"; landings and discards are monitored and skate possession is prohibited when catch exceeds the ACL 3. Whole/bait skate possession limit 4. Skate wing possession limit 5. Skate time/area closures for vessels on declared skate trips 6. Prohibition on using Multispecies Category B DAS to fish for skates 7. Skate trip declaration requirements 8. Skate incidental possession limit for undeclared trips 9. Annual review and bi-ennial specification setting with SAFE Report	A combination of skate possession limits, time/area closures, and a zero skate possession limit when catch exceeds the ACL prevents excessive skate mortality and promotes biomass rebuilding.
1B (Section 5.2.8.3)	Measures are the same as Alternative 1A, except: 2. Accountability measures via a "Target TAC"; landings are monitored and skate possession is limited to the incidental limit (500 lbs. of whole skates) when the landings exceed the TAL.	A combination of skate possession limits, time/area closures, and an incidental skate possession limit when landings exceed the TALs prevent excessive skate mortality and promotes biomass rebuilding.
2 (Section 5.2.8.4)	1. Annual catch limit (ACL) of 30,643 mt; annual catch target (ACT) of 22,982 mt; total allowable landings (TAL) of 9,427 mt 2. Accountability measures via a "Target TAC"; landings are monitored and skate possession is limited to the incidental limit (500 lbs. of whole skates) when the landings exceed the TAL. Time/area skate management applies when the landings exceed or approach the ACLs. 3. Whole/bait skate possession limit 4. Skate wing possession limit 5. Prohibition on using Multispecies Category B DAS to fish for skates 6. Skate trip declaration requirements 7. Skate incidental possession limit for undeclared trips 8. Annual review and bi-ennial specification setting with SAFE Report	A combination of skate possession limits, time/area closures (as an accountability measure), and an incidental skate possession limit when landings exceed the TALs prevent excessive skate mortality and promotes biomass rebuilding.

Alternative	Proposed measures	Philosophy or rationale
3A (Section 5.2.8.5)	1. Annual catch limit (ACL) of 30,643 mt; annual catch target (ACT) of 22,982 mt; total allowable landings (TAL) of 9,427 mt 2. Accountability measures via a "Hard TAC"; landings and discards are monitored and skate possession is prohibited when catch exceeds the ACL. 3. Whole/bait skate possession limit 4. Skate wing possession limit 5. Prohibition on using Multispecies Category B DAS to fish for skates 6. Skate trip declaration requirements 7. Skate incidental possession limit for undeclared trips 8. Annual review and bi-ennial specification setting with SAFE Report	A combination of skate possession limits, and a zero skate possession limit when catch exceeds the ACL prevents excessive skate mortality and promotes biomass rebuilding. Lower skate possession limits than those in Alternatives 1A and 4 are needed to achieve the skate catch limits without the benefit of time/area closures.
3B (Section 5.2.8.6)	Measures are the same as Alternative 3A, except: 2. Accountability measures via a "Target TAC"; landings are monitored and skate possession is limited to the incidental limit (500 lbs. of whole skates) when the landings exceed the TAL.	A combination of skate possession limits, and an incidental skate possession limit when landings exceed the TALs prevent excessive skate mortality and promotes biomass rebuilding. Lower skate possession limits than those in Alternatives 1B and 4 are needed to achieve the skate catch limits without the benefit of time/area closures. **This alternative, with some modifications, became the proposed action as applied to vessels targeting skates for the wing market.**
4 (Section 5.2.8.7)	Measures are the same as Alternative 1A, except: 3. The landings for the skate bait fishery are limited by an annual or seasonal quota in lieu of whole skate possession limits.	A combination of skate wing possession limits, a skate bait fishery quota, and a zero skate possession limit when catch exceeds the ACL prevents excessive skate mortality and promotes biomass rebuilding. Unique market characteristics in the skate bait fishery are more easily accommodated by a seasonal quota than by skate possession limits. **This alternative, with some modifications, became the proposed action as applied to vessels targeting skates for the bait market.**

1.2.1 Changes from the DEIS

The ABC, ACT, and TAL values contained in the DEIS that went out to public hearing were different than those contained in this FEIS. The values contained in the September 2008 DEIS were an ABC of 27,809 mt, an ACT of 20,857 mt, and a TAL of 11,544 mt. The calculation of ABC was adjusted by the SSC two times following the conclusion of the public hearings on the DEIS; once due to updated catch information from the Data Poor Assessment Workshop (DPWS) in February 2009, and a second time in September 2009 to correct and update a previous calculation. As a result of the revised ABC, the values for the ACT and TAL also were adjusted accordingly using the same procedures and percentages as were in the DEIS.

The ABC, ACT, and TAL values contained in this FEIS are as follows and are reflected in Table 1: 30,643 mt, 22,982 mt, and 9,427 mt, respectively. It should be noted that these adjusted values do not impact the analysis of alternatives contained in the DEIS. Thus, the analysis contained in that document and this FEIS still stands for the reasons described in the next section.

Also changed were two management measures based on public comment during and subsequent to the DEIS hearings. In the final alternative (a combination of Alternatives 3B and 4), the Council increased the incidental skate possession limit that applies when a vessel is not operating on a DAS or when the inseason accountability measures apply triggered when landings approach the TALs. The incidental limit was raised from 220 lbs. whole (500 lbs. of skate wings) to 500 lbs. whole (1135 lbs skate wings) to accodomodate common bycatch of skates for vessels targeting other species, reducing the amount of skate discards that might otherwise occur.

The final alternative also includes a precautionary possession limit for vessels targeting whole skates for the bait market. The DEIS included no bait skate possession limit in Alternative 4, but the reduced TALs calculated from the DPWS results increased the likelihood that the AMs in the skate bait fishery would be triggered. Industry advisors recommended that the final alternative should include a 20,000 lbs. whole weight possession limit for vessels with a Skate Bait Letter of Authorization to reduce the probability that derby style fishing behavior could develop in a fleet-quota managed bait skate fishery.

Along with other measures derived from the DEIS alternatives, these two new or revised measures in the final alternative were analyzed in Section 8.0.

1.2.2 FEIS analysis

No additional analyses of the draft alternatives were required following the re-evaluation and approval of revised ABCs by the Council's Scientific and Statistical Committee, based on results from the Dec. 2008 Data Poor Assessment Workshop (DPWS). The non-preferred alternatives were formulated to achieve a 40.2 and 34.7 percent reduction in the TAL for the wing and bait skate fisheries, respectively, for allocation option 1 (see Table 12) and a 45.5 and 19.0 percent reduction in the TAL respectively for allocation option 2. These non-preferred alternatives included a set of proposed skate closure areas (either used as a primary management measure or as an accountability measure if the TALs were exceeded), skate possession limits for the wing and bait fisheries, and DAS restrictions. Alternatives 3A and 3B did not include skate area closures, but were intended to achieve the TAL with only skate possession limits and limits on DAS use. Alternative 4 substituted a bait skate possession limit for a seasonal whole/bait skate quota.

Although the possession limits were intended to achieve the TAL without invoking the in-season accountability measures (AMs), there was some uncertainty about the effect of the area closures and possession limits due to changes in fishing behavior between 2007 (the data year used to evaluate the impacts) and 2010 (when the regulations are scheduled for implementation). Lowering the TALs without changing the possession limits simply increases the likelihood that the inseason AMs would come into play, but it also decreases total revenue expected from the fishery. Since the economic impact analysis (Section 8.7) included a broad range of potential outcomes and predicted the response of skate price, revenue, and profits at various levels of skate landings, no additional analysis of the above non-preferred alternatives were required, particularly since changes in the skate possession limits were not contemplated.

Alternatives 1A, 1B, 2, 3A, and 3B all included skate possession limits which were analyzed over a very wide range of values (see Section 8.3.1.7), estimating their predicted effects on skate landings and catch (assuming a constant discard proportion at 2005-2007 estimated discard rates), the number and type of vessels, and ports. These results were furthermore evaluated and compared with respect to protected species (Section 8.5.2), habitat (Section 8.6.2), economic (Section 8.7.4), and social (Section 8.8.5) impacts. The effects on habitat and bycatch (Sections 8.6.2 and 8.3.4, respectively) were qualitatively descrived with respect to anticipated decreases in skate fishing. A reduction in the TAL relative to the values in the DEIS only increase the uncertainty about effects on habitat and bycatch, depending on how fishermen react while the inseason AMs are in effect.

Although the skate ABC, ACL, and (wing and bait fishery) TALs changed due to an updated stock assessment (DPWS 2009a) it did not necessitate a change in the management measures included in the non-preferred alternatives. In fact, due to consideration of fishing practices, retention of markets, and economic effects, the Council chose the possession limits and seasonal quotas in Alternatives 3B and 4 with very minor modifications (incorporation of a high skate bait possession limit in Alternative 4 and an increase in the incidental skate catch limit when the TALs are exceeded). Therefore the existing analysis and comparison of the non-preferred alternatives is appropriate and accurate with respect to the final alternative and proposed action. Had the Council adjusted the skate possession limits to achieve the lower TALs (a 55.5 and 33.9 percent reduction for the skate wing and bait fisheries respectively under Option 1, Figure 2) that resulted from the updated assessment, the skate possession limits would have been considerably lower, particularly for alternatives that did not include the proposed skate area closures. The Council did not choose this recourse because of its patent impracticality.

Instead the amendment with the lower TALs resulting from the Dec. 2008 DPWS results will rely to a greater extent on the in-season accountability measure (reduction of skate possession limits to an incidental amount) earlier in the season that would be expected with the preliminary TALs that were used in the DEIS. This change is expected to result in a proportional decline in skate revenue and similar effects on the lobster fishery (which uses whole skates for bait), which is generally addressed in the economic impact analysis (Section 8.7) and the Regulatory Flexibility Analysis (Section 9.9). Increases in price to mitigate the decline in landings may occur, but are expected to be minimal due to the availability of secondary supplies (skate wing landings from other regions in the international market) and substitutable goods (other forms of bait, albeit more expensive, for the lobster fishery).

1.3 Proposed action

Taking into consideration the public comments on the DEIS, incorporating the approved ABC into the ACL framework, and accounting for new estimates of recent discards, the Council selected a combination of Alternative 3B for the skate wing fishery and Alternative 4 for the skate bait fishery. These two alternatives were strongly supported by fishermen in each respective fishery. The Council also selected a three-season quota system for the bait fishery, based on strong public comment to choose this option to minimize the effect on the skate bait market and prices. A few minor changes were also incorporated to respond to public comment.

Concern was expressed that with a 220 lbs. skate wing incidental possession limit (500 lbs. of whole skate), skate discards would rise for vessels targeting other species. And with the reduced TALs, the fishermen and processors in the bait fishery were concerned about the development of derby-style fishing behavior with lower fleet quotas. Responding to these comments, the proposed action increased the incidental skate possession limit to 500 lbs. of wings (1135 lbs. whole) and established a 20,000 lbs. whole weight possession limit for vessels with a Skate Bait Letter of Authorization.

Although the TALs in the FEIS are lower than previously estimated in the DEIS, the Council did not change the wing possession limit because the ones in Alternative 3B were already as low as practicable for a directed skate fishery to exist at all. In addition the effect of changing groundfish regulations is difficult to judge and DAS that vessels may use to fish for skates may undergo substantial changes through the Interim Action and through Final Amendment 16 to the NE Multispecies FMP. There is also some uncertainty how constraining the skate wing possession limit need to be to achieve the desired catch level. If skate wing prices fall due to changes in the economy or in foreign markets, fewer vessels may target skates. And if prices rise, more vessels may use their DAS to target skates. Particular in the latter circumstance, the mortality objectives will rely more on the TAL triggers to reduce the possession limit earlier, rather than later, in the fishing year.

The proposed action is expected to keep skate catch below the median exploitation ratio[1], promoting increases in skate biomass while preventing overfishing and reducing the risk that skate stocks will become overfished. In addition, the reduced catch is expected to promote rebuilding of overfished smooth and thorny skates. Quantitative projections are unavailable due to insufficient information about the species' population dynamics, although a probabilistic analysis framework is applied and analyzed in Section 8.3.1.1. Revenue from skate landings is expected to decline in proportion to the planned reduction in skate landings, which could be partially offset by the redirection of Multispecies DAS to target other species when landings reach the TAL triggers. The economic effects on the lobster fishery (which partially relies on skates for bait) are expected to be negative (i.e. bait availability will decline and bait price will rise in the short term), although the alternatives have been adjusted to minimize this economic impact.

These economic impacts on the lobster fishery are estimated in Sections 8.7.3.2 and 8.7.3.3. The biological impacts from reducing skate catch to a more sustainable level are expected to be positive and are evaluated in Section 8.3. The economic impacts are expected to be negative in the short term, but positive in the long term when skate yield increases to B_{MSY}. Although fishing effort targeting skates is expected to decline, the DAS that fishermen use to target skates is likely to be redirected to target other species, but no meaningful changes in gear use are anticipated. The net effect on bycatch of non-target species, habitat, and on protected species is therefore uncertain, and may be neutral, increase, or decrease depending on how the available DAS are redeployed. These impacts are discussed in Sections 8.4, 8.5, and 8.6. The cumulative effects of the Skate FMP on other species and of other FMPS or regulations (including the Interim Action) are discussed in Section 8.1.

[1] The target catch is 75% of the ABC, which is associated with the median exploitation (catch/biomass) ratio. Analysis has shown that more often than not skate biomass increases when the catch is below the median exploitation ratio.

1.4 Conclusions

The landings and catch limits proposed by this amendment have an acceptable probability of promoting biomass growth and achieving the rebuilding (biomass) targets for smooth and thorny skates. Modest reductions in landings and a stabilization of total catch below the median relative exploitation ratio is expected to cause increases in skate biomass and future yield. Some short-term decreases in economic surpluses derived from the skate fishery can be expected (Section 9.8.1). With No Action (status quo), skate biomass is expected to decline further or remain at low, overfished levels. Due to insufficient information about the population dynamics of skates, the rate of decline under No Action and the rate of increase under the proposed alternatives cannot be forecast. But No Action is not expected to achieve OY and the loss of future yield under No Action will be greater than the short-term reductions in economic surplus expected under any of the alternatives.

The expected impacts of the alternatives are largely identical to each other with respect to the probability of achieving rebuilding objectives and overall economic effects, because all alternatives have been developed to achieve the same TALs for the skate wing and bait fisheries. There are two TAL allocation options. Option 1 (Section 5.1.1.1) allocates more of the TAL to the wing fishery while Option 2 allocates a greater share to the skate bait fishery than does Option 1. It is unclear which option is clearly superior and provides greater economic benefits, but Option 1 reduces skate supply to a traditional US based lobster fishery while Option 2 reduces supply to an export market for skate wings. There is therefore little consumer surplus generated through higher wing landings, while producer surplus is affected by changes in the skate bait supply (Section 8.7.3.2).

Alternatives with time/area management (Alternatives 1A, 1B, and 4) allow for higher skate wing possession limits, which may be more efficient (i.e. cost-effective) since vessels could take longer trips than they would if the skate possession limits are lower (as in Alternatives 2, 3A and 3B. Also, alternatives with higher possession limits and time area closures (Alternatives 1A, 1B, and 4) would increase skate discards (see Section 8.3.1.10) less than alternatives with lower skate possession limits (Alternatives 2, 3A, and 3B). However, alternatives with time/area closures have greater impacts on adjacent ports (like Chatham, MA) and may cause a shift in fishing effort to areas where vessel target smaller skates for the bait market. Alternative 4 uses quotas to manage the skate bait fishery instead of possession limits. Although Alternative 4 may require seasonal fishery closures that would disrupt bait supply to the lobster fishery, it may give processors and vessels more flexibility to respond to short-term fluctuations in market demand. Alternative 2 only differs from Alternatives 1B and 3B in the way that time/area management is applied, as an accountability measure, and therefore its effects are dependent on the timing and implementation of the accountability measures.

2.0 AMENDMENT 3 TABLE OF CONTENTS

2.1 Appendix I Table of Contents

Supplemental Correspondence and Technical Documents

2.2 List of Tables

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2.5 List of Acronyms

ABC	Allowable biological catch
ACL	Annual Catch Limit
ALWTRP	Atlantic Large Whale Take Reduction Plan
AM	Accountability Measure
APA	Administrative Procedures Act
ASMFC	Atlantic States Marine Fisheries Commission
CAI	Closed Area I
CAII	Closed Area II

CPUE	catch per unit of effort
DAM	Dynamic Area Management
DAS	days-at-sea
DFO	Department of Fisheries and Oceans (Canada)
DMF	Division of Marine Fisheries (Massachusetts)
DMR	Department of Marine Resources (Maine)
DPWG	Data Poor Working Group
DSEIS	Draft Supplemental Environmental Impact Statement
EA	Environmental Assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
F	Fishing mortality rate
FEIS	Final Environmental Impact Statement
FMP	fishery management plan
FW	framework
FY	fishing year
GARM	Groundfish Assessment Review Meeting
GB	Georges Bank
GIS	Geographic Information System
GOM	Gulf of Maine
GRT	gross registered tons/tonnage
HAPC	habitat area of particular concern
HPTRP	Harbor Porpoise Take Reduction Plan
IFQ	individual fishing quota
ITQ	individual transferable quota
IVR	interactive voice response reporting system
IWC	International Whaling Commission
LOA	letter of authorization
LPUE	landings per unit of effort
MA	Mid-Atlantic
MAFAC	Marine Fisheries Advisory Committee
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MPA	marine protected area
MRFSS	Marine Recreational Fishery Statistics Survey
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSMC	Multispecies Monitoring Committee
MSY	maximum sustainable yield
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act

NERO	Northeast Regional Office
NLSA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NT	net tonnage
OBDBS	Observer database system
OLE	Office for Law Enforcement (NMFS)
OY	optimum yield
PBR	Potential Biological Removal
PDT	Plan Development Team
PRA	Paperwork Reduction Act
RFA	Regulatory Flexibility Act
RMA	Regulated Mesh Area
RPA	Reasonable and Prudent Alternatives
SA	Statistical Area
SAFE	Stock Assessment and Fishery Evaluation
SAP	Special Access Program
SARC	Stock Assessment Review Committee
SAW	Stock Assessment Workshop
SBNMS	Stellwagen Bank National Marine Sanctuary
SEIS	Supplemental Environmental Impact Statement
SFA	Sustainable Fisheries Act
SIA	Social Impact Assessment
SNE	Southern New England
SNE/MA	Southern New England-Mid-Atlantic
SSB	spawning stock biomass
SSC	Social Science Committee
TAC	Total allowable catch
TAL	Total allowable landings
TED	Turtle excluder device
TEWG	Turtle Expert Working Group
TMS	ten minute square
TRAC	Trans-boundary Resources Assessment Committee
TSB	total stock biomass
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VMS	vessel monitoring system
VPA	virtual population analysis
VTR	Vessel trip report
WGOM	Western Gulf of Maine
YPR	Yield per recruit

3.0 PURPOSE AND NEED FOR ACTION (AMENDMENT, EIS, RFA)

The Skate FMP was implemented in 2003, after concerns were expressed about the low biomass of barndoor skate and potential overfishing. During the development of the FMP and as a result of a skate stock assessment, barndoor skate and thorny skate were identified as being overfished. In addition, smooth skate was near the minimum biomass threshold and winter skate was thought to be experiencing overfishing, but winter skate fishing mortality could not be estimated with existing data.

The FMP (available at http://www.nefmc.org/skates/fmp/fmp.htm) cited a problematic lack of adequate information and could not estimate Maximum Sustainable Yield (MSY) or Optimum Yield (OY), particularly for each species individually. The FMP listed major concerns about this lack of information and concerns for the perceived vulnerability of large skates (barndoor, thorny, and winter skates) to exploitation. Responding to these concerns, the FMP identified the management unit; established a skate permit; established new reporting requirements including those for landings and discards by individual species; prohibited landings of barndoor, thorny, and smooth skates; set a 10,000 pound per day/20,000 pound per trip possession limit on skate wings (a fishery targeting larger skates); and established a management baseline to evaluate the effect that measures in other FMPs would impact skates.

As described below in this section, reference points defining overfishing and an overfished biomass for all seven skate species were identified in the FMP and approved. Annual status determinations for each of the seven managed skate species (barndoor skate, *Dipturus laevis* (Mitchill 1818); clearnose skate, *Raja eglanteria* (Bosc 1880) little skate, *Leucoraja erinacea* (Mitchill 1825) rosette skate, *Leucoraja garmani virginica* (McEachran 1977); smooth skate, *Malacoraja senta* (Garman 1885) thorny skate, *Amblyraja radiata* (Donovan 1808); and winter skate, *Leucoraja ocellata* (Mitchill 1815)) rely on resource survey catches, based on a three-year biomass moving average and a rate of change for average biomass (see discussion below for more detail).

Skates were re-assessed in 2006, during the 44th Stock Assessment Workshop (documents available through http://www.nefsc.noaa.gov/nefsc/saw/). The assessment addressed some, but not all of the lacking information cited in the FMP, including better estimates of skate discards. The discard estimates were however not identified by species and even now nearly 60% of landings are still reported as unclassified species. Making the problem even worse, some dealers landing wings erroneously assume that all landings are of winter skate and some bait dealers erroneously assume that all landings are of little skate. Data taken by trained observers indicate that a significant fraction (but not majority) of landings in the wing fishery are little skate and a significant fraction of landings in the bait fishery are winter skate. Port agents also observe a small amount of landings of smooth and thorny skates, which are prohibited. The SAW 44 assessment evaluated an MSY-based analytical assessment of skate species, but this assessment was not approved on technical grounds. The SAW 44 report concluded that the existing status determinations were adequate until better approaches could be developed and reporting problems were resolved. A "Data Poor Assessment Workshop" was conducted by the Northeast Fisheries Science Center in December 2008, which was intended to resolve some of the issues or develop better approaches. The results of this recent assessment were incorportated in the FEIS and are described in Section 4.1.1.1.

3.1 Status determination

When the 2006 survey results became available, the Skate Plan Development Team determined that barndoor skate was rebuilding and approaching the target. On the other hand, winter skate biomass had declined below the minimum biomass threshold, thorny skate remained below the minimum biomass threshold and no rebuilding was evident, and little and smooth skates were nearing an overfished condition. Following this determination, NMFS declared that winter skate had become overfished and that little and smooth skate were in danger of becoming overfished. In accordance with the Magnuson-Stevens Act, NMFS notified the Council of the change in status determination (see Document 1 in Appendix I), giving the Council one year to develop a plan to address the status of the overfished species and initiate rebuilding for winter skate. Thorny skate had been in a rebuilding plan since the plan inception, but biomass has not increased and the FMP never adopted a rebuilding schedule due to the lack of critical life history information.

While this amendment was under development, the 2007 survey data became available for analysis (see Document 2 in Appendix I) and while thorny and winter skates remained overfished[2], the mean biomass estimate for smooth skate (B=0.14 kg/tow) slipped under the minimum biomass targets (B=0.16 kg/tow). In addition, thorny skate biomass also declined enough that the rate of change exceeded the amount that triggered a determination that overfishing was occurring.

After the DEIS had been completed and the Council held public hearings, the NEFSC held a DPWS to investigate novel approaches to assessing data poor or model resistant stocks, including skates. As a result of this process, the DPWS evaluated the overfishing definition reference points and except for barndoor skate recommended updating the selected reference time series to include the bottom trawl survey results through 2007. The selected reference time series in the FMP relied on survey data through 1997 as the basis for the reference points. Except for barndoor skate, the underlying theory behind the reference points was that sometime during the time series, the skate biomass was at a level consistent with producing MSY, and that the 75th percentile was an appropriate proxy for B_{MSY}. The DPWS reviewers (see http://www.nefsc.noaa.gov/nefsc/saw/datapoor/Data Poor - Review Panel Report Final-1-20-09.pdf) thought that there was no reason to exclude the more recent survey data for this purpose. The Council's SSC concurred with this recommendation, but cautioned against automatically updating the reference points using new data (see Appendix I, Document 17), particularly for stocks that are trending down due to fishing. The proposed action would change the selected time series for the reference points, following the advice of the DPWS. All of the reference point changes were relatively small and most had no effect on the status determinations made in 2007. The biomass for smooth and winter skates, however, would be slightly over the minimum biomass threshold and therefore not overfished.

The existing and proposed biomass reference points are listed in Table 96. Combined with the updated survey biomass indices, the new biological reference points meant that the status determinations for skates changed as listed in the table below.

Table 2. History of skate status determination since FMP implemention.

	FMP implementation (2003)	2007 status determination (initiated Amendment 3)	DPWS assessment 2008 status determination	2009 status determination
Survey data	2000-2002	2004-2006	2005-2007	2006-2008
Barndoor	No overfishing; **Overfished**	No overfishing; **Rebuilding**	No overfishing; **Rebuilding**	No overfishing; **Rebuilding**
Clearnose	No overfishing; Not overfished	No overfishing; Not overfished	No overfishing; Not overfished	No overfishing; Not overfished
Little	**Overfishing**;	No overfishing;	No overfishing;	No overfishing;

[2] N.B. Later, the final status determination for winter skate changed to "not overfished" during the development of this amemdment, due to both the proposed change in the overfishing definition reference points and the higher winter skate catches in the 2008 suvery data.

	Not overfished	Not overfished	Not overfished	Not overfished
Rosette	No overfishing; Not overfished	No overfishing; Not overfished	No overfishing; Not overfished	No overfishing; Not overfished
Smooth	No overfishing; Not overfished	No overfishing; Not overfished	No overfishing; **Overfished**	No overfishing; **Overfished**
Thorny	No overfishing; **Overfished**	No overfishing; **Overfished**	**Overfishing**; **Overfished**	No overfishing; **Overfished**
Winter	No overfishing; Not overfished	No overfishing; **Overfished**	No overfishing; Not overfished	No overfishing; Not overfished

3.2 Purpose

This change in status determination using the updated reference points slightly alters the focus of Amendment 3 from that expressed in the DEIS. Instead of initiating a rebuilding program for winter skate and increasing the prospects for rebuilding of thorny skate, the emphasis changes to initiating rebuilding of smooth skate (which recently became overfished), promoting rebuilding of thorny skate (which has been overfished since plan implementation), stopping overfishing of thorny skate, preventing overfishing, and preventing other skate stocks (namely smooth and winter skate) from becoming overfished. Nonetheless, the overarching objective remains the same – reduce and limit skate catch to a sustainable level that will promote increases in biomass for stocks that are below the biomass target (i.e. levels that can produce MSY) and a sustainable level that will not cause skate stocks to experience overfishing.

The purpose of this amendment is therefore to end overfishing and promote rebuilding of overfished thorny skate to achieve the biomass target within the mandated rebuilding schedule, or earlier if possible, and to prevent overfishing of all managed skates. To achieve this goal, the Amendment 3 objective is to reduce discards and landings sufficiently to keep catches below the productive capacity of the stocks and thereby promote increases in skate biomass.

This amendment proposes several alternatives to rebuild smooth and thorny skate, but also offering conservative benefits for other skates that may become overfished if their biomass index declines slightly, or becoming subject to overfishing if biomass declines too quickly. Increasing skate wing landings and stable landings in the bait fishery (catching a mix of little year around and small winter skates during the spring), coupled with rising discards is likely to prevent rebuilding (see analysis in Section 8.3.1.1 for population responses to catches that exceed a median exploitation ratio). Included in the Amendment 3 alternatives are time/area closures that apply to vessels fishing for skates, wing and skate bait possession limits to keep landings from exceeding the ACL, and a prohibition on the use of Multispecies Category B DAS to fish for skates (a program meant for fishing on healthy groundfish stocks, but allowed a rapid rise in skate wing landings during 2007).

Another purpose of this amendment is to implement annual catch limits (ACLs) and accountability measures (AMs) to comply with new Magnuson-Stevens Act requirements. Final National Standard 1 guidelines have been published and the proposed ACL framework for skates meets the guidelines. The amendment includes an Allowable Biological Catch (ABC) that would prevent overfishing (catch > OFL) and accounts for scientific uncertainty. The ABC was also set at the catch/biomass median value to promote rebuilding based an analysis on changes in skate biomass at various levels of historic catch. The amendment also specifies an ACL, equal to the ABC, since the ABC accounted for both scientific and management uncertainty, which for skates (and often other managed stocks) are sometimes indistinguishable from each other. Furthermore, the amendment includes a catch target (ACT) equal to

75% of the ACL which applies the precautionary principal to set specifications for management measures (time/area closures and possession limits). The ACTs primary purpose is to set management measures that will substantially reduce the likelihood that the AMs would be triggered because the primary measures (possession limits, limited access, and DAS restrictions) are set at amounts to make it unlikely. In particular, triggering the inseason AM that reduces the possession limit to 500 lbs. of wings or 1135 lbs. of whole skate could be very disruptive and increase discards. So the skate ACT has a very important function.

In addition, AMs that will keep the management plan from exceeding the ACL are included in the alternatives. The AMs include an adjustment to the buffer between the ACL and ACT if catches exceed the ACL due to management uncertainty (changes in discards, for example). They also include adjustments to TAL triggers to slow the landings from wing and bait fisheries that target skates, as landings approach the TALs. Due to incidental skate possession limits, some skate landings will continue to occur after the trigger is met and the skate possession limits automatically change. If the landings during the remainde of the fishing year cause annual landings to exceed the TALs, the proposed action includes an automatic mechanism to reduce the applicable TAL trigger.

A third purpose of this amendment is to provide timelier monitoring and pro-active responses to fishery changes that could cause skate overfishing or cause skates to become overfished. To achieve this goal, the objective of Amendment 3 alternatives is to improve the process for evaluating the effects on the skate resource and on skate catches from new or pending regulations, alternatives under consideration in amendments or framework adjustments for other FMPs, and structural or economic changes in related fisheries that catch or land skates. The existing baseline review process has become obsolete and less meaningful, because the baseline measures have become less relevant to the current effect on skate catches. A new annual review process would be conducted regularly and have a broader scope than a baseline review of a single fishery action. The SAFE Report and bi-annual specification process would allow for more timely changes in skate specifications than currently occurs.

3.3 Rebuilding

The Skate Plan Development Team (PDT) has estimated that keeping catches below the catch/biomass median will promote increasing the stock biomass for winter, thorny, and smooth skates, but not enough is known to predict when or how quickly this would occur.

Thorny skate will take longer than 10 years to rebuild. Based on new life history parameter estimates, the Council has estimated that it takes a female thorny skate 15 years to replace its own spawning capacity, which by definition is a mean generation time. Thus the maximum rebuilding period allowed by the MSA is 25 years (10 years plus one mean generation time), or 2028 when counted from the FMP implementation in 2003 which determined that thorny skate was overfished. From the current biomass (0.42 kg/tow in 2007), it would take an average annual increase of 13.2% to rebuild to the 4.41 kg/tow target by 2028. The PDT has advised that the best estimate of the maximum intrinsic rate of population growth is 0.17, so achieving the biomass target within the rebuilding schedule appears to be achievable. It is estimated that the intrinsic rate of smooth skate population growth is sufficient to allow rebuilding to the target in 10 years or less.

Although there is insufficient information about skate population dynamics to project changes in biomass, historic catches that have been below the catch/biomass median have frequently led to increases in smooth, thorny, and winter skate biomass. As more becomes known about skate population dynamics, catch and landings reporting improves, and more data are collected, the Council will re-examine these catch limits and the response of skate populations to the actual catches resulting from this amendment and future actions.

4.0 CONTEXT OF AMENDMENT 3 AND MANAGEMENT BACKGROUND (EIS,RFA)

4.1 Management Background

Table 3 describes the seven species in the Northeast Region's skate complex, including each species common name(s), scientific name, size at maturity, and general distribution.

Table 3. Species description for skates in the management unit

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	GENERAL DISTRIBUTION	SIZE AT MATURITY	OTHER COMMON NAMES
Winter Skate	*Leucoraja ocellata*	Inshore and offshore GB and SNE with lesser amounts in GOM or MA	Large (> 100 cm)	• **Big Skate** • **Spotted Skate** • **Eyed Skate**
Barndoor Skate	*Dipturus laevis*	Offshore GOM (Canadian waters), offshore GB and SNE (very few inshore or in MA region)	Large (> 100 cm)	
Thorny Skate	*Amblyraja radiata*	Inshore and offshore GOM, along the 100 fm edge of GB (very few in SNE or MA)	Large (> 100 cm)	• **Mud Skate** • **Starry Skate** • **Spanish Skate**
Smooth Skate	*Malacoraja senta*	Inshore and offshore GOM, along the 100 fm edge of GB (very few in SNE or MA)	Small (< 100 cm)	• **Smooth-tailed Skate** • **Prickly Skate**
Little Skate	*Leucoraja erinacea*	Inshore and offshore GB, SNE, and MA (lower abundance in GOM)	Small (< 100 cm)	• **Common Skate** • **Summer Skate** • **Hedgehog Skate** • **Tobacco Box Skate**
Clearnose Skate	*Raja eglanteria*	Inshore and offshore MA	Small (< 100 cm)	• **Brier Skate**
Rosette Skate	*Leucoraja garmani*	Offshore MA	Small (< 100 cm)	• **Leopard Skate**

Abbreviations are for Gulf of Maine (GOM), Georges Bank (GB), Southern New England (SNE), and the Mid-Atlantic (MA) regions.

The seven species in the Northeast Region skate complex (Maine to North Carolina) are distributed along the coast of the northeast United States from near the tide line to depths exceeding 700 m (383 fathoms). In the Northeast Region, the center of distribution for the little and winter skates is Georges Bank and Southern New England. The barndoor skate is most common in the Gulf of Maine, on Georges Bank, and in Southern New England. The thorny and smooth skates are commonly found in the Gulf of Maine. The clearnose and rosette skates have a more southern distribution, and are found primarily in Southern New England and the Chesapeake Bight. Skates are not known to undertake large-scale migrations, but they do move seasonally in response to changes in water temperature, moving offshore in summer and early autumn and returning inshore during winter and spring. Members of the skate family lay eggs that are enclosed in a hard, leathery case commonly called a mermaid's purse. Incubation time is six to twelve months, with the young having the adult form at the time of hatching (Bigelow and Schroeder 1953). A description of the available biological information about these species can be found in Section 7.2 of this document.

Skates are harvested in two very different fisheries, one for lobster bait and one for wings for food. The fishery for lobster bait is a more historical and directed skate fishery, involving vessels primarily from Southern New England ports that target a combination of little skates (>90%) and, to a much lesser extent, juvenile winter skates (<10%). The catch of juvenile winter skates mixed with little skates are difficult to differentiate due to their nearly identical appearance. The fishery for skate wings evolved in the 1990s as skates were promoted as "underutilized species," and fishermen shifted effort from groundfish and other troubled fisheries to skates and dogfish. The wing fishery is a more incidental fishery that involves a larger number of vessels located throughout the region. Vessels tend to catch skates when targeting other species like groundfish, monkfish, and scallops and land them if the price is high enough. A complete description of available information about these fisheries can be found in Section 7.5.1.

On January 15, 1999, NMFS requested information from the public on barndoor skate for possible inclusion on the list of candidate species under the Endangered Species Act (ESA). On March 4, 1999, NMFS received a petition from GreenWorld to list barndoor skate as endangered or threatened and to designate Georges Bank and other appropriate areas as critical habitat. The petitioners also requested that barndoor skate be listed immediately, as an emergency matter. On April 2, 1999, NMFS received a petition from the Center for Marine Conservation (now the Ocean Conservancy) to list barndoor skate as an endangered species. The second petition was considered by NMFS as a comment on the first petition submitted by GreenWorld. Both the petition and comment referenced a paper in the journal *Science*, which presents data on the decline of barndoor skates (Casey and Myers, 1998). These petitions provided the impetus to complete a benchmark stock assessment for the entire skate complex.

The Northeast skate complex was assessed in November 1999 at the 30th Stock Assessment Workshop (SAW 30) in Woods Hole, Massachusetts. The work completed at SAW 30 indicated that four of the seven species of skates were in an overfished condition: winter, barndoor, thorny and smooth. In addition, overfishing was thought to be occurring on winter skate. In March 2000, NMFS informed the Council of its decision to designate the NEFMC as the responsible body for the development and management of the seven species included in the Northeast Region's skate complex. NMFS identified the need to develop an FMP to end overfishing and rebuild the resources based on the conclusions presented at SAW 30.

During the development of this FMP, the Skate PDT has continued to update the status determinations for the skate species based on the biomass reference points used during SAW 30. At the time of the fall 2001 survey, only two species remain in an overfished condition: barndoor and thorny skates. The overfished status of these two species required the Council to develop management measures to end overfishing and rebuild these resources in accordance with the Magnuson-Stevens Fishery Conservation and Management Act.

On September 27, 2002, NMFS published its findings relative to the petitions to list barndoor skate as an endangered species. NMFS determined, after review of the best available scientific and commercial information that listing the barndoor skate was not warranted. The following factors all indicate a positive trend for barndoor skate populations: recent increases in abundance of barndoor skate observed during trawl surveys; the expansion of known areas where barndoor skate have been encountered; increases in size range; and the increase in the number of small barndoor skate that have been collected. These trends are not consistent with a species that is in danger of extinction throughout all or a significant portion of its range or likely to become endangered within the foreseeable future throughout all or a significant portion of its range. NMFS retained the species on its candidate species list, however.

Very little information is available about the individual skate species and the fisheries of which they are a component. Because skates have not been managed through a federal FMP until then, very little accurate and complete fishery data were available (for example, landings and discards by species, amount of skate bait sold directly to lobster vessels, etc.). Without this information, uncertainty will continue to constrain the ability of the Council to take appropriate management actions to conserve these resources as necessary. As an example, while developing the measures proposed in the 2002 FMP, the Council wrestled with difficult issues related to overfishing definition reference points and appropriate management measures to address individual skate species in need of rebuilding. Much of the difficulties arose due to the lack of information and data to support management action that the Council were required by law. Moreover, effective plan monitoring and appropriate recommendations for management adjustments, especially for fisheries in which skates are caught incidentally, hinged on the availability of more comprehensive information about skates.

NMFS approved the Final Skate FMP and implemented regulations on September 18, 2003 which established a fishing year that coincides with the May 1 to April 30 groundfish fishing year, established an open access skate permit and associated reporting requirements, established essential fish habitat (EFH) designations and overfishing definitions for all seven species, established a rebuilding program for barndoor skate and thorny skate, prohibited landings of barndoor, thorny, and smooth skates, set a 10,000 lbs./day or 20,000 lbs./trip skate possession limit, established a letter of authorization for vessels to fish for small skates to supply the bait market with an allowance to exceed the skate possession limit, and established seven baseline management measures to evaluate how related fishery regulations would affect skate catches.

Since FMP implementation, a considerable number of amendments and framework adjustments in the Multispecies, Monkfish, and Scallop FMPs have been approved. Many of these actions have changed the effect that baseline measures had on skate catches and are less relevant now. During this time skate wing landings have increased, skate bait landings have varied without trend, estimated discards have substantially declined, and total skate catch has declined, although the species composition of the catch likely changed somewhat.

Most notably, Multispecies FMP Amendment 13 was implemented in May 20043. This action included a package of measures that reduced groundfish fishing mortality, with a focus on depleted groundfish stocks. Later in 2004, the Council passed Framework Adjustments 40A and 40B, which altered the multispecies DAS program and established some special access programs (SAPs). In particular, Framework Adjustment 40A established a Category B DAS program which vessels could use to target 'healthy stocks of groundfish'. Certain types of vessels were allowed to use these DAS to fish for skates, because it was thought that doing so would not adversely affect depleted groundfish stocks. In 2006, the Council approved and NMFS implemented Framework 42, which among other changes significantly reduced the amount of A DAS that vessels could use to target groundfish and other species. Early

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3 Changes in the Multispecies FMP are important because the multispecies fishery has significant amounts of skates that are either discarded or landed as incidental catch. Some vessels with multispecies permits also target skates on either an A or B DAS.

indications are that trawl vessels began using more A DAS and gillnet vessels began using more B DAS to fish for skate wings. Framework Adjustment 42 also initiated differential DAS accounting in certain areas, which probably had an effect on the amount and distribution of fishing effort that targeted or discarded skates. The effect of Framework Adjustment 42 on skate discards has not been estimated, but skate discards have substantially declined since Amendment 13 was implemented. Also, the final rule on the Standard Bycatch Reporting Methodology Omnibus Amendment4 was implemented on February 27, 2008.

In the Scallop FMP5, Amendment 10 was implemented in June 2004 and changed the DAS program by including a comprehensive program of area rotation and specific allocation of DAS by management area. It also included measures to reduce and minimize bycatch, as well as measures to minimize the adverse effects of fishing on EFH. Thus, the DAS allocations no longer had the same meaning they once did as a measure of the effect of the scallop fishery on skate catches, limiting its utility as a skate baseline measure. Just as important, the effects on skates also were a result of the spatial allocation of days or trips which were an outcome of scallop area rotation management. These allocations were further modified by Framework Adjustments 16 (2004) and 18 (2006).

During this period, the scallop fishery also saw a rapid increase in fishing by vessels with open access general category permits. These permits were available to any vessel to fish in exempted areas, allowing the vessel to land up to 400 lbs. of scallop meats on an unlimited number of trips. While skate discard estimates for the general category scallop fleet do not exist and some of this increasing effort occurred in the Mid-Atlantic region, a significant scallop fishery occurred in the Great South Channel area, SE of Cape Cod, MA. Skate discard estimates for this fleet are unavailable, but given the distribution of skates, these vessels likely had significant amounts of little and winter skate discards. Amendment 11 to the Scallop FMP was implemented on April 14, 2008 and included measures to control the capacity and scallop mortality in the general category scallop fishery.

The most notable changes in the Monkfish FMP regulations as they relate to skate catches were Amendment 2 (implemented in 2006) and Framework Adjustment 3 (implemented in November 2006). Amendment 2 made extensive changes in how monkfish DAS could be used, removed a seasonal 20-day block out requirement, and made changes in allowable gear configurations. Again, it is unclear what the effects on skate discards were and discard estimates specifically for the monkfish fishing fleet are unavailable. Framework Adjustment 3 prohibited targeting monkfish on a Multispecies B-regular DAS. While this action may have made more B DAS available for vessels to target skates, it also reduce the DAS available to use to target monkfish and skates in a mixed fishery. It is unclear what effect this action had on skate landings or discards.

Since 2003, the three year moving averages for skate biomass increased for barndoor skate and rosette skate, and despite declining catch the survey biomass declined for the other five skate species (Table 4). Barndoor skate is no longer overfished, but biomass has not yet rebuilt to the 1.62 kg/tow target. Thorny skate remained overfished and as of the 2007 survey is experiencing overfishing[6].

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4 Amendment 15 to the Multispecies FMP, Amendment 12 to the Scallop FMP, Amendment 3 to the Monkfish FMP, and Amendment 1 to the Skate FMP.

5 Changes in the Scallop FMP are important because limited access and general category scallop vessels using dredges and trawls often catch and discard skates.

6 NMFS updated these survey results and status determinations with 2008 spring and fall survey data as the Council approved the final alternative and submitted the final amendment document. The new survey results and the updated biological reference points from the Data Poor Assessment Workship changed the status determinations for smooth and winter skates. See Section 4.1.1 for a detailed explanation.

As a result of these trends in the survey that changed the status of several skate species, NMFS notified the NEFMC on February 20, 2007 that winter skate had become overfished (Document 1 in Appendix I). At the time, the Magnuson-Stevens Act required the Council to develop a plan amendment to address the overfished condition and initiate rebuilding. In addition, the Skate PDT noted that smooth skate was approaching an overfished condition and that little skate biomass could decline enough that overfishing would be occurring.

The Council began developing this amendment in April 2007 and held scoping hearings on May 22-24, 2007. During 2007, the Council developed a framework of measures and alternatives to reduce skate catch and landings, particularly for the wing fishery which catches and lands predominantly winter skate. Poor data quality, however, has been a hindrance for developing management measures and predicting their effects throughout the existence of the Skate FMP. In addition to frequently unclassified species composition of landings and discards, the population dynamics of skates were poorly understood. Recently acquired life history information about fecundity, survival, and growth allowed the PDT to estimate maximum rebuilding potential and mean generation times for smooth, thorny, and winter skates.

These rebuilding potential estimates were presented to the Council's Science and Statistical Committee (SSC) in November 2007, but while the SSC approved of the analysis, they advised the Council that these estimates could not be applied to current conditions to forecast rebuilding and set catch limits accordingly. It was unclear to the SSC whether current rates of exploitation were above or below F_{MSY}, much less whether a particular catch rate would cause rebuilding to occur. The SSC advised the Council that an MSY-based analytical assessment should be attempted, but the Council found that insufficient resources or time were available to begin a new assessment.

In response, the Council prepared a heuristic analysis of changes in skate biomass in response to historic exploitation rates to estimate probabilities of rebuilding biomass based on past history for all seven species. Positive relationships (i.e. increases in biomass with low exploitation rates) were found for smooth, thorny, and winter skates. This approach, developed by the Skate PDT, was approved by the SSC in April 2008 and forms the basis for catch limits proposed by Amendment 3.

While Amendment 3 analysis was occurring, the 2007 survey results became available and NMFS evaluated the status of skates with respect to each species overfishing definition. Biomass of smooth skate declined from 0.19 kg/tow to 0.14 kg/tow, below the minimum biomass threshold of 0.16 kg/tow. Biomass of thorny skate declined from 0.55 kg/tow to 0.42 kg/tow, which is more than the maximum 20% decline that defines overfishing. Based on this new information, NMFS informed the Council on July 21, 2008 that smooth skate is now considered to be overfished and that thorny skate was experiencing overfishing. Little skate biomass had also declined and was very close to the overfishing threshold (a 20% decline in the three year moving average for survey biomass), but preliminary spring trawl survey biomass had substantially increased (5.04 kg/tow) and overfishing is likely not occurring.

In summary, discards have remained stable to a slight increase and skate wing landings have increased since plan implementation in 2003. During this time skate biomass has declined for five of the seven skate species. Smooth and winter skates were classified as overfished because their biomass declined below the minimum biomass threshold. Thorny skate remains overfished and is now experiencing overfishing. And while little skate came very close to overfishing being declared, the preliminary 2008 data indicates that a change in little skate status may have been averted.

4.1.1 Developments after the DEIS publication

4.1.1.1 Data Poor Assessment Workshop (DPWS)

Using this new information and reacting to the overfished status of smooth, thorny, and winter skates, the Council developed a Draft Amendment 3 document. The document included four alternatives described in Section 5.2.8 of this document. Some alternatives had A and B options, which applied a Hard TAC and Target TAC approach to the ACL framework, respectively. The Hard TAC A option would monitor landings and discards, prohibiting skate landings when the catch reached a high fraction (e.g. 80-100%) of the ACL, with a payback provision to take overages off of future ACLs. The Target TAC B option would monitor landings and reduce the skate possession limit to an incidental amount when landings reached a high fraction of the TAL. Alternative 1 included skate time/area closures which would apply to trips retaining more than the incidental limit of skates. This alternative allowed for higher skate possession limits on skate trips, since some of the mortality reduction would be achieved through the closures. Alternative 2 would use the time/area closures only as an in-season AM to curtail skate fishing trips when the catch was approaching the ACL. Alternative 3 would rely only on possession limits to achieve the landings reducing in the skate wing and skate bait fisheries. And Alternative 4 would use time/area closures and skate possession limits for the wing fishery, combined with seasonal quotas and no skate possession limit for the bait fishery.

The Council held public hearings from October 27-30, 2008 and accepted public comment during the 45 day comment period. Most of the public comment supported Alternative 3B for the wing fishery and Alternative 4 for the bait fishery. A summary of comments and responses to comments can be found in Section 15.0 of this document.

After the Council had completed the DEIS and held public hearings, the Northeast Fisheries Science Center convened a Data Poor Assessment Working Group (DPWS 2009a and 2009b) to evaluate novel approaches to assessing data poor and model resistant stocks, including skates. Skates were included on the agenda to address and correct the uncertain species identification in landings and discards, and to develop analytical (i.e. model based) assessments. Although the analytical assessments were deemed to be exploratory, but unreliable for management at this time, significant progress was made to assign species to landings and discards using the survey data for exploitable size skates in seasons and areas where fishing occurred. Although it was shown that the errors in the PDT method (Appendix I, Document 4) were small, both of these methods corrected for a technical inconsistency between the survey statistical design and the way that the exploitable skate species allocations were associated with commercial catch reported by three-digit statistical area. Both new methods calculate a stratified mean exploitable weight per tow, which is consistent with the stratified random bottom trawl survey. The primary difference between the two methods is that one method (“maturity ogive”) estimates the species proportions by calculating stratified mean weights within a three-digit statistical area and sums the landings over areas. The other method (“length composition”) calculates stratified mean weights by region (Gulf of Maine, Georges Bank, Southern New England, Mid-Atlantic) and applies them to total commercial catch in each region. A second difference between the two methods is in the way that the commercial size selectivity was determined, hence the difference in methodology names.

More importantly, skate discards were re-estimated using more sea sampling data, including observed discard/kept ratios for special access trips to Georges Bank and trips by scallop fishing vessels within the scallop access areas (including some observed trips which had been omitted from the previous PDT and SAW44 discard estimates). The new discard estimates were higher than those calculated in SAW 44 and by the PDT, particularly for estimated discards since 2004. The overall trend from 1989 to 2004 was the same as previously estimated and at about the same level. But instead of a 62% decline in skate discards since the Skate FMP took effect in 2003, the new catch estimates suggest that discards did not decline, and may have even increased. These new estimates had a meaningful effect on the DEIS specifications for the wing and bait fishery total allowable landings (TAL) as described below.

Both sets of new data, including hind-cast estimates of discards for years before sea sampling began in 1989, were incorporated in the PDT analysis of rebuilding potential (see Appendix I, Document 16) for the seven managed skate stocks. Some of the relationships between changes in biomass at various levels of catch rates were different than previous analyses had suggested and this expected relationship (high catch rates causing biomass to decline, and vice versa) was generally weaker than it had been estimated (see Appendix I, Document 4) in the DEIS. Although not statistically significant, biomass more frequently increased when catches were below the median exploitation ratio and declined when the exploitation rate was high. Some of this apparent negative correlation arises from including biomass on both sides of the relationship, however. A randomization test was included in the new analyses that the PDT presented to the SSC in February 2009, which included the new DPWS catch estimates. Using these new results, the PDT offered five alternatives for the SSC approval (including other levels of the exploitation ratio and a constant median catch similar to Tier 6 used for some US West Coast groundfish stocks), with no strong support for any one in particular. The PDT generally favored a more flexible approach, such as applying the catch ratio to recent survey biomass, because it would be responsive to changes in stock condition.

The SSC reviewed the supporting information provided by the PDT and approved an ABC based on the median exploitation ratio (total catch divided by survey biomass), as a risk averse strategy to prevent overfishing and to prevent skates from becoming overfished. Although with new biological reference points, smooth and winter skate would no longer be classified as overfished (see discussion below), the SSC was concerned that these stocks were at low biomass, nonetheless, and the FMP should attempt to achieve conditions that would produce MSY.

In addition to re-estimating catch and attempting analytical assessments, the DPWS also re-evaluated the overfishing definition reference points. If the analytical assessments had been more reliable, they could have suggested new MSY-based reference points, rather than relying on an MSY proxy using survey time series values. Since the DPWS deemed the attempted analytical analyses as being unreliable for management advice, the DPWS recommended updating the MSY proxy reference points to include 1998-2007 data (through the 2008 spring survey for little skate). This update was thought to be consistent with the original concept or theory behind the existing reference points, that the 75th percentile of the survey time series was an acceptable approximation of B_{MSY}. And furthermore, there was no apparent reason to exclude the more recent survey data from that time series (DPWS 2009a).

The Council's SSC approved this recommendation and thus the final alternative includes a change to the selected reference time series for the reference points for six of the seven skate stocks. Barndoor skate was not updated because in the FMP only a portion of the early survey time series was considered appropriate as an approximation of MSY conditions. Using the new reference points proposed by Amendment 3, smooth and winter skate would not have been classified as overfished in 2006 or 2007. Thorny skate would remain overfished, however, and in 2007, overfishing had been occurring but did not continue to occur in 2008.

4.1.1.2 Updated stock status using 2008 survey data

At the April 2009 Council meeting, when the Council approved the final alternative and authorized the staff to submit the final amendment document for NMFS review and approval, NMFS warned the Council that the 2008 survey data had been audited and the new data indicated that smooth skate had become overfished (see Document 19 in Appendix I). It was also reported that winter skate would not be classified as overfished, but that thorny skate was both overfished and experiencing overfishing as had been the case using the 2007 survey data. Document 19 was not available at the Council meeting.

Since Amendment 3 had originally been developed to address the overfished condition of smooth and thorny skate, as well as rebuild winter skate to MSY conditions, NMFS advised that no further change in proposed management measures were needed, but that the Amendment 3 needed to clearly state that it addressed the condition of smooth and thorny skates. A brief chronology of Amendment 3 viz. the recent skate status determination for species that are or were overfished is given in Table 5.

Through aggregate skate catch limits as well as existing and planned changes in other FMPs that govern fisheries that have incidental skate landings or discards, this amendment is intended to rebuild smooth and thorny skates as well as increase skate biomass to produce MSY. The smooth skate rebuilding period is 10 years from implementation of Amendment 3 and the thorny skate rebuilding period is 25 years from the FMP implementation in 2003.

The current status of skates is shown in Table 6. Survey biomass for barndoor and thorny skates remained nearly the same as it was in 2007. Barndoor skate was still rebuilding to the MSY target and thorny skate was still overfished. Smooth skate was slightly above the minimum biomass threshold in 2007, but declined by 7.6%, below the minimum biomass threshold and is once again considered overfished.

Rosette skate biomass declined by 18.9%, but is above the biomass target. Little skate biomass increased to 5.04 kg/tow and winter skate biomass increased by 78.2% to 5.23 kg/tow, the latter being 93% of the biomass target. Although promising, the increase in little and winter skate biomass are largely driven by one year of survey data. It is unlikely, however, that the status of little and winter skates could become overfished for three years until the 2008 biomass values drop from the three year moving averages.

4.1.1.3 Recalculation of ABC

As noted in Section 4.1.1.1, the SSC approved a revised ABC of 23,826 mt in February 2009 based on information presented by the PDT which incorporated the new DPWS catch estimates. However, following the approval of the FEIS in April 2009, it was discovered that the 2007 and 2008 spring survey biomass values for little skate had been omitted from the calculation of the ABC approved by the SSC in February. Following a recalculation by the PDT that incorporated the omitted spring survey values for little skate, the SSC approved a revised ABC of 30,643 mt in September 2009.

Table 4. **Survey biomass trends and skate status determinations as of 2007.**

	BARNDOOR	CLEARNOSE	LITTLE	ROSETTE	SMOOTH	THORNY	WINTER
Survey (kg/tow) Time series basis Strata Set	**Autumn 1963 – 1966 Offshore 1 – 30, 33-40**	**Autumn 1975-1998 Offshore 61-76, Inshore 15-44**	**Spring 1982-1999 Offshore 1-30, 33-40, 61-76, Inshore 1-66**	**Autumn 1967-1998 Offshore 61-76**	**Autumn 1963-1998 Offshore 1-30, 33-40**	**Autumn 1963-1998 Offshore 1-30, 33-40**	**Autumn 1967-1998 Offshore 1-30, 33-40, 61-76**
1997	0.11	0.61	2.71	0.01	0.23	0.85	2.46
1998	0.09	1.12	7.47	0.05	0.03	0.65	3.75
1999	0.30	1.05	9.98	0.07	0.07	0.48	5.09
2000	0.29	1.03	8.60	0.03	0.15	0.83	4.38
2001	0.54	1.61	6.84	0.12	0.29	0.33	3.89
2002	0.78	0.89	6.44	0.05	0.11	0.44	5.60
2003	0.55	0.66	6.49	0.03	0.19	0.74	3.39
2004	1.30	0.71	7.22	0.05	0.21	0.71	4.03
2005	1.04	0.52	3.24	0.07	0.13	0.22	2.62
2006	1.17	0.53	3.32	0.06	0.21	0.73	2.48
2007	0.80	0.85	4.46	0.07	0.09	0.32	3.71
2002-2004 3-year average	0.88	0.75	6.72	0.04	0.17	0.63	4.34
2003-2005 3-year average	0.96	0.63	5.65	0.05	0.18	0.56	3.34
2004-2006 3-year average	1.17	0.59	4.59	0.06	0.19	0.55	3.04
2005-2007 3-year average	1.00	0.64	3.67	0.06	0.14	0.42	2.93
Percent change 2005-2007 compared to 2004-2006	-14.2	8.1	-20	12.7	-22.4	-23.7	-3.6
Percent change for overfishing status determination in FMP	-30	-30	-20	-60	-30	-20	-20
Biomass Target	1.62	0.56	6.54	0.029	0.31	4.41	6.46
Biomass Threshold	0.81	0.28	3.27	0.015	0.16	2.2	3.23
CURRENT STATUS	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Overfished Overfishing is Not Occurring	Overfished Overfishing is Occurring	Overfished Overfishing is Not Occurring

Table 5. Synopsis of barndoor, smooth, thorny, and winter status determinations during the development of Skate Amendment 3.

Timeline **Survey data used** **Action trigger**	**Amendment 3 development**	**Status determination**			
		Barndoor OFD < 0.81 kg/tow OF 3YMA > 30% decline	**Smooth** Old OFD < 0.16 kg/tow New OFD < 0.14 kg/tow OF 3YMA > 30% decline	**Thorny** Old OFD < 2.2 kg/tow New OFD < 2.06 kg/tow OF 3YMA > 20% decline	**Winter** Old OFD < 3.43 kg/tow New OFD < 2.80 kg/tow OF 3YMA > 20% decline
FMP implementation to 2006 2002 survey data Barndoor and thorny skates overfished	FMP submitted in 2002 and implemented in 2003 to address barndoor and thorny skate status	**Overfished** (34% below threshold) No overfishing	Not overfished (19% above threshold) No overfishing	**Overfished** (76% below threshold) No overfishing	Not overfished (4.62 kg/tow; 72% of MSY) Overfishing occurred ONLY in 2005
April 2007 2006 survey data Winter skate became overfished	Initiated scoping to address overfishing of thorny and winter skates	Not overfished, but not rebuilt (72% of MSY) No overfishing	Not overfished (20% above threshold) No overfishing	**Overfished** (75% below threshold) No overfishing	**Overfished** (3.04 kg/tow; 6% below threshold) No overfishing
April 2008 2007 survey data Smooth skate became overfished and thorny skate overfishing occurring	Council develops DEIS to address overfished status of thorny, winter, and smooth skates	Not overfished, but not rebuilt (62% of MSY) No overfishing	**Overfished** (7% below threshold) No overfishing	**Overfished** (81% below threshold) Overfishing occurring	**Overfished** (2.93 kg/tow; 9% below threshold) No overfishing
December 2008 2007 survey data, new reference points Only thorny skate overfished and overfishing occurring	DPWS biomass reference point update; approved by SSC in February; Final alternative developed and approved	Not overfished, but not rebuilt (62% of MSY) No overfishing	**Overfished** (1% below new threshold) No overfishing	**Overfished** (79% below new threshold) Overfishing occurring	Not overfished (2.93 kg/tow; 5% above new threshold) No overfishing
April 2009 2008 survey data Smooth skate overfished, no overfishing of thorny skate	Council approved FEIS addressing overfished status of thorny and smooth skates; ABC/ACL not changed using new data	Not overfished, but not rebuilt (63% of MSY) No overfishing	**Overfished** (8% below new threshold) No overfishing	**Overfished** (80% below new threshold) No overfishing	Not overfished (5.23 kg/tow; 93% of MSY!!!) No overfishing

Table 6. Survey biomass trends and skate status determinations as of 2008.

	BARNDOOR	CLEARNOSE	LITTLE	ROSETTE	SMOOTH	THORNY	WINTER
Survey (kg/tow) Time series basis Strata Set	**Autumn 1963 – 1966 Offshore 1 – 30, 33-40**	**Autumn 1975-1998 Offshore 61-76, Inshore 15-44**	**Spring 1982-1999 Offshore 1-30, 33-40, 61-76, Inshore 1-66**	**Autumn 1967-1998 Offshore 61-76**	**Autumn 1963-1998 Offshore 1-30, 33-40**	**Autumn 1963-1998 Offshore 1-30, 33-40**	**Autumn 1967-1998 Offshore 1-30, 33-40, 61-76**
1997	0.11	0.61	2.71	0.01	0.23	0.85	2.46
1998	0.09	1.12	7.47	0.05	0.03	0.65	3.75
1999	0.30	1.05	9.98	0.07	0.07	0.48	5.09
2000	0.29	1.03	8.60	0.03	0.15	0.83	4.38
2001	0.54	1.61	6.84	0.12	0.29	0.33	3.89
2002	0.78	0.89	6.44	0.05	0.11	0.44	5.60
2003	0.55	0.66	6.49	0.03	0.19	0.74	3.39
2004	1.30	0.71	7.22	0.05	0.21	0.71	4.03
2005	1.04	0.52	3.24	0.07	0.13	0.22	2.62
2006	1.17	0.53	3.32	0.06	0.21	0.73	2.48
2007	0.80	0.85	4.46	0.07	0.09	0.32	3.71
2008	1.09	1.73	7.34	0.03	0.10	0.21	9.50
2002-2004 3-year average	0.88	0.75	6.72	0.04	0.17	0.63	4.34
2003-2005 3-year average	0.96	0.63	5.65	0.05	0.18	0.56	3.34
2004-2006 3-year average	1.17	0.59	4.59	0.06	0.19	0.55	3.04
2005-2007 3-year average	1.00	0.64	3.67	0.06	0.14	0.42	2.93
2006-2008 3-year average	1.02	1.04	5.04	0.05	0.13	0.42	5.23
Percent change 2006-2008 compared to 2005-2007	1.9	62.9	37.2	-18.9	-7.6	-1.2	78.2
Percent change for overfishing status determination in FMP	-30	-30	-20	-60	-30	-20	-20
Biomass Target	1.62	0.77	7.03	0.048	0.29	4.12	5.6
Biomass Threshold	0.81	0.385	3.515	0.024	0.145	2.06	2.8
CURRENT STATUS	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Overfished Overfishing is Not Occurring	Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring

4.1.2 Protected Species Actions

Many of the factors that serve to mitigate the impacts of the skate fishery on protected species are currently being implemented in the Northeast Region under either the Atlantic Large Whale Take Reduction Plan (ALWTRP) or the Harbor Porpoise Take Reduction Plan (HPTRP). NMFS conducted a Section 7 consultation under the Endangered Species for the proposed skate fishery management plan, and signed a Biological Opinion on July 24, 2003, available on the Regional Office website at: http://www.nero.noaa.gov/prot_res/section7/NMFS-signedBOs/Skate2003signedBO.pdf. The Agency concluded at that time that the skate fishery is not likely to jeopardize the continued existence of any listed marine mammals or sea turtles. The focus of the 2003 consultation was on the directed skate fishery, since the effects of the incidental fishery were considered during the consultation on those other directed fisheries (where the skate is an incidental catch, regardless of whether the skates are landed or discarded). Since 2003, a number of relevant factors have changed, including the status of some skate species, the pattern of effort in the skate fishery (gear, amount and distribution of effort, etc.), the status of ESA-listed species, and agency guidance on how consultations are to be conducted. NMFS has reinitiated the consultation on the skate fishery in response to new information on the anticipated takes of loggerhead turtles in the bottom trawl gear such as that used in the skate fishery (see Murray 2008). The new consultation is on-going. Sections 7.2.7.2 and 7.2.7.3 provide more details on recent takes that initiated a new consultation phase.

In addition, the Northeast Multispecies FMP has undergone repeated consultations pursuant to Section 7 of the Endangered Species Act (ESA), with the most recent Biological Opinion dated June 14, 2001. In that Opinion, NMFS concluded that the continued authorization of the Northeast multispecies FMP would jeopardize the continued existence of ESA-listed right whales as a result of entanglement in gillnet gear. A Reasonable and Prudent Alternative (RPA) was provided to remove the likelihood of jeopardy, and the RPA measures were implemented, in part, through the ALWTRP. On April 2, 2008, NMFS reinitiated section 7 consultation on the continued authorization of the Northeast Multispecies FMP for two reasons: (1) new information on the number of loggerhead sea turtles captured in bottom otter trawl gear used in the fishery, and (2) changes to the ALWTRP that will result in the elimination of measures that were incorporated as a result of the RPA for the June 14, 2001, Opinion on the continued authorization of the Northeast Multispecies FMP. The new consultation is on-going.

4.1.2.1 Harbor Porpoise Take Reduction Plan

NMFS published the rule implementing the Harbor Porpoise Take Reduction Plan on December 1, 1998. The HPTRP includes measures for gear modifications and area closures, based on area, time of year, and gillnet mesh size. In general, the Gulf of Maine component of the HPTRP includes time and area closures, some of which are complete closures; others are closures to gillnet fishing unless pingers (acoustic deterrent devices) are used in the prescribed manner. The Mid-Atlantic component includes time and area closures in which gillnet fishing is prohibited regardless of the gear specifications. Based on an increase in harbor porpoise takes in the overall sink gillnet fishery in recent years, the Harbor Porpoise Take Reduction Team is currently developing options to reduce takes.

4.1.2.2 Atlantic Large Whale Take Reduction Plan

The ALWTRP contains a series of regulatory measures designed to reduce the likelihood of fishing gear entanglements of right, humpback, fin, and minke whales in the North Atlantic. The main tools of the plan include a combination of broad gear modifications and time/area closures (which are being supplemented by progressive gear research), expanded disentanglement efforts, extensive outreach efforts in key areas, and an expanded right whale surveillance program to supplement the Mandatory Ship Reporting System.

Key regulatory changes implemented in 2002 included: 1) new gear modifications; 2) implementation of a Dynamic Area Management system (DAM) of short-term closures to protect unexpected concentrations of right whales in the Gulf of Maine; and 3) establishment of a Seasonal Area Management system (SAM) of additional gear modifications to protect known seasonal concentrations of right whales in the southern Gulf of Maine and Georges Bank.

On June 21, 2005, NMFS published a proposed rule (70 *Federal Register* 35894) for changes to the ALWTRP, and published a final rule on October 5, 2007 (72 *Federal Register* 57104). The new ALWTRP measures expand the gear mitigation measures by: (a) including additional trap/pot and net fisheries (*i.e.*, gillnet, driftnet) to those already regulated by the ALWTRP, (b) redefining the areas and seasons within which the measures would apply, (c) changing the buoy line requirements, (d) expanding and modifying the weak link requirements for trap/pot and net gear, and (e) requiring (within a specified timeframe) the use of sinking and/or neutrally buoyant groundline in place of floating line for all fisheries regulated by the ALWTRP on a year-round or seasonal basis.

4.1.2.3 Atlantic Trawl Gear Take Reduction Team

The first meeting of the Atlantic Trawl Gear Take Reduction Team (ATGTRT) was held in September 2006. The ATGTRT was convened by NMFS as part of a settlement agreement between the Center for Biological Diversity and NMFS to address the incidental mortality and serious injury of long-finned pilot whales, short-finned pilot whales, common dolphins, and white-sided dolphins in several trawl gear fisheries operating in the Atlantic Ocean. Incidental takes of pilot whales, common dolphins and white-sided dolphins have occurred in fisheries operating under the Atlantic Mackerel, Squid, and Butterfish FMP, as well as in mid-water and bottom trawl fisheries in the Northeast Multispecies and the Atlantic Herring FMPs.

4.2 Maximum Sustainable Yield (MSY)

Principally due to intractable problems with species identification in commercial catches, the Skate FMP did not derive or propose an MSY estimate for skate species or for the skate complex. Catch histories for individual species were unreliable and probably underreported. Furthermore, the population dynamics of skates was largely unknown so measures of carrying capacity or productivity were not available on which to base estimates of MSY.

One of the major purposes of Amendment 3 is to set catch limits which prevent overfishing. If overfishing is defined as an unsustainable level of exploitation, then a suitable candidate for MSY is the catch that when exceeded generally leads to declines in biomass MSY. This value, estimated by the Skate PDT and approved as an ABC by the SSC, is the median exploitation ratio (catch/relative biomass). If and when the biomass of skates is at the target, the maximum catch that would not exceed the median exploitation ratio can serve as a proxy for MSY (Hilborn and Walters 1992).

The estimated catch when skates are at the biomass target and landings of all skates are allowed is 60,527 mt (Table 7). This value should be considered as a provisional estimate of MSY and is probably conservative due to the historic underreporting of skate landings for data that were used to estimate the median exploitation ratio.

Using the 2005-2007 average fall biomass for barndoor, clearnose, rosette, smooth, thorny, and winter skates and the 2006-2008 average spring biomass for little skate, the current yield that does not exceed the median exploitation ratio is 30,643 mt and was approved by the Council's SSC as the allowable biological catch, or ABC. The DEIS estimate using previous estimates of the median exploitation ratio and 2005-2007 biomass was 27,809 mt.

Table 7. Exploitation ratios and survey values for managed skates, with estimates of annual catch limits, catch targets, and allowable landings that take into account the 2005-2007 discard rate using DPWS catch data using the selectivity ogive method to assign species to catch[7].

	Catch/biomass index (thousand mt catch/kg per tow)		Stratified mean survey weight (kg/tow)			
Species	**Median**	**75% of median**	**2004-2006**	**2005-2007**	**Old MSY Target**	**New MSY target**
Barndoor	3.23	2.42	1.17	1.00	1.62	1.62
Clearnose	2.44	1.83	0.59	0.63	0.56	0.77
Little	2.39	1.79	4.59	5.04	6.54	7.03
Rosette	2.19	1.65	0.06	0.06	0.03	0.05
Smooth	1.69	1.27	0.19	0.14	0.31	0.29
Thorny	3.14	2.36	0.55	0.42	4.41	4.12
Winter	4.12	3.09	3.04	2.93	6.46	5.60
Annual catch limit (ACL/ABC)			30,898	30,643	63,240	60,527
Annual catch target (ACT)			23,162	22,982	47,462	45,388
Total allowable landings (TAL)			9,501	9,427	19,469	18,618

4.3 Optimum Yield (OY)

For the reasons that numeric estimates of MSY were unavailable in the Skate FMP, a quantitative estimate of optimum yield was also not previously specified. The Skate FMP defined optimum yield as equating "to the yield of skates that results from effective implementation of the Skate FMP."

While developing this amendment, the Council chose to set a catch targets that are 75% of the ABC/ACL value, taking into account all sources of uncertainty and considering unspecified factors. Thus, as a provisional estimate of optimum yield and also defining effective management as achieving the biomass targets, a suitable estimate of optimum yield is 75% of MSY, or 45,388 mt (Table 7). Accounting for the discard rate in 2005-2007, a landed yield of 18,618 mt can be considered as a suitable amount of skate landings to achieve optimum yield.

At current skate biomass, the ACT will be set at 22,982 mt, allowing a 25% buffer to account for scientific and management uncertainty. Deducting the 2005-2007 discard rate to account for bycatch sets the aggregate TAL at 9,427 mt. In the DEIS, the TAL calculated by deducting the 2005-2006 discards from the ACT was 11,544 mt[8].

[7] The survey biomass value for little skate is the arithmetic average of the 2006-2008 spring surveys.
[8] Although the ABC increased with the new data from the Data Poor Assessment Workshop, updated discard estimates were considerably higher than previously estimated, therefore the final TAL is lower than had been specified in the DEIS.

4.4 Overfishing

Since skate fishing mortality could not be reliably estimated and catch reporting was thought to be incomplete, the FMP overfishing definitions rely on estimates of skate biomass, indexed by the appropriate NEFSC trawl survey. Direct estimates of absolute biomass and the relationship between the survey index values and B_{MSY} are unavailable. As a proxy until MSY-based estimates could be developed using better data and methods, the Council chose a value based on the statistical distribution of the annual stratified mean weight per tow. Except for barndoor skate[9], the chosen target biomass value was the 75th percentile for the survey time series for each species[10]. Following the advice in the National Standard 1 guidelines, the Council set the minimum biomass threshold that defined when a species would be considered overfished as ½ of the target value (not the 37.5th percentile).

The survey biomass indices were similarly used to define overfishing, as a rate of exploitation that led to declining biomass. The variation in the annual mean biomass index for each species was used to choose a maximum rate of biomass decline to signify overfishing. This value ranged from a 20% decline in the three year moving average of biomass for little, thorny, and winter skates to a 60% decline in the three year moving average of biomass for rosette skate.

The existing skate overfishing definitions are listed below and the values for making a status determination are listed in Table 8.

Winter skate is in an overfished condition when the three-year moving average of the autumn survey mean weight per tow is less than one-half of the 75th percentile of the mean weight per tow observed in the autumn trawl survey from the selected reference time series. Overfishing occurs when the three-year moving average of the autumn survey mean weight per tow declines ***20% or more, or when the autumn survey mean weight per tow declines for three consecutive years****. The reference points and selected time series may be re-specified through a peer-reviewed process and/or as updated stock assessments are completed.*

Little skate is in an overfished condition when the three-year moving average of the spring survey mean weight per tow is less than one-half of the 75th percentile of the mean weight per tow observed in the spring trawl survey from the selected reference time series. Overfishing occurs when the three-year moving average of the spring survey mean weight per tow declines ***20% or more, or when the spring survey mean weight per tow declines for three consecutive years****. The reference points and selected time series may be re-specified through a peer-reviewed process and/or as updated stock assessments are completed.*

Barndoor skate is in an overfished condition when the three-year moving average of the autumn survey mean weight per tow is less than one-half of the mean weight per tow observed in the autumn trawl survey from 1963-1966 (currently 0.81 kg/tow). Overfishing occurs when the three-year moving average of the autumn survey mean weight per tow declines **30% or more, or when the autumn survey mean weight per tow declines for three consecutive years**. The reference points and selected time series may be re-specified through a peer-reviewed process and/or as updated stock assessments are completed.

Thorny skate is in an overfished condition when the three-year moving average of the autumn survey mean weight per tow is less than one-half of the 75th percentile of the mean weight per tow observed in

9 The average 1963-1966 mean weight per tow was chosen as the barndoor skate biomass target.
10 All skates except little skate use the fall survey biomass index, but the time series for each species varies due to changes in which survey strata were sampled.

the autumn trawl survey from the selected reference time series. Overfishing occurs when the three-year moving average of the autumn survey mean weight per tow declines ***20% or more, or when the autumn survey mean weight per tow declines for three consecutive years****. The reference points and selected time series may be re-specified through a peer-reviewed process and/or as updated stock assessments are completed.*

Smooth skate is in an overfished condition when the three-year moving average of the autumn survey mean weight per tow is less than one-half of the 75th *percentile of the mean weight per tow observed in the autumn trawl survey from the selected reference time series. Overfishing occurs when the three-year moving average of the autumn survey mean weight per tow declines* ***30% or more, or when the autumn survey mean weight per tow declines for three consecutive years****. The reference points and selected time series may be re-specified through a peer-reviewed process and/or as updated stock assessments are completed.*

Clearnose skate is in an overfished condition when the three-year moving average of the autumn survey mean weight per tow is less than one-half of the 75th *percentile of the mean weight per tow observed in the autumn trawl survey from the selected reference time series. Overfishing occurs when the three-year moving average of the autumn survey mean weight per tow declines* ***30% or more, or when the autumn survey mean weight per tow declines for three consecutive years****. The reference points and selected time series may be re-specified through a peer-reviewed process and/or as updated stock assessments are completed.*

Rosette skate is in an overfished condition when the three-year moving average of the autumn survey mean weight per tow is less than one-half of the 75th *percentile of the mean weight per tow observed in the autumn trawl survey from the selected reference time series. Overfishing occurs when the three-year moving average of the autumn survey mean weight per tow declines* ***60% or more, or when the autumn survey mean weight per tow declines for three consecutive years****. The reference points and selected time series may be re-specified through a peer-reviewed process and/or as updated stock assessments are completed.*

4.5 Essential Fish Habitat (EFH)

Section 4.6 of the Skate FMP (available at http://www.nefmc.org/skates/fmp/skate_final_fmp_sec3.PDF) described and identified EFH for all seven managed skate species, based on the observed distribution of eggs, juvenile, and adult skates. The section includes maps based on the distribution of juveniles and adults. In general, no information was available on the distribution of eggs and skates do not have a larval life stage, instead hatching (i.e. emerging from egg cases) as juvenile skates.

This amendment proposes no changes to skate EFH descriptions or designations, but Amendment 2 to the Skate FMP will be approved as a part of a developing Omnibus EFH Amendment that will re-evaluate skate EFH.

5.0 DESCRIPTION OF MANAGEMENT ALTERNATIVES AND RATIONALE (AMENDMENT, EIS, RFA)

5.1 Final Alternative

The final alternative is derived from the proposed management alternatives described in Section 5.2.8, some parts modified based on public comment on the Draft Environmental Impact Statement (DEIS) and subsequent development of management alternatives based on that public comment. The final alternative includes an update to the survey-based overfishing definitions for all managed skates except barndoor skate, an annual catch limit (ACL) framework using ABCs based on the Data Poor Workshop (DPWS) catch time series (see http://www.nefsc.noaa.gov/publications/crd/crd0902/and Technical Document 16 in Appendix I), an ACL monitoring program that relies on existing data collected and reported by seafood dealers who buy skates from vessels, skate possession limits for vessels that land wings or whole skates for food, a three-season fleet quota and a skate bait possession limit for vessels that land whole skates to sell as bait, an incidental skate possession limit that would become effective whenever the wing fishery reaches a percentage of its TAL, and a process for annual review and bi-annual SAFE Report and specification process.

When debating the final alternative and considering the predicted effects, the Council decided to raise the incidental skate possession limit (Section 5.1.8) to reduce discards when either the wing or bait fishery approaches the TALs and the bait and/or wing fisheries close. As a precautionary measure to reduce the potential for total landings to exceed the TALs, the Council set the wing fishery TAL trigger at 80% and the bait fishery TAL trigger at 90%, since some skate landings would continue under the incidental skate possession limit for the remainder of the year or bait fishery season. A lower wing fishery TAL trigger is needed to account for the recommended incidental trip limit and the possibility that skate wing prices could rise, making day trips more lucrative.

Many of the measures in the proposed action described below require landings and catch to be monitored and attributed to a fishery, which causes an in-season accountability measure to be triggered when landings reach 80-90% of the TAL or when the landings reach a seasonal quota limit. Although the Council wants to reduce skate landings and catch as soon as possible, the expected implementation of the amendment is not until January 2010. This implementation date occurs so far into the 2009 fishing year that the uncertainty about the effect of applying the 2009 landings to 2009 catch limits would cause significant business risk. Sufficient landings for the fishing year may have occurred before implementation and without the benefit of the possession limits as to cause the plan to immediately trigger the accountability measures. This would have unintended consequences, so the proposed action will implement the possession limits right away and postpone the quotas, catch monitoring, and accountability measures until the 2010 fishing year.

Rationale: The public supported setting limits on landings and catch to prevent overfishing and rebuild skates that were overfished. Fishermen that target skates to supply the wing market supported Alternative 3B, an alternative that did not include time/area closures for vessels that target skates. Fishermen in the skate bait fishery strongly supported Alternative 4, with three seasonal quota periods. They felt that alternatives with lower skate possession limits would not be suitable for a market that demands landings of large quantities of skates to use as bait in the offshore lobster fishery. A three-season quota with a 20,000 pound whole weight possession limit, they felt, would be the least disruptive option and might cause shorter fishery closures.

This alternative also addresses NMFS concerns raised during the comment period. New estimates of landings and discards by species were developed during the DPWS, which had a bearing on the PDT analysis of the propensity of skates to increase biomass at various levels of observed catch. The DPWS also re-estimated discards using additional observer data which substantially increased the discard estimates for 2003-2007, accounting for a much higher share of the total catch. As a result, the Total Allowable Landings (TAL) in the ACL framework was corresponding lower to account for the additional expected discards. The Target TAC measure was revised to improve the application of accountability measures (AMs), which is expected to reduce the probability of future overages if they occur. The AMs include an adjustment to the TAL trigger that would reduce skate possession limits and close a skate fishery as landings approach the TALs and an increase in the buffer between the ACL and the catch target (ACT) to account for unexpected uncertainty. Finally, the monitoring of landings and assignment to skate fishery were modified, relying more on existing data collected from permitted seafood dealers and eliminating a requirement for vessels to make a skate trip type declaration at the start of the fishing trip.

5.1.1 Overfishing Definition Biological Reference Point Update and Allowable Biological Catch (ABC)

The "selected reference time series[11]" (or biological reference point biomass targets and thresholds) for clearnose, rosette, smooth, thorny, and winter skates would be updated to include survey data through the 2007 autumn bottom trawl survey (see Table 8). The "selected reference time series" (or biological reference point biomass targets and thresholds) for little skate would be updated through the 2008 spring bottom trawl survey.

The threshold defining when a skate stock is classified as experiencing overfishing would not change. Except for the "selected reference time series", the FMP language describing when a skate stock would be overfished or classified as experiencing overfishing would not change. The selected survey strata will also remain unchanged in this amendment and are consistent with the strata used in recent skate assessments. If one or more strata are unsampled during an annual survey, then the remaining surveyed stratum shall be used to compute the stratified mean weight per tow and make skate status determinations.

The Council may periodically change via a Framework Adjustment (Section 5.1.4.1) either the selected reference time series, the survey used for the determination, or the selected strata shown in the table below may be changed periodically, following review and approval of the Council's Scientific and Statistical Committee. The updated reference points are listed in Table 9. Using the proposed updates, the biomass thresholds and targets declined for three species, increased for three species, and remained the same for barndoor skate.

In addition, the rebuilding period for thorny skate will be defined as 25 years, which is calculated as 10 years plus one generation time (see Technical Document 6 in Appendix I). Although continuously overfished since FMP inception, the thorny skate rebuilding period had been undefined due to a lack of data supporting an estimate of rebuilding potential and generation time. The target for thorny skate rebuilding will therefore be 2028. Based on existing life history parameter estimates, the Skate PDT has estimated that smooth skate can be rebuilt within 10 years. The Council therefore chose a rebuilding period for smooth skates of no more than 10 years.

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11 The selected time series reference varies for each skate stock due to variations in survey time series and geographic coverage of the survey.

Table 8. Status determination criteria specifications for skates in the management unit.

Species/stock	Bottom Trawl Survey	Selected reference time series12	Selected strata used for status determination and setting reference points
Winter	Autumn	1967-2007	1-30, 33-40, and 61-76
Little	Spring	1982-2008	1-30, 33-40, 61-76, and inshore strata 1-66
Barndoor13	Autumn	1963-1966	1-30 and 33-40
Thorny	Autumn	1963-2007	1-30 and 33-40
Smooth	Autumn	1963-2007	1-30 and 33-40
Clearnose	Autumn	1975-2007	61-76 and inshore strata 15-44
Rosette	Autumn	1967-2007	61-76

The ABC for skates is the median catch/biomass exploitation rate multiplied by the 2005-2007 average biomass (2006-2008 for little skate), aggregated over the seven skate species in the management unit. The value updated using data available for the 2008 DPWS is 30,643 mt. The three year biomass moving average for this estimate will not be updated as new data are collected, until the calibration between the FSV Bigelow bottom trawl (first used in fall 2008) and FSV Albatross IV bottom trawl is peer reviewed and approved by the Council's SSC for application to updated ABC specifications.

Rationale: During the development of the Skate FMP, the overfishing definition reference points were chosen from the 75th percentile of the observed survey time series through autumn 1997 (spring 1998 for little skate). The Data Poor Assessment Workshop considered the issue of updating the skate reference points since a considerable amount new data had accumulated since then. It was not obvious that fishing was the sole factor in determining stock biomass in the most recent decade. Furthermore the selected reference time series was chosen with the belief that sometime during the survey time series the skate stocks had passed through a level equivalent to B_{MSY} and that the 75th percentile of the time series was a reasonable proxy for that value. The DPWS had no reason to believe that the most recent decade of survey data shouldn't be part of that time series.

The Council's Science and Statistical Committee (SSC) reviewed the recommendations of the DPWS and concurred, but with a caveat that this type of biomass reference point should not be updated on a routine basis without thorough consideration, but there was no reason to exclude the new data from the selected reference time series at this time.

As a result of the update, the status of winter skate will change from being overfished, to not overfished, although winter skate biomass is slightly above the new biomass threshold (see Figure 1). Thorny skate would continue to be overfished and was experiencing overfishing in 2007. Smooth skate would not have been considered as being overfished using the updated reference points, but the 2008 survey data show that smooth skate biomass has fallen below the minimum biomass threshold and is therefore classified as

12 The beginning of the selected reference time series was chosen in the Skate FMP based on changes in geographical range of the survey and the seasonal distribution of the species/stock.
13 Unchanged.

overfished. The reference points for barndoor skate would remain unchanged and barndoor skate would remain in a rebuilding phase after being overfished, but not yet reaching the B_{MSY} target.

Table 9. Updated overfishing definition reference points for skates in the management unit.

SKATE SPECIES	TARGET BIOMASS B_{target} (kg/tow)	THRESHOLD BIOMASS $B_{threshold}$ (kg/tow)	TARGET FISHING MORTALITY F_{target}	THRESHOLD FISHING MORTALITY $F_{threshold}$
Winter	5.60	2.80	N/S	A decline of **20% or more** in the three-year moving average of the autumn trawl survey, or a decline in the autumn survey mean weight per tow for three consecutive years
Little	7.03	3.51	N/S	A decline of **20% or more** in the three-year moving average of the spring trawl survey, or a decline in the spring survey mean weight per tow for three consecutive years
Barndoor14	1.62	0.81	N/S	A decline of **30% or more** in the three-year moving average of the autumn trawl survey, or a decline in the autumn survey mean weight per tow for three consecutive years
Thorny	4.12	2.06	N/S	A decline of **20% or more** in the three-year moving average of the autumn trawl survey, or a decline in the autumn survey mean weight per tow for three consecutive years
Smooth	0.29	0.14	N/S	A decline of **30% or more** in the three-year moving average of the autumn trawl survey, or a decline in the autumn survey mean weight per tow for three consecutive years
Clearnose	0.77	0.38	N/S	A decline of **30% or more** in the three-year moving average of the autumn trawl survey, or a decline in the autumn survey mean weight per tow for three consecutive years
Rosette	0.048	0.024	N/S	A decline of **60% or more** in the three-year moving average of the autumn trawl survey, or a decline in the autumn survey mean weight per tow for three consecutive years

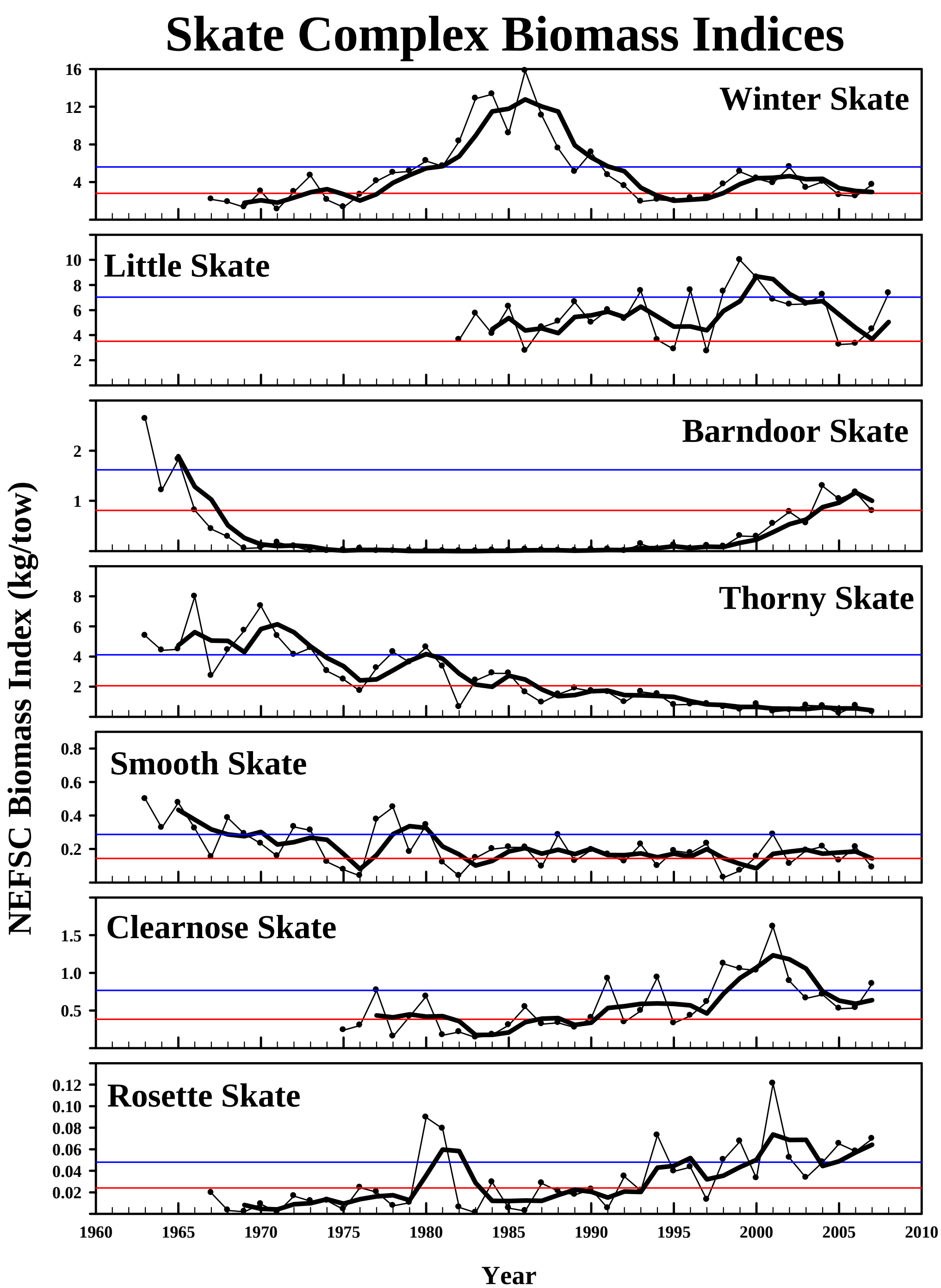
Using the catch time series approved by the DPWS, the SSC approved an aggregate skate ABC of 30,643 mt[15]. As the basis for this catch limit, the SSC chose the median catch/biomass exploitation ratio of the time series because catches below this level had a much greater than average chance of allowing biomass to increase. The SSC thought that increasing skate biomass is a reasonable goal because in addition to smooth and thorny skates being overfished, the status of winter skate is close to the minimum biomass threshold that defines when a stock is overfished. The plan would furthermore be able to achieve MSY

14 Not updated.

15 A corrected value of 30,643 mt was approved by the SSC in September 2009, after it was discovered that the 2007 and 2008 spring survey biomass values for little skate had been omitted in the SSC's ABC approval in February 2009 of 23,826 mt.

by allowing biomass to rise toward the biomass target, a proxy for B_{MSY}. Although the relationship was not statistically significant, catches higher than the catch/biomass median tended to result in declines in biomass and could increase the probability of overfishing.

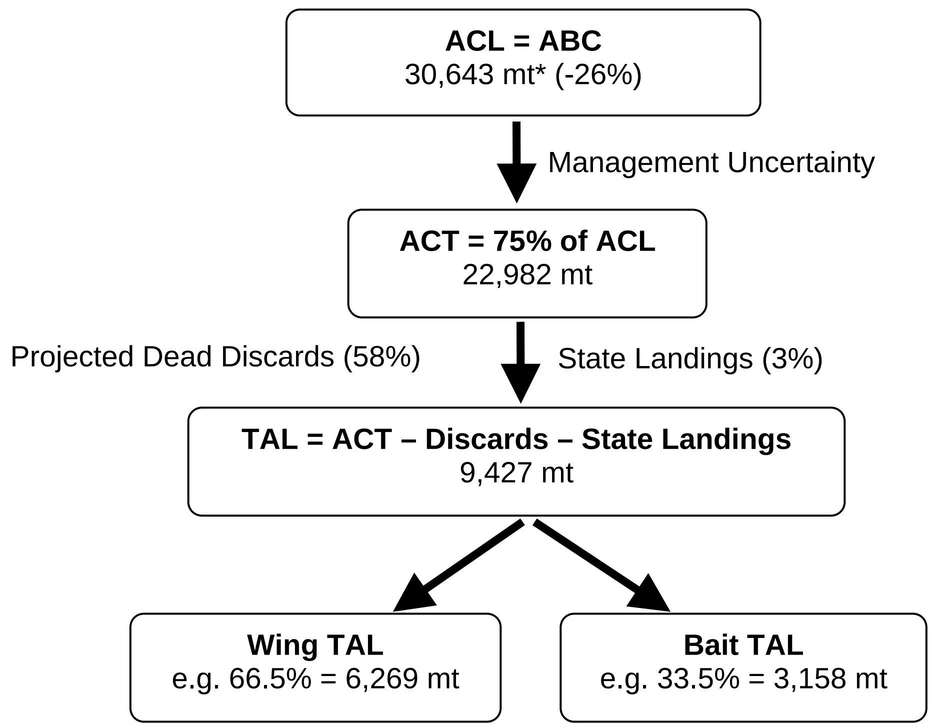
Figure 1. Survey biomass (kg/tow) for skates in the management unit and its three year moving average (heavy line), compared to the updated minimum biomass threshold and target.



5.1.2 Target TAC Management

The Annual Catch Limit (ACL) for the skate complex will be set equal to the Acceptable Biological Catch (ABC) recommended by the Council's Scientific and Statistical Committee (SSC), 30,643 mt (67.56 million pounds). This ACL will be applied for FY 2010-2011. Accounting for management uncertainty in monitoring skate catch, the Annual Catch Target (ACT) will be initially set at 75% of the ACL. During the specifications process for the subsequent two fishing years (2012-2013), the Skate PDT will project total skate discards based on estimates of the average total skate discards from the preceding 3 years (2007-2009), incorporating anticipated regulatory changes in other fisheries that discard skates, and subtract that amount from the ACT to generate total allowable landings (TAL). Estimated skate landings from state waters (currently about 3-4% of total landings) will then be subtracted from the TAL. The remaining Federal waters TAL will then be allocated to the wing and bait fisheries according to the ratio selected by the Council (refer to Table 6). This procedure will be followed in the specification process for subsequent two year periods.

Figure 2. Diagram of ACL framework for the Skate ABC**.**



5.1.3 Accountability Measures

<u>Accountability measures for TAL or ACL overages will not become effective until the 2010 fishing year.</u>

5.1.3.1 In-season possession limit triggers

When the wing fishery harvests 80% of its TAL (6,269 mt; 13.82 million pounds), the Regional Administrator would be given authority to reduce the wing possession limit to 500 lb wing wt. (1135 lb whole wt.) for the remainder of the fishing year. When the bait fishery harvests 90% of its seasonal quota, the Regional Administrator would be given authority to reduce the possession limit for the bait fishery to the whole-weight equivalent of the wing fishery limit for the rest of that quota period, assuming the wing fishery is also open. If the wing fishery is closed, the possession limit will be reduced to 1135 lb whole wt. for the remainder of the quota period.

For example, if the bait fishery has a trip limit of 20,000 lb whole wt, and the wing fishery has a trip limit of 1,900 lb wing wt (4,313 lb whole wt), when the bait fishery harvests 90% of its TAL (or seasonal quota), its trip limit would be reduced to 4,313 lb whole wt for the remainder of the year (or season). This would effectively close the directed skate bait fishery, while still allowing some level of bait landings. It would also reduce the incentive for bait vessels to land whole skates, and have the landings applied to the wing TAL. Subsequently, when the wing fishery harvests 80% of its TAL, the possession limit for both fisheries would be reduced to the incidental level of 500 lb wing wt (1135 lb whole wt.).

5.1.3.2 TAL Overages

If for either skate fishery, at the end of a fishing year, it is calculated that the TAL was exceeded by more than 5 percent, an automatic adjustment to that fishery's TAL trigger would occur for the next fishing year. A straight one-for-one percent reduction in a TAL trigger for prior overages, reducing the likelihood that future landings would exceed the TAL. This increases the buffer between the TAL and the trigger to account for incidental landings in a skate fishery when the skate possession limit declines to the incidental limit. For example, an overage of 7.5% in a previous year would cause the TAL trigger for that fishery to decline from 90% to 82% of the TAL.

Rationale: The Council chose this process over the alternatives to avoid big changes in the TAL trigger caused by small differences in landings. An overage of less than 5% would not be alarming and might be offset by reductions in skate discards. Above that amount, a smooth reduction in the trigger would occur, rather than in large even steps that could be caused by small differences in landings.

5.1.3.3 ACL Overages

Should it be determined, based on final landings and discard estimates for a given year, that the ACL (30,643 mt; 67.56 million pounds for FY 2010-2011) for that year was exceeded, an automatic increase in the buffer between ACL and ACT, based on the percent overage, will be implemented in the next fishing year (i.e. two years after the overage occurred). The regulations would require the buffer to be appropriately set either through the Council's specifications process or rulemaking by NMFS, depending on the timing of the determination of the ACL overage.

If the Council is not developing specifications at the time the overage is determined (e.g., alternate year between specifications), NMFS will modify the buffer through a rulemaking, effective in the subsequent fishing year. If an ACL overage is determined after submission of the Council's biennial specifications document, but before publication of the final rule, NMFS will appropriately adjust the buffer in the final rule. After years where there are no ACL overages, the Council may adjust the ACL-ACT buffer to an optimal level in a framework action. (NB: In the event of an ACL overage, NMFS would not modify the Council-approved ABC/ACL or discard estimates; only the percent buffer between the ACL and ACT.)

In the example shown in Table 10, if in 2011, during the development of specifications for FYs 2012–2013, it is calculated that the 2010 ACL was exceeded by 5.7%, the ACT for 2012-2013 would be reduced from 75% to 69% of the ACL. Since the ACT is the value from which estimated discards are deducted to form the TAL, the TAL could also effectively be reduced, unless projected discards are lower and/or ABC/ACL is higher in the next year.

Table 10. Example application of AMs for ACL and Wing TAL overages in 2010, assuming ABC/ACL remains unchanged.

	2010 Specifications	2010 Observed	% Overage	2012 Specifications
ABC/ACL	30,643	32,390	**5.7%** →	30,643
ACT Buffer	25%			**30.7%**
ACT	22,982			**21,236**
Discards	13,555	22,366		13,555
TAL	9,427	10,023		7,680
Wing TAL	6,269	6,770	**8.0%** →	5,107
Wing Trigger	80%			**72.0%**
Bait TAL	3,158	3,253	3.0%	2,573
Bait Trigger	90% each season quota			**90% each season quota**

5.1.4 Annual review, SAFE Report, and specification setting procedure

The process and requirements in this Section would replace the baseline review process described in Section 4.16.1 of the Skate FMP and in regulations at §648.320(c). The Skate FMP established seven baseline measures listed below, which have proven to be of limited value in estimating the effects of measures on skate catches and mortality, particularly for DAS restrictions whose metric has changed over time (due to measures such as minimum DAS charges, new DAS categories, special access programs, and rollovers). The baseline review procedure for every amendment and framework action in other plans has moreover proven to be very cumbersome.

In place of the skate baseline review process, the proposed process would allow for an annual review of recently implemented or developing alternatives in other plans, allowing the Council and opportunity to make accommodations or initiate a skate framework action to mitigate the effects on the skate fishery. Although the measures listed below would no longer comprise a baseline per se, they would still be important factors which the Skate PDT and the Council would consider in developing management advice.

- Multispecies closed areas (Section 4.16.1.1 of the Skate FMP)
- Multispecies DAS restrictions (Section 4.16.1.2 of the Skate FMP)
- Gillnet gear restrictions (Section 4.16.1.3 of the Skate FMP)
- Lobster restricted gear areas (Section 4.16.1.4 of the Skate FMP)
- Gear restrictions for small mesh fisheries (Section 4.16.1.5 of the Skate FMP)
- Monkfish DAS restrictions for monkfish-only permit holders (Section 4.16.1.6 of the Skate FMP)
- Scallop DAS restrictions (Section 4.16.1.7 of the Skate FMP)

Adjustments to the ACL and TAL values are expected through a specification process as skate biomass changes and is updated with new survey data (NB: the Council's SSC has recommended that the specifications NOT be updated until at least 2011, after the new trawl calibration analyses have been completed and peer reviewed) and as new estimates of the proportion of catch generated from dead discards becomes available. The initial TAL uses the latest three years of estimated discards to set the proportion of the catch target that can be allocated to landings. Therefore, future allocations of TAL should use the latest three years of discard and landing estimates to reduce uncertainty, while accounting for recent changes in fisheries that will affect total skate discards. The median catch/biomass values will not change, unless new estimates for landings and discards during 1989-2007 become available.

5.1.4.1 Annual Review

The Skate PDT will meet at least annually, prior to the June Council meeting, to evaluate the most recent data available on skate stock status, fishing mortality, landings, discards, changes to other FMPs that catch skates, and other available information. The term of reference for the PDT will be to monitor the effectiveness of the management plan and to develop options for framework adjustments and/or amendments such that the plan continues to meet the objectives. If not included as framework measures currently established by the Skate FMP and subsequent amendments and framework adjustments; new measures in Amendment 3 that may be adjusted by framework action include:

- ABCs
- ACLs and TACs,
- The ACT buffer (accounting for scientific and management uncertainty)
- TALs (accounting for changes in the discard rate and/or new information about skate discard mortality) and the TAL triggers (accounting for management uncertainty in discard and landings estimates)
- Skate wing and bait fishery possession limits, and
- Overfishing definition biological reference points (requiring approval of the Council's SSC)
    - Selected reference time series,
    - The selected strata, and/or
    - The selected survey used for status determination
- Other measures contained within the Skate FMP.

If the PDT feels that adjustments to the FMP are necessary to meet FMP objectives, it will make recommendations to the SSC, which will review the PDT's analyses, and subsequently advise the Council at its June meeting on potential adjustments to the Skate FMP. If the Council agrees that action is required, it will initiate framework action at the June meeting. Final framework documents must be approved by the Council during their fall meetings, and submitted for NMFS review by December 1, so that proposed and final rulemaking may be completed by the beginning of the fishing year (May 1). In addition to the existing measures that may be adjusted by framework action, the Council may also modify the bait skate quota seasons, catch monitoring procedures, the ACT buffer, and the TAL triggers via the Specification Process to be consistent with the revised TACs, TALs, and estimates of scientific and management uncertainty.

The Regional Administrator will publish the Councils' recommendation in the *Federal Register* as a proposed rule. The *Federal Register* notification of the proposed action will provide a public comment period in accordance with the Administrative Procedures Act. If the Regional Administrator concurs that the Councils' final recommendation meets the Skate FMP objectives and is consistent with other applicable law, and determines that the recommended management measures should be published as a final rule, the action will be published as a final rule in the *Federal Register*.

5.1.4.2 Biennial SAFE Report and Specification of TACs and TALs

The Skate PDT shall prepare a Stock Assessment and Fishery Evaluation (SAFE) Report for skates every two years. The SAFE Report shall be the primary vehicle for the presentation of all updated biological and socio-economic information regarding the NE skate complex and its associated fisheries. The SAFE report shall provide source data for any adjustments to the management measures that may be needed to continue to meet the goals and objectives of the FMP (see 50 CFR 648.320(b)).

Based on the results of the biennial skate SAFE Report, the PDT will use the available information to recommend new specifications (ACL, ACT, TALs, and skate possession limits) for the skate fishery, which will be implemented for the subsequent two fishing years. For example, the SAFE Report completed in 2008, as part of Amendment 3, will be used to establish the ACL and TALs for the skate fishery for FY 2010-2011 (May 1, 2010 through April 30, 2012). The next SAFE Report will be completed by June 2011, which will be used to establish specifications for FY 2012-2013, and every two years thereafter.

If a regulatory action is not implemented to establish new ACLs for the skate fishery for a given year, either through the annual review procedure or the biennial specification process, the ACL, ACT, and TALs in effect during the previous year will remain in effect until new measures are implemented.

Rationale: Since so much of the conservation of skates depends on regulations that govern associated fisheries and discards are such a large portion of the total catch of skates, this process would allow for timely review, evaluation, and response to changes in the fishery and regulations that affect skate landings and discards. The annual review is a pro-active process that allows the PDT and Council to evaluate regulations that have been recently implemented, or are in the development or review process. It may result in recommendations that mitigate adverse impacts of measures under consideration (particularly for the Multispecies and Monkfish FMPs) or it may trigger a framework action to change the skate regulations. The biennial specification process would allow for changes in skate limits, responding to changes in skate biomass or other factors that influence whether the skate possession limits and other skate measures regulate landings and achieve the ACL.

5.1.5 Annual Catch Limit Monitoring

Catch monitoring will be delayed until May 1, 2010.

Any vessel possessing a valid Federal open access skate permit may possess skates up to the limits specified (see Section 5.1.6), until landings reach the skate fishery TAL trigger. Vessels fishing with non-exempt gears (e.g., bottom trawls, gillnets, dredges) to harvest skates must be fishing on a declared Multispecies, Monkfish, or Scallop DAS, unless the vessel is fishing in and complying with the requirements of the Mid-Atlantic Exemption Area (west of 72° 30' W longitude; 50 CFR 648.80(c)) or another skate exemption area specified in the Multispecies regulations (50 CFR 648.80(a) and (b)).

Under the Target TAC, a projection of total dead discards would be subtracted from the ACT before the beginning of the fishing year, so only reported skate landings would be monitored against the TAL. The TAL would be allocated between the wing and bait fisheries, and so reported landings must be assigned to one fishery or the other. Market and disposition codes already existing in Federal Dealer reports would be used to assign landings to each fishery. No VMS or IVR declarations or reporting would be required.

Using the existing reporting information, all skate landings by vessels holding a valid Skate Bait Letter of Authorization will be charged against the bait fishery TAL. All skates landed as wings will be charged against the wing fishery TAL. All skates landed in whole form and coded by the dealer for sale as food will be charged against the wing fishery TAL and all skates landed in whole form and coded by the dealer for sale as bait will be charged against the bait fishery TAL.

Prohibitions on the retention, possession, or landing of barndoor, thorny, and smooth skates remain in effect (50 CFR 648.322(c)).

Rationale: Although the proposed catch limit monitoring relies on existing dealer reports and dealer-supplied information, the above described process makes it clear when landings are ascribed to and counted against the wing and bait skate fishery TALs. A formal process for skate catch monitoring is required to know when to trigger in-season accountability measures to restrain further skate landings and catch. Although NMFS may begin collecting this data earlier than May 1, 2010, the effectiveness of this measure to trigger accountability measures and track quotas is delayed until the 2010 fishing year, because it might otherwise cause an immediate trigger in 2009 from skate catches that occurred before implementation of the amendment, anticipated for January 2010.

5.1.6 Skate possession limits

Skate possession limits will become effective when final rules for this amendment are published and implemented, subject to the possibility of a cooling off period.

Vessels with skate permits may possess and land skates up to the limit specified for each skate fishery. **Landings and possession of skates by vessels with a Skate Bait Letter of Authorization (LOA) will be limited to 20,000 lbs. of whole skates per trip** and all landings by vessels with a valid, active Skate Bait LOA will count against the skate bait fishery TAL.

Vessels with an LOA must land skates in whole form, may not retain skates over 23 in (58.42 cm) total length, and the skates must be marketed and sold for bait (see 50 CFR §648.322). The LOA does not, however, exempt vessels from gear or DAS requirements of the Multispecies regulations. Skate bait vessels must therefore fish on a Multispecies Category A DAS, a Monkfish DAS, or a Scallop DAS, unless the vessel is fishing in the Mid-Atlantic Exemption Area or other specified skate exemption area, or using exempted gear.

All other vessels holding a Federal skate permit (but without a Skate Bait Letter of Authorization) may land up to 1,900 lbs. of wings, or 4,313 lbs. of whole skates per trip. A vessel may only land one trip per day from trips where skates were retained for commercial sale. Both the wing and bait fishery skate possession limits apply to a trip, defined as when a vessel leaves port or (if the vessel uses VMS) crosses the VMS demarcation line to when a vessel returns to port or (if the vessel uses VMS) crosses shoreward of the VMS demarcation line. Vessels may land fish at multiple permitted dealers within a 24 hour period, but the skate landings must be from the same trip.

Regardless of whether skates are landed dressed or whole, skate landings reported by the dealer as being marketed as wings or food will count against the wing fishery TAL. However, whole skate landings by vessels without a Skate Bait Letter of Authorization which the dealer markets and sells in its entirety for bait will count against the skate bait fishery TAL.

Unless the skate fishery TALs have been harvested, any vessel possessing a valid Federal open access skate permit may possess skates up to the skate fishery possession limit (Table 8), **except for vessels that are fishing under a declared Multispecies B DAS trip, in which case the skate trip limit is 220 lbs. of wings (500 lbs. whole wt)**. When the bait fishery has reached the TAL trigger, the skate possession limit will be the wing fishery possession limit. If both the wing and bait fisheries have reached their TALs, the skate trip limit for all vessels will be 500 lbs. of wings (1135 lbs. whole wt), unless the vessel is fishing on a Multispecies Category B DAS.

Rationale: Skate possession limits were estimated to reduce the 2007 landings to the TAL for the skate wing and skate bait fisheries. The skate possession limits for all the alternatives were estimated to achieve one of the two TAL options individually for the skate wing and skate bait fisheries, after accounting for time/area skate fishing closures and for changes in discarding. Coupled with management measures in other fisheries that have a skate catch, the proposed possession limits in this final alternative are intended to achieve the specified TALs in the absence of skate time/area closures (Alternatives 3A and 3B; Sections 5.2.8.5 and 5.2.8.6).

The wing fishery possession limits are intended to reduce mortality on skates and be consistent with the skate wing TAL. The estimated reduction in mortality was calculated to reduce the 2007 landings to achieve the TAL and after accounting for increases in dead discards caused by trips that would continue fishing for other species and discard excess skates. Skate discards would decline on trips that target skates and return to port early due to the possession limit, assuming that vessels cannot take additional trips to compensate. Although the final wing fishery TAL is lower than was estimated in the DEIS, the Council did not re-estimate and change the possession limit to a level that would be calculated to achieve the revised TAL. At 1,900 lbs of wings, the wing possession limit is low and if reduced would effectively prevent any sort of trips targeting skate wings for the commercial seafood market. Also, due to uncertainties about the effect of the multispecies interim action and other related management measures on skate catches that were not present in 2007 (data used in the possession limit model), the 1,900 lbs. limit may achieve the TAL anyway. If is does not and landings reach the TAL trigger, the possession limit will decline to the incidental skate possession limit as a backup and prevent overfishing.

The draft amendment did not include possession limits for a quota-managed skate fishery (Alternative 4), but included whole skate possession limits for the wing fishery for other alternatives. Fishermen in the bait fishery overwhelmingly supported Alternative 4, because the low possession limits associated with the other alternatives would be disruptive to the skate bait market. With the bait fishery TALs that were in the draft amendment, fishermen and skate bait dealers felt that the fishery would last sufficiently long through the three seasons to avoid major disruptions in the supply of bait, and henceforth did not recommend any possession limits for the skate bait fishery. The updated TALs however are much lower because total discard estimates (for all fisheries) are higher. With the lower TAL, fishermen and skate bait dealers thought that derby fishing behavior may develop with a shortened fishing season and recommended setting a bait fishery possession limit near the maximum limit observed. During 2007, only five of 211 trips landed more than 20,000 lbs. of whole skates. This bait fishery possession limit is intended only to prevent vessels from landing abnormal amounts of skates if the fishery nears the TAL, not to reduce skate mortality from landings.

5.1.7 Skate bait fishery quota[16]

A seasonal quota to regulate landings by the skate bait fishery will apply according to the schedule listed in Table 11. Vessels must hold a valid and active Skate Bait Letter of Authorization, issued according to §648.322(b) to fish under the quota. Skates must be landed in whole form, must be less than 23 inches (58.42 cm) total length, and must be marketed as bait. Any skate landings made by a vessel holding a valid and active Skate Bait Letter of Authorization will be counted against the skate bait quota, regardless of how the skates are actually marketed.

The annual limit for landings by vessels with federal skate permits, after accounting for landings from state vessels fishing in state waters, will be 3,158 mt (6.96 million lbs.) split into seasonal quotas as specified in the table below.

TAL trigger: If the landings reach 90% of the quota for each period, or 90% of the annual skate bait fishery TAL, the Regional Administrator will issue a notice to close the skate bait fishery until the next

[16] This measure will not be implemented until the beginning of the 2010 fishing year.

quota period begins. When the skate bait fishery is closed, Skate Bait Letters of Authorization automatically become null and void and the skate wing possession limit will apply to all vessels landing skates. If the wing fishery is also closed, however, the incidental skate possession limit will apply to all vessels landing skates.

Table 11. Seasonal allocation of the annual skate bait fishery TAL.

Three seasonal quota periods; beginning on a. May 1 (30.8% of the skate bait fishery TAL, or 972.7 mt in 2010-2011) b. August 1 (37.1% of the skate bait fishery TAL, or 1171.6 mt in 2010-2011) c. November 1 (the unharvested portion of the annual skate bait fishery TAL)

As an example, skate bait landings might have been 200 mt less than the quota during the May 1 to July 31 period, but the landings are projected to meet the August 1 to October 31 seasonal quota on September 20th. Before Sept. 20th, the Regional Administrator would issue a notice action closing the skate bait fishery on Sept. 20th and simultaneously announcing a 200 mt increase of the quota for the next season beginning on November 1.

Rationale: Fishermen in the skate bait fishery sell their landings to lobster fishermen through on-shore dealers. Often, the market demands large landings of skates to supply vessels that make extended offshore trips for lobsters. Because of this unique market demand, skate bait fishermen claim that low skate possession limits would make it much more difficult to supply the lobster fishery with bait. It might require on-shore dealers to stockpile skate landings from several trips to supply a lobster vessel with bait, or lobster fishermen might seek other supplies for bait, because they cannot buy sufficient quantities for a lobster fishing trip.

Seasonal quotas would help maintain supply throughout the lobster fishing season (primarily April to November) when demand for bait is highest. Conversely an annual quota could cause prices to decline from excess supply during a short season and make bait unavailable for the lobster fishery when the landings have met the quota. Seasonal quotas would increase the monitoring costs, as well as increase business uncertainty due to more frequent quota adjustments. The annual quota is separated into seasonal allotments based on seasonal landings patterns during fishing years 1998 to 2006.

5.1.8 Incidental skate possession limit

When the wing fishery has reached the TAL trigger, vessels without Skate Bait LOAs may retain and land no more than 1135 lbs. of whole skate or 500 lbs. of skate wings. A vessel must have a Federal skate vessel permit to retain and land skates for commercial sale. Vessels on a Multispecies Category B DAS may not possess or land more than 500 lbs. of whole skate or 220 lbs. of skate wings.

Rationale: As an incidental limit when skate fisheries close and for vessels not on a Multispecies Category A DAS, a scallop DAS, or a monkfish DAS, the Council has determined that 1135 lbs. of whole skate or 500 lbs. of skate wings is a reasonable and suitable amount to distinguish trips targeting skates from those targeting other species and having an incidental amount of skate landings.

The Council raised the incidental skate limit from the amount proposed in the draft amendment to reduce the discards associated with a low possession limit when the fishery reached the TAL. The added landings that would be expected, compared to a 500 lb. incidental skate wing limit, is offset by lower

TAL triggers (Section 5.1.3.1) that would initiate action to reduce directed skate fishing as landings approach the TAL.

The lower possession limit for vessels fishing in the Multispecies B DAS program is intended to standardize the possession limit to be consistent with existing multispecies regulations for vessel fishing on a B DAS with trawls, and reduce the targeting of skates by gillnet vessels on a Multispecies B DAS. This lower skate possession limit was set for vessels on a Multispecies B DAS to discourage fishermen from modifying nets to target flatfish, many of which are classified as overfished, not merely to discourage multispecies vessels from using the B DAS to target skates.

5.2 Draft Alternatives

5.2.1 Management measures

To achieve the landings targets (TALs) and prevent catch from exceeding the limits (TACs), the Amendment 3 alternatives include various specifications of one or more of the following management measures. Rather than be repetitive, the management measures are described fully in this section, while they are described briefly and include specifications within the alternatives to which they apply.

All alternatives are expected to meet a specific reduction in mortality of landings for the wing and bait fishery, which depend on how the Council allocates the landings targets between the two skate fisheries. One option is to split the allocation in the same average proportion that occurred during 2005-2007, which allocates 73.0% of the TAL to the skate wing fishery and the remainder of the TAL to the bait skate fishery. The other options splits the TAL in the same average proportion that occurred during 1995-2006, or 66.5% percent to the skate wing fishery and the remainder of the TAL to the bait skate fishery. The initial TALs are shown in the table below, including skate landings from all areas. Since the accountability measures apply to vessels with Federal permits, skate landings by vessels holding state permits and fishing in state waters must be deducted. Dealer data for 2005-2007 indicates that 1.28% of total bait landings and 2.07% of total skate wing landings were made by state-permitted vessels while fishing in state waters and will be the basis for determining an initial Federal TAL. In the future, the Federal waters TAL will be adjusted in the specification process (Section 5.2.2.2) to account for changes in landings of skates by vessels with state permits.

Table 12. Total allowable landings (TALs) options for the skate wing and bait skate fisheries[17].

	Option 1 2005-2007 average landings proportion	**Option 2 1995-2006 average landings proportion**
Skate wing fishery	6,882 mt (15.17 million lbs. 73.0%)	6,269mt (13.82 million lbs. 66.5%)
Federal wing fishery TAL	6,675 mt (14.72 million lbs.)	6,675 mt (13.41 million lbs.)
Bait skate fishery	2,545 mt (5.61 million lbs. 27.0%)	3,158 mt (6.96 million lbs. 33.5%)
Federal bait fishery TAL	2,469 mt (5.44 million lbs.)	3,063 mt (6.75 million lbs.. 73.0%)

[17] These allocation options were based on an 9,427 mt aggregate skate TAL.

5.2.1.1 Interim catch limits and accountability measures (all alternatives)

While smooth, winter and thorny skates are rebuilding to the biomass target, the skate catch limit will be equivalent to the aggregate median catch/biomass ratio for 1989 to 2006 multiplied by recent biomass for each skate species[18], represented by the latest three year average catch per tow in the NMFS surveys used for status determination. Using the 2005-2007 average biomass values for the seven skate species, this calculation estimates the TAC to be 30,643 mt (67.55 million lbs.). To account for scientific and management uncertainty, the FMP will use 75% of this amount (or 22,982 mt; 60.67 million lbs.) as a catch target, from which discards are taken into account by applying the ratio of landings to total catch during the 2004-2006 period. This procedure gives a TAL, or total allowable landings, of 9,427 mt (20.78 million lbs.), which will be sub-allocated to the skate wing fishery, the skate bait fishery, and state-waters component based on historic landings proportions (Table 12).

5.2.1.2 Annual catch limits and accountability measures

An ACL and associated accountability measures would ensure that skate catches do not exceed biological limits, complying with the mandates of the Magnuson-Stevens Act. Both implementations of ACLs described below would apply to combined landings and (both live and dead) discards, requiring adequate sea sampling data or other programs to accurately estimate discards. The Council would select either hard TACs or target TACs, but not both. Due to the difficulties identifying skate species from one another, the Council would set a single ACL for the skate complex, allocated by fishery (wing and bait).

5.2.1.3 Hard TACs with overage deductions in subsequent years

The ACL (30,643 mt; Table 7) would be implemented as a hard TAC, or quota for the fishing year (May 1 to April 30). The total estimated catches occurring between May 1, 2009 and April 30, 2010 would count against the TAC, regardless of the timing of implementation of Amendment 3 regulations. Existing sea sampling procedures would be used to estimate discards beginning May 1, 2009 until implementation of Amendment 3 regulations. Since the ACT is a target, it does not play a role in alternatives that use the Hard TAC approach, except to set management specifications like possession limits and to evaluate the effectiveness of time/area closures.

Landings and estimated discards would be combined and count against the hard TAC, less 3.0% to account for skate catches that are estimated to be associated with skate fishing in state waters (Section 8.3.1.3), assuming that the skate discard rate is the same in state and federal waters. The TAC would be monitored by a combination of reported landings and a moving average discard/kept ratio derived from at-sea observer data to estimate total discards. When the catch equals, or is anticipated to reach 80-100% of the ACL (TAC), skate landings would be prohibited, and skate time/area closures would go into effect. No skate landings would be allowed for the remainder of the fishing year. These areas are described in the table below and shown in the accompanying map (Map 1). Since discards would be difficult to assign to wing or bait fisheries, this approach would likely require monitoring the complex as a whole.

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18 The method for calculating the median catch/biomass values is described in Supplemental Document 17 in Appendix I.

Accountability measures

The value of the hard TAC in subsequent fishing years would be the same as its value in preceding years, less an amount equivalent to the accumulated overages in prior years. Annual catches which are less than the ACL would make up for prior overages, but would not increase the baseline ACL if there were no prior overages. The baseline ACL would remain constant until smooth, winter and thorny skates reach the biomass target and then increase to the average amount for the stable 1998-2004 period. The Council may adjust the baseline ACL through a new specification setting process, based on new information about the biology of skates and/or the prosecution of the skate fishery which would require an adjustment in allocations to various sub-components.

Rationale: ACLs and AMs are required provisions of FMPs by 2010 for stocks subject to overfishing, and by 2011 for all other stocks. Since the Council is not planning an amendment on the heels of Amendment 3, the Council is adopting an ACL in this amendment that is consistent with the rebuilding objectives. Hard TACs and adjustments for unpreventable overages will ensure that the catches do not exceed biological limits and overfishing will not occur.

5.2.1.4 Target TACs with in-season triggers to management measures

The ACL would be implemented as a target TAC for the fishing year (May 1 to April 30) and used as a guideline to implement mandatory triggers by regulation. For purposes of monitoring and triggering action, the target TAC would be split into a TAL (Table 12) and a discarded component based on 2004-2006 estimated catch proportions derived from landings and observed trips. Estimated discards would be deducted from the TAC at the start of the fishing year, and all in-season triggers would be based upon reported landings. The TAL would be allocated to the wing fishery and bait fishery, resulting in a wing TAL and a bait TAL (Table 12). Dealer and vessel reporting requirements will be modified so that landings on each skate trip are assigned to either the wing TAL or the bait TAL.

Accountability measures

When landings equal or are anticipated to reach 80-100% of the wing or bait TAL (Table 12), the possession limits for that sector would be reduced to an incidental level (500 lb whole wt) for the remainder of the fishing year. The (wing TAL) + (bait TAL) + (discards) are set at a level below the target TAC to allow a buffer for uncertainty in the discard estimate. Under allocation option 2, for example, if the wing TAL is specified at 6,269 mt (Table 12), and the in-season trigger is specified at 80% of the TAL, when reported landings reach 5,015 mt, the wing fishery skate possession limits (Section 5.2.6) would be reduce to 220 lbs. of skate wings (500 lbs. whole weight) for the rest of the fishing year.

No adjustments to the baseline ACL are necessary since they are implemented as a target and have restrictive in-season accountability measures to greatly reduce the risk of exceeding the ACL. The Council may however adjust the baseline ACL through a new specification setting process, based on new information about the biology of skates and/or the prosecution of the skate fishery which would require an adjustment in allocations to the various sub-components.

Rationale: ACLs and AMs are required provisions of FMPs by 2010 for stocks subject to overfishing, and by 2011 for all other stocks. Since the Council is not planning an amendment on the heels of Amendment 3, the Council is adopting an ACL in this amendment that is consistent with the rebuilding objectives. Although the FMP would use a target TAC and some landings of incidental skate catch could continue, the in season accountability measures are sufficiently restrictive to make it very unlikely that the catch will exceed the ACL. The target TAC for the complex would be set at 30,643 mt (median 2005-2007 catch/biomass ratio). Using 75% of the median 2005-2007 catch/biomass ratio for TALs equals a wing TAL of 6,882 mt and a bait TAL of 2,545 mt, resulting in a combined TAL of 9,427 mt (20.78 million lbs., including presumed landings of 3.0% in state waters by vessels without federal vessel permits). Adding estimated discards of 13,555 mt results in 22,982 mt of estimated total catch.

Due to unresolved problems in skate species identification and large amounts of landings reported as unclassified species, monitoring and compliance with catch limits and targets for individual skate species would be impossible. Although much of the problem is caused by difficulty distinguishing juvenile little and winter skates, fishermen do not often take the time to carefully identify skate species based on morphology and separate them into separate landings. Fishermen in the skate wing fishery often assume that their catch is nearly all winter skate while fishermen in the skate bait fishery often assume that their catch is nearly all little skate. During certain seasons, this is not accurate. And within the landings data that are identified by species, there are often glaring errors in species identification, such as landings of prohibited skates and landings of skates from fishing areas outside the range of the species.

While the proposed procedures identify a catch limit and catch target, as well as sub-allocate landings limits, the Amendment does not identify a secondary catch target to account for scientific uncertainty. The 25% difference between the catch target and catch limit is intended to account for all sources of uncertainty, including management uncertainty that arises due to inefficient controls on catches and scientific uncertainty due to poor data and unknown stock productivity. Particularly for skates which are difficult to identify, some of the scientific and management uncertainties are indistinguishable. It is better to treat them as one and adjust the separation between the catch target and limit as the situation warrants, better data become available, and/or better controls on the number of fish removals or size selection are adopted.

5.2.2 Annual review, SAFE Report, and specification setting procedure (all alternatives)

The process and requirements in this Section would replace the baseline review process described in Section 4.16.1 of the Skate FMP and in regulations at §648.320(c). The Skate FMP established seven baseline measures listed below, which have proven to be of limited value in estimating the effects of measures on skate catches and mortality, particularly for DAS restrictions whose metric has changed over time. The baseline review procedure for every amendment and framework action in other plans has moreover proven to be very cumbersome. In its place, the following process would allow for an annual review of recently implemented or developing alternatives in other plans, allowing the Council and opportunity to make accommodations or initiate a skate framework action to mitigate the effects on the skate fishery. Although the measures listed below would no long comprise a baseline per se, they would still be important factors which the Skate PDT and the Council would consider in developing management advice.

- Multispecies closed areas (Section 4.16.1.1 of the Skate FMP)
- Multispecies DAS restrictions (Section 4.16.1.2 of the Skate FMP)
- Gillnet gear restrictions (Section 4.16.1.3 of the Skate FMP)
- Lobster restricted gear areas (Section 4.16.1.4 of the Skate FMP)
- Gear restrictions for small mesh fisheries (Section 4.16.1.5 of the Skate FMP)
- Monkfish DAS restrictions for monkfish-only permit holders (Section 4.16.1.6 of the Skate FMP)
- Scallop DAS restrictions (Section 4.16.1.7 of the Skate FMP)

Adjustments to the TAC and TAL values are expected in setting future specifications as skate biomass is updated with new survey data and as new estimates of the proportion of catch generated from dead discards becomes available. The current TAL estimate uses the latest three years of discards to estimate the proportion of the catch target that can be allocated to landings, or the TAL. Therefore, future allocations of TAL should use the latest three years of discard and landing estimates to reduce uncertainty in annual estimates of discards, while accounting for recent changes in fisheries that will affect total skate discards. The median catch/biomass values will not change, unless new estimates for landings and discards during 1989-2006 become available.

5.2.2.1 Annual Review

The Skate PDT will meet at least annually, prior to the June Council meeting, to evaluate the most recent data available on skate stock status, fishing mortality, landings, discards, changes to other FMPs that catch skates, and other available information. The term of reference for the PDT will be to monitor the effectiveness of the management plan and to develop options for framework adjustments such that the plan continues to meet the objectives. These may include adjustments to ABCs, ACLs/TACs, TALs, trip limits, area-based measures, or other measures contained within the Skate FMP.

If the PDT feels that adjustments to the FMP are necessary to meet FMP objectives, it will make recommendations to the SSC, which will review the PDT's analyses, and subsequently advise the Council at its June meeting on potential adjustments to the Skate FMP. If the Council agrees that action is required, it will initiate framework action at the June meeting. Final framework documents must be approved by the Council during their fall meetings, and submitted for NMFS review by December 1, so that proposed and final rulemaking may be completed by the beginning of the fishing year (May 1).

The Regional Administrator will publish the Councils' recommendation in the *Federal Register* as a proposed rule. The *Federal Register* notification of the proposed action will provide a public comment period in accordance with the Administrative Procedures Act. If the Regional Administrator concurs that the Councils' final recommendation meets the Skate FMP objectives and is consistent with other applicable law, and determines that the recommended management measures should be published as a final rule, the action will be published as a final rule in the *Federal Register*.

5.2.2.2 Biennial SAFE Report and Specification of TACs and TALs

The Skate PDT shall prepare a Stock Assessment and Fishery Evaluation (SAFE) Report for skates every two years. The SAFE Report shall be the primary vehicle for the presentation of all updated biological and socio-economic information regarding the NE skate complex and its associated fisheries. The SAFE report shall provide source data for any adjustments to the management measures that may be needed to continue to meet the goals and objectives of the FMP (see 50 CFR 648.320(b)).

Based on the results of the biennial skate SAFE Report, the PDT will use the available information to recommend new ABCs, TACs and TALs for the skate fishery, which will be implemented for the subsequent two fishing years. For example, the SAFE Report completed in 2008, as part of Amendment 3, will be used to establish TACs and TALs for the skate fishery for FY 2009-2010 (May 1, 2009 through April 30, 2011). The next SAFE Report will be completed by June 2010, which will be used to establish TACs and TALs for FY 2011-2012, and so on. The annual review procedure described above, will be followed to implement these measures.

If a regulatory action is not implemented to establish new TACs for the skate fishery for a given year, either through the annual review procedure or the biennial TAC/TAL specification process, the TACs in effect during the previous year will remain in effect until new measures are implemented.

Rationale: Since so much of the conservation of skates depends on regulations that govern associated fisheries and discards are such a large portion of the total catch of skates, this process would allow for timely review, evaluation, and response to changes in the fishery and regulations that affect skate landings and discards. The annual review is a pro-active process that allows the PDT and Council to evaluate regulations that have been recently implemented, or are in the development or review process. It may result in recommendations that mitigate adverse impacts of measures under consideration (particularly for the Multispecies and Monkfish FMPs) or it may trigger a framework action to change the skate regulations. The biennial specification process would allow for changes in skate limits, responding to changes in skate biomass or other factors that influence whether the skate possession limits and other skate measures regulate landings and achieve the ACL.

5.2.3 Trip declaration and monitoring of landings (all alternatives)

Any federally permitted vessel landing or in possession of more than 500 lbs. of skates (or 220 lbs. of skate wings) must be fishing on a declared skate trip, either by entering the proper macro code into the VMS equipment before starting the trip (by leaving port or by crossing seaward of the demarcation line), or for vessels without VMS equipment by declaring a skate trip via the IVR call in program before leaving port. The skate trip type must be declared regardless of where the vessel fishes.

Vessels fishing for groundfish, monkfish, or other species on a Multispecies B DAS would be prohibited from declaring a skate trip or land more than 500 lbs. of whole skates (or 220 lbs. of skate wings).

Any vessel not on a Multispecies Category B DAS may declare a skate wing trip in which all regulations and possession limits that pertain to the skate wing fishery would apply. All skate landings for the trip will be counted against the wing fishery TAL and may trigger accountability measures if the landings exceed the TAL. A skate trip may be declared as a trip for the skate bait market by vessels holding a valid and active Skate Bait Letter of Authorization [see §648.322(b)]. All skate landings on bait trips must be in whole disposition and will be counted against the skate bait TAL or seasonal quota.

Amendment 3 includes two options for monitoring landings, so that the landings are attributed to the correct fishing activity and accountability measures would be properly applied if landings exceed the TAL. Both require additional reporting requirements. Whole skate landings less than 500 lbs. will be associated with the skate bait fishery and count against the skate bait TAL. Wing landings less than 221 lbs. will be associated with the skate wing fishery and count against its TAL. Since a share of the TAL has been deducted to account for landings by state-permitted vessels, skate landings by vessels with state permits will not count against the TAL.

Option 1: Vessel operators would be required to inform dealers about the skate trip type if one had been declared, whether or not the vessel is landing more than 500 lbs. This information should match the VMS/IVR trip declaration and dealers would report this information with the landings report for that trip. This process might require a new field to be added to the dealer report. Dealers would be able to process and sell skates to any market, regardless of the trip type declared by the vessel operator. Dealer reports will be considered the official record of landings for skate TAL monitoring.

Option 2: Operators of federally-permitted vessels making declared skate trips or landing more than 500 lbs. of whole skates (220 lbs. of skate wings) on one or more trips would be required to submit weekly interactive voice response system (IVR) showing at a minimum the vessel's permit number, the amount and disposition of skates landed, the dates when those landings occurred, and the declared trip type. Other data would also be required, consistent with the IVR program that exists for other Northeast fisheries. The IVR data submitted by the vessel operator would be considered the official record of landings for skate TAL monitoring purposes, but NMFS may apply an adjustment factor to account for unreported landings by federally-permitted vessels in the dealer data.

Rationale: A trip declaration is needed to distinguish what type of skate fishing is intended and how to account for the landings. It is also needed to determine what trips would be subject to seasonal closures of skate management areas. Vessels that do not declare into the skate fishery would be able to fish in any legal fishing area, but could only land an incidental amount of skates (see Section 5.2.4). On declared skate trips, skate possession and landings could exceed the incidental skate possession limit (500 lbs. whole weight, 220 lbs. of skate wings), but the vessel would have to declare a skate trip and would be prohibited from fishing in closed skate management areas (see Section 5.2.5).

Currently, vessels holding a Skate Bait Letter of Authorization are required to land skates in whole form and market them as bait. But vessels landing skates for the wing market sometimes land whole skates, processing the skates onshore and marketing the 'racks' for the bait market. A trip declaration would distinguish the two types of fishing activity and account for them properly without prohibiting landings of whole skates by vessels selling the skate landings into the wing market.

If there is no trip declaration, it would leave open a loophole and inconsistency: vessels may elect to land whole skates to be counted toward a whole skate possession limit or quota which is intended for the bait fishery. Conversely, it would be too easy for vessels to land whole skates supposedly for the wing market, when and if a skate bait quota is met. The loophole could cause a derby-style fishery to develop in which each skate fishery is in a 'competition' to avoid triggering accountability measures.

Accounting for landings by fishery with no changes in reporting requirements is impossible, due to substantial inaccuracies that appear when linking DAS activity with dealer reports. Often the VTR serial number which was meant to link data on trips does not match. One of two reporting options would apply to all of the proposed management alternatives, along with a skate trip declaration requirement for vessels that possess and/or land more than 500 lbs. of whole skates (220 lbs. of skate wings).

Option 1 is a simple approach that matches the landings and trip data, but does not require additional reports. It does however require an additional data element to be reported by dealers and communication between the vessel operator and the dealer. In this case, whatever the dealer reports may affect the application of AMs if the landings approach or exceed a fishery TAL.

Conversely, option 2 would use reports by vessel operators to monitor the TAL, allowing for a potential post-hoc adjustment to account for differences between the IVR and dealer reported landings. NMFS periodically evaluates this adjustment factor, but there is no post hoc correction to old data. This monitoring approach does not require a change in dealer reports, nor cooperation by dealers. But the IVR data may be inconsistent with total landings and requires a separate report by vessels operators, who may be making an IVR report for other fisheries anyway.

Since Multispecies Category B DAS are intended for fishing on 'healthy' stocks (i.e. those not overfished or approaching an overfished condition, or are subject to overfishing), prohibiting a skate trip on a

Multispecies B DAS would be consistent with that policy. All vessels using any gear on a Multispecies B DAS would therefore be limited to landing an incidental amount of skates (see Section 5.2.4).

5.2.4 Incidental skate possession limit

Vessels may retain and land no more than 500 lbs. of whole skate or 220 lbs. of skate wings without declaration to be in the skate wing or skate bait fishery.

Rationale: A trip declaration is needed to implement management measures that are intended to apply to vessels fishing for skates. Vessels that land less than an incidental catch of skates do not need to declare into the skate fishery or abide by management measures that are intended to regulate trips targeting skates. For this purpose, the Council has determined that 500 lbs. of whole skate or 220 lbs. of skate wings is a reasonable and suitable amount to distinguish trips targeting skates from those targeting other species and having an incidental amount of skate landings.

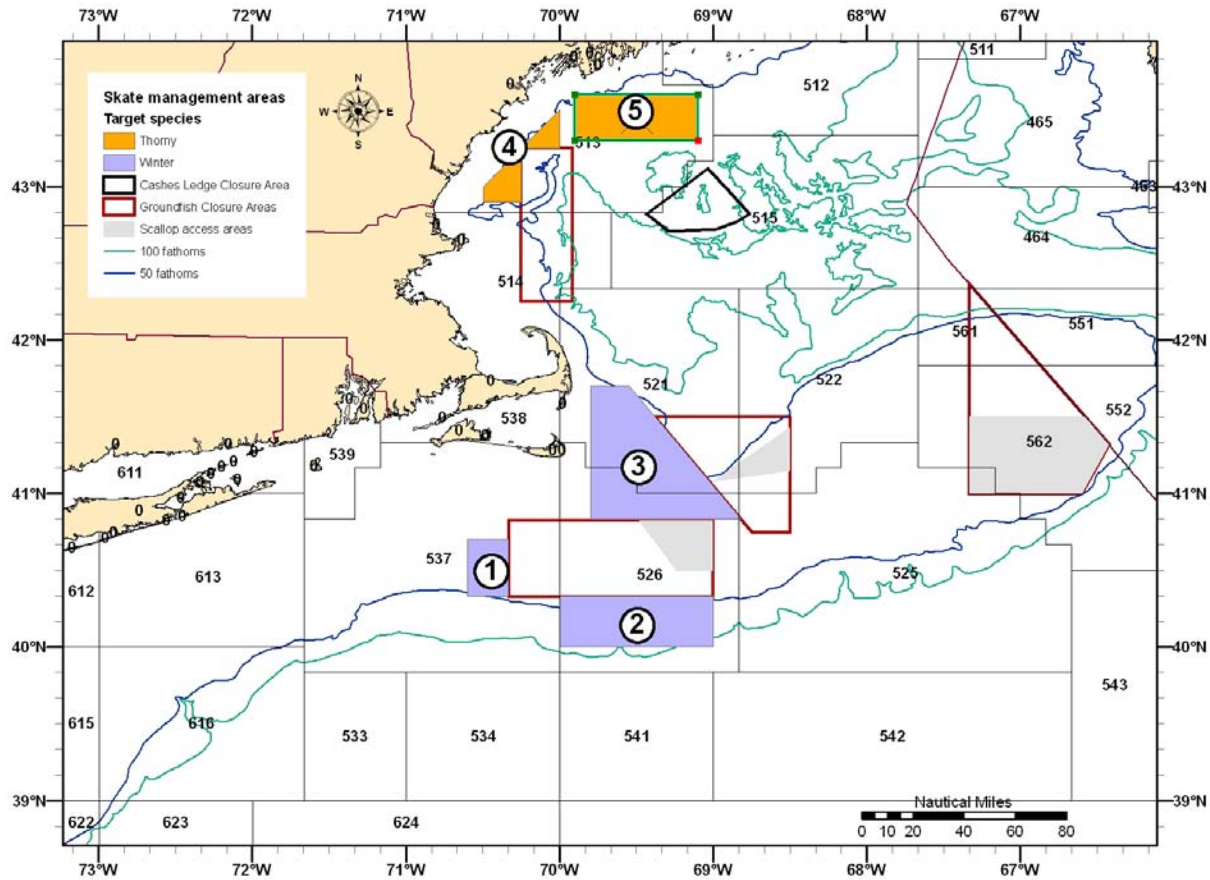
5.2.5 Time/area management (Alternatives 1a, 1b, and 4)

Five skate management areas will have a semi-annual closure for vessels that fish for or target skates. Vessels would be required to declare their intent to fish for skates via a macro code, entered into the VMS or call-in system. During skate trips declared by macro code, the vessels would be able to retain more than an incidental limit (500 lbs whole, or 220 lbs. of skate wings), but would be unable to fish in the skate management areas while they are closed to skate fishing. Vessels on a skate trip would be able to transit the closed skate management areas, but fishing gear must be stowed in accordance with one of the methods specified in §648.23(b). Vessels not on a declared skate trip may retain no more than 500 lbs of whole skates, or 220 lbs. of skate wings (as an incidental catch), but may fish in any area not otherwise prohibited by another FMP (e.g. groundfish closed areas, EFH closed areas, etc.).

The five skate management areas are shown in Map 1. Their semi-annual closure dates and coordinates are listed in Table 13. The specifications for all alternatives that include time/area management as a measure all have the same specifications, unless closures are triggered as an accountability measure.

Areas 1, 2, and 3 are intended to reduce fishing pressure on winter skate, by both the skate wing and skate bait fisheries. The three areas are contiguous with existing groundfish closed areas, the Nantucket Lightship Area and Closed Area I, and were chosen based on the distribution of high observed winter skate CPUE. The skate management areas overlap areas designated for other purposes or that regulate other types of fishing, i.e. the EFH closure near the Nantucket Lightship Area and the scallop dredge exemption area. The skate management areas described above would apply to the intended areas even if the EFH closure area changes in future phases of the EFH Omnibus Amendment but would apply only to vessels targeting skates (defined as those landing more than 500 lbs. of skates). The scallop dredge exemption area applies to a different segment of the fishing fleet, vessels using dredges to target scallops. Applying the scallop dredge exemption area to vessels using trawls and gillnets to target skates may have unintended and unanalyzed consequences.

Map 1. Location and designation of five skate management areas, shown in relationship to three-digit statistical areas, groundfish closed areas, and scallop access area boundaries.



Rationale: Area closures will discourage vessels from fishing for skates in areas where the catch rates are highest. These vessels may fish for other species or target skates elsewhere. Since nearly all skate trips must occur on a DAS, which are limited by other plans, the lower skate catches outside of the skate closures is estimated to reduce skate wing landings by 15.1 percent, but increase whole skate landings by 4.6 percent.

Areas 4 and 5 are intended as a conservation measure to enhance the probability of thorny skates rebuilding to the target biomass. Although during 2004-2006, there was relatively low amounts of trawl and gillnet fishing (for any species) in skate management areas 4 and 5, these areas consistently had relatively high thorny skate catches during the spring and fall trawl surveys. The boundaries of the areas 4 and 5 encompass the high survey catches and would prevent targeting other skates in these areas and discarding thorny skate (whose landings are currently prohibited by the Skate FMP). As time/area closures, areas 4 and 5 have however a relatively small effect on reducing skate mortality from levels observed in 2007.

Table 13. **Description of skate management areas closed to fishing by vessels on declared skate trips.**

Area	**Skate management area**				
	1	**2**	**3**	**4**	**5**
Conservation target species	**Winter**	**Winter**	**Winter**	**Thorny**	**Thorny**
Closed season	Jan 1 – Jun 30	Jan 1 – Jun 30	Jul 1 – Dec 31	Jan 1 – Jun 30	Jul 1 – Dec 31
Coordinate 1	40°42' N 70°36' W	40°20' N 70°00' W	41°42' N 69°48' W	43°30' N 70°00' W	43°36' N 69°54' W
Coordinate 2	40°42' N 70°20' W	40°20' N 69°00' W	41°42' N 69°32'50" W	43°15' N 70°00' W	43°36' N 69°06' W
Coordinate 3	40°20' N 70°20' W	40°00' N 69°00' W	40°50' N 69°49'10" W (western boundary of Closed Area I)	43°15' N 70°15' W	43°18' N 69°06' W
Coordinate 4	40°20' N 70°36' W	40°00' N 70°00' W	40°50' N 69°48' W	42°54' N 70°15' W	43°18' N 69°54' W
Coordinate 5	Coordinate 1	Coordinate 1	Coordinate 1	42°54' N 70°30' W	Coordinate 1
Coordinate 6				43°00' N 70°30' W	
Coordinate 7				Coordinate 1	

5.2.6 Skate possession limits (Alternatives 1-3, plus for the skate wing fishery Alternative 4)

Vessels on a declared skate trip may possess and land skates up to the limit specified for each alternative (see below for a description of management alternatives) and landings allocation (TAL) option. Landings by vessels with a Skate Bait Letter of Authorization will be subject to the bait skate possession limit and count against the bait skate TAL. These vessels must land skates in whole form, may not retain skates over 23 in (58.42 cm), and the skates must be marketed and sold for bait (see §648.322). Landings on a declared skate trip by vessels without a Skate Bait Letter of Authorization will be subject to the skate wing possession limit and the landings will count against the skate wing TAL, regardless of whether skates are landed dressed or whole.

Skate possession limits apply to a trip, defined as when a vessel leaves port or crosses the VMS demarcation line to when a vessel returns to port or crosses shoreward of the VMS demarcation line. Possession limits apply to the total catch landed within a 24 or more hour trip, i.e. total skate landings may not exceed the possession limit if landed by a single vessel within a 24 hour period.

The skate possession limits for each alternative are shown in the table below.

Table 14. Proposed skate possession limits (in pounds) for vessels on declared skate trips.

	Skate wing fishery trips		Skate bait fishery trips	
TAL allocation option and limit	2005-2007 basis 6,882 mt[19]	1995-2006 basis 6,269 mt[20]	2005-2007 basis 2,545 mt[21]	1995-2006 basis 2,469 mt[22]
Landings disposition	Wings (whole)	Wings (whole)	Whole	Whole
Alternatives 1a and 1b	4,800 (10,896)	3,800 (8,626)	6,800	12,100
Alternatives 2, 3a, and 3b	2,500 (5,675)	1,900 (4,313)	8,200	14,200
Alternative 4	4,800 (10,896)	3,800 (8,626)	Quota managed, no possession limit	

Rationale: Skate possession limits were estimated to reduce the 2007 landings to the TAL for the skate wing and skate bait fisheries. The skate possession limits for all the alternatives were estimated to achieve one of the two TAL options individually for the skate wing and skate bait fisheries, after accounting for time/area skate fishing closures and for changes in discarding.

The estimated reduction in mortality was calculated after accounting for the effect of time/area closures (Section 5.2.5) for alternatives that include them and after accounting for increases in dead discards caused by trips that would continue fishing for other species and discard excess skates. Skate discards would decline on trips that target skates and return to port early due to the possession limit, assuming that vessels cannot take additional trips to compensate.

5.2.7 Skate bait fishery quota (Alternative 4)

In lieu of a possession limit, alternative 4 includes a seasonal quota to regulate landings by the skate bait fishery. Vessels must hold a valid and active Skate Bait Letter of Authorization, issued according to §648.322(b) to fish under the quota. Skates must be landed in whole form, must be less than 23 inches (58.42 cm) total length, and must be marketed as bait. Any skate landings made by a vessel holding a valid and active Skate Bait Letter of Authorization will be counted against the skate bait quota, regardless of how the skates are actually marketed.

The annual limit for landings by vessels with federal skate permits, after accounting for landings from state vessels fishing in state waters, would be either 2,469 or 3,063 mt (5.44 or 6.75 million pounds, respectively) depending on the TAL allocation option chosen, may be split into seasonal quotas. If the landings reach or are projected to meet the quota for each period, the Regional Administrator will issue a notice to close the skate bait fishery until the next quota period begins.

The following three quota options may be chosen:

[19] Previously 8,426 mt in the DEIS
[20] Previously 7,677 mt in the DEIS
[21] Previously 3,118 mt in the DEIS
[22] Previously 3,867 mt in the DEIS

2. An annual quota period beginning on May 1 (either 2,469 or 3,063 mt depending on the chosen TAL allocation option), subject to adjustments for overages or shortfalls from the previous fishing year

3. Two seasonal quota periods, beginning on
   a. May 1 (67.9% of the skate bait fishery TAL, either 1,676 or 2,080 mt depending on the chosen TAL allocation option), subject to adjustments for overages or shortfalls in the May 1 to October 31 season from the previous fishing year
   b. November 1 (32.1% of the skate bait fishery TAL, either 793 or 983 mt depending on the chosen TAL allocation option), subject to adjustments for overages or shortfalls in the November 1 to April 30 season of the previous fishing year

4. Three seasonal quota periods; beginning on
   a. May 1 (30.8% of the skate bait fishery TAL, either 760 or 943 mt depending on the chosen TAL allocation option), subject to adjustments for overages or shortfalls in the August 1 to October 31 season from the previous fishing year,
   b. August 1 (37.1% of the skate bait fishery TAL, either 916 or 1,136 mt depending on the chosen TAL allocation option), subject to adjustments for overages or shortfalls in the November 1 to April 30 season of the previous fishing year, and
   c. November 1 (32.1% of the skate bait fishery TAL, either 793 or 983 mt depending on the chosen TAL allocation option), subject to adjustments for overages or shortfalls in the May 1 to July 31 season.

Unless the Regional Administrator and Council reset the annual quota through a change in specifications, adjustments to seasonal quotas will be made for overages (landings exceed a seasonal quota) or shortfalls (landings are less than the seasonal quota) in the period after next. In option 3, for example, an overage in a May 1 to July 31 quota would be deducted from the November 1 to April 30 quota. Likewise in option 2, a shortfall in landings for the May 1 to October 30 quota would be added to the May 1 to October 30 quota for the next fishing year. Adjustments to the annual quota in option 1 would be made in-season (or sooner) during the next fishing year.

Thus, the Regional Administrator would only need to issue one notice action during each seasonal quota period, to announce an adjustment for the next seasonal quota and a closure of the current seasonal quota if the landings meet or are projected to meet the quota. If the landings reach or are projected to reach a seasonal quota, the Regional Administrator would issue a notice action to close the skate bait fishery and prohibit landings by vessels holding a Skate Bait Letter of Authorization. In the same notice, the Regional Administrator may also announce a quota adjustment for the next quota period for overages or shortfalls during the last quota period.

As an example, skate bait landings might have been 200 mt less than the quota during the May 1 to July 31 period, but the landings are projected to meet the August 1 to October 31 seasonal quota on September 20th. Before Sept. 20th, the Regional Administrator would issue a notice action closing the skate bait fishery on Sept. 20th and simultaneously announcing a 200 mt increase of the quota for the next season beginning on November 1.

Rationale: Fishermen in the skate bait fishery sell their landings to lobster fishermen through on-shore dealers. Often, the market demands large landings of skates to supply vessels that make extended offshore trips for lobsters. Because of this unique market demand, skate bait fishermen claim that skate possession limits would make it much more difficult to supply the lobster fishery with bait. It might require on-shore dealers to stockpile skate landings from several trips to supply a lobster vessel with bait, or lobster fishermen might seek other supplies for bait, because they cannot buy sufficient quantities for a lobster fishing trip.

Seasonal quotas would help maintain supply throughout the lobster fishing season (primarily April to November) when demand for bait is highest. Conversely an annual quota could cause prices to decline from excess supply during a short season and make bait unavailable for the lobster fishery when the landings have met the quota. Option 3 would allow skate bait to be available during the second half of the lobster fishery season, whereas Options 1 and 2 would not do this. More seasonal quotas would increase the monitoring and notification costs, as well as increase business uncertainty due to more frequent quota adjustments. The annual quota is separated into seasonal allotments based on seasonal landings patterns during fishing years 1998 to 2006.

5.2.8 Description of Alternatives

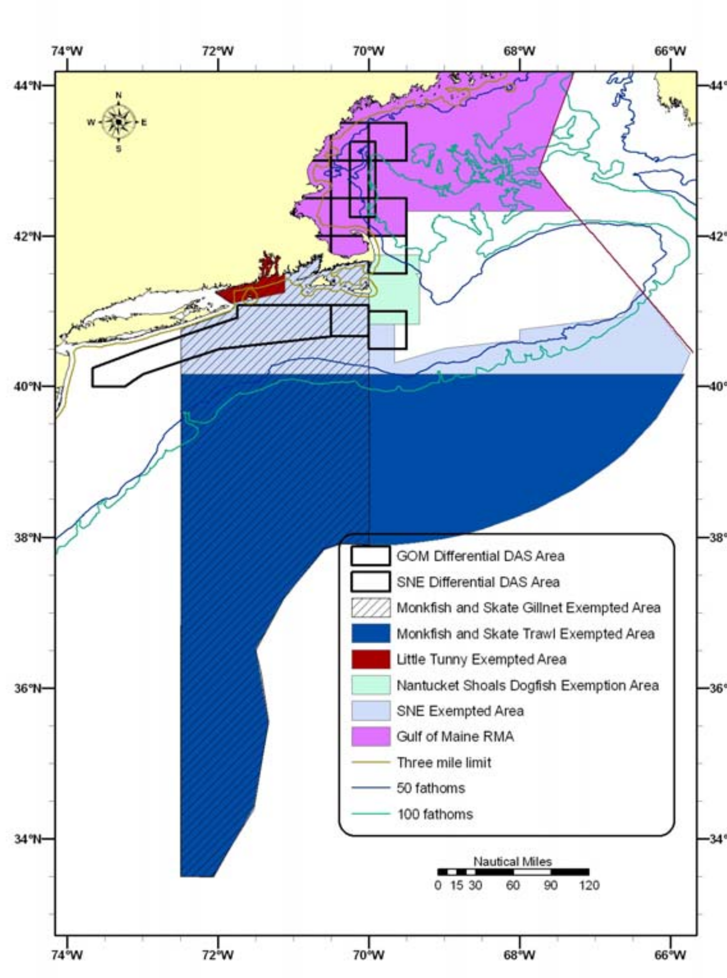
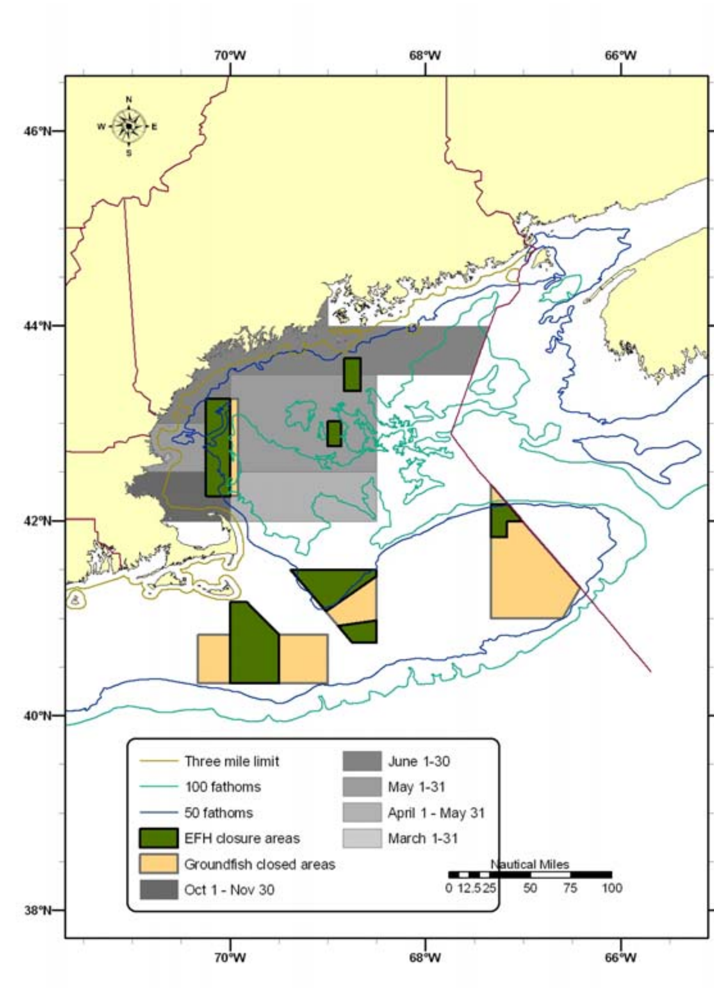
The following alternatives include different sets of management measures described above, with specifications intended to keep catch and landings from exceeding the limits. With the exception of the skate possession limits for the skate wing fishery and the exemption from skate possession limits for vessels holding a Skate Bait Letter of Authorization, all alternatives include the management regulations that form the status quo (described below), including measures in the Multispecies, Monkfish, and Scallop management plans that affect skate fishing activities on a DAS or in regulated mesh areas.

5.2.8.1 No Action (Status quo)

Except for specific exempted or experimental fisheries, vessels must be on a multispecies, monkfish, or scallop DAS to fish for skates. Any vessel on a day-at-sea, fishing in an exempted area must use large mesh (§648.84) and unless exempted by a Skate Bait Letter of Authorization, may possess no more than 20,000 lbs. of skate wings (45,400 lbs. whole weight) per trip and no more than 10,000 lbs. of skate wings (22,700 lbs. of whole skates) for trips less than 24 hours in duration. Vessels using trawls on a Category B DAS are required to use a haddock separator trawl or an eliminator trawl and since these nets catch few skates the Multispecies FMP limits skate landings by trawl vessels to 500 lbs. of whole skates [or 220 lbs. of skate wings; see §648.85(b)(6)(D)]. Limits on DAS use to fish for skates is controlled by allocations of multispecies, monkfish, and scallop DAS which are periodically adjusted to achieve conservation goals on stocks regulated by those plans. Fishing in two areas for skates accrue DAS use at a differential rate higher than 1:1 (Map 2).

Vessels may also retain and land skates in certain multispecies exempted areas, without being on a DAS trip. When using a gillnet with mesh at least 10-inches throughout the net, vessels may retain up to 20,000 lbs. of skate wings (or 10,000 lbs. of skate wings on trips less than 24 hours in duration), when fishing in the SNE Monkfish and Skate Gillnet Exemption Area [§648.80(b)(5); Map 2]. Vessels fishing in this area with an active Skate Bait Letter of Authorization have no skate possession limit, but may only retain skates less than 23 inches (58.35 cm) in total length and sell them for bait. Vessels using trawls having no smaller than 10” square or 12” diamond mesh [§648.91(c)(1)(i)] may also fish for and land skates without using a DAS in the SNE Monkfish and Skate Trawl Exemption Area [§648.80(b)(5)]. In the Nantucket Shoals Dogfish Exemption Areas [§648.80(a)(10)], and the Little Tunny Exemption Area [§648.80(b)(9)], vessels may retain skates on trips not on a DAS as long as the total weight of skates and skate parts does not exceed 10 percent of the total weight of all other species on board. The same skate possession limit also applies to vessels using small mesh trawls in the Southern New England Exemption Area [§648.80(b)(10)].

In addition, vessels may not fish for skates using certain types of fishing gears in closed groundfish, groundfish rolling closures, or EFH areas (Map 3). Possession of barndoor skate (all areas), thorny skate (all areas), and smooth skate (when caught in the Gulf of Maine Regulated Mesh Area; Map 3) is prohibited.

Map 2. Areas where vessels may fish for skates without using a Multispecies, Monkfish, or Scallop DAS. Skate wing possession limits apply to the Monkfish and Skate Exempted Areas, but skate possession in the other exempted areas is limited to 10% of the weight of all other fish onboard. Possession of smooth skates is prohibited in the Gulf of Maine RMA.	Map 3. Areas which are presently closed to skate fishing by vessels using gears capable of catch groundfish (e.g. trawls, gillnets, dredges, and hook gear) in the groundfish closed and rolling closure areas and bottom tending mobile gear (e.g. trawls and dredges) in the EFH closed areas.
	

5.2.8.2 Alternative 1A – Hard TAC with skate possession limits and time/area management

This alternative controls landings and discards through a hard TAC and accountability measures (Section 5.2.1.3), semi-annual area closures (Section 5.2.5) for vessels that declare into the skate fishery to exceed the incidental skate landings limit (Section 5.2.4), possession limits for the skate wing and skate bait fisheries (see table below), a skate trip declaration requirement for vessels intending to land more than 500 lbs. of whole skates or 220 lbs. of skate wings (Section 5.2.3), plus an annual review and bi-annual specification process (Section 5.2.2). When the Regional Administrator determines that skate catches (landings plus dead discards) will exceed the TAC, skate landings would be prohibited during the remainder of the fishing year. Adjustments to the TAC and TAL would occur in the next fishing year if there are overages in the current fishing year.

Table 15. Proposed alternative 1 skate possession limits (in pounds) for vessels on declared skate trips.

	Skate wing fishery trips		Skate bait fishery trips	
TAL allocation option and limit	2005-2007 basis 6,882 mt[23]	1995-2006 basis 6,269 mt[24]	2005-2007 basis 2,545 mt[25]	1995-2006 basis 2,469 mt[26]
Landings disposition	Wings (whole)	Wings (whole)	Whole	Whole
Skate possession limit	4,800 (10,896)	3,800 (8,626)	6,800	12,100

Rationale: This alternative would prevent landings from exceeding the TALs and skate catch from exceeding the TAC. This alternative would require discard estimates to be derived from sea sampling data, by applying a discard/kept ratio to total landings. Although it might control total catch rather than landings, it might take longer to derive these estimates which also add uncertainty.

Skate wing possession limits can be higher than those in Alternatives 2-5, due to the 15.1% estimated mortality reduction associated with time/area management. Therefore the target mortality reduction to be achieve through skate possession limits is 21.4% or 27.0% in the skate wing fishery, depending on the TAL allocation option chosen, and 36.1% or 18.6% in the skate bait fishery.

5.2.8.3 Alternative 1B – Target TAC with skate possession limits and time/area management

This alternative is exactly the same and has the same skate possession limits as Alternative 1A, except using a Target TAC approach (Section 5.2.1.4) to keep the catch from exceed the limits. In this approach, the Regional Administrator would determine when the landings will meet or likely to meet the TAL (by fishery). When this occurs, the Regional Administrator will issue a notice to prohibit skate landings that exceed the incidental possession limit (Section 5.2.4).

Rationale: This alternative is expected to have the same effect on landings as would Alternative 1A. Discards would be assumed to be a constant fraction of the total catch and would be regulated indirectly

[23] Previously 8,426 mt in the DEIS
[24] Previously 7,677 mt in the DEIS
[25] Previously 3,118 mt in the DEIS
[26] Previously 3,867 mt in the DEIS

by limiting skate landings. Landings are much easier to monitor in real time than are discards (which would otherwise depend on estimates derived from sea sampling), so this alternative may react to excessive catches more quickly than would Alternative 1A.

5.2.8.4 Alternative 2 – Target TAC with skate possession limits and time/area management only as an accountability measure

This alternative is exactly the same as Alternative 1B, but does not use time/area management as a primary tool to control skate landings. This alternative would include a Target TAC approach (Section 5.2.1.4) to keep the catch from exceed the limits, possession limits for the skate wing and skate bait fisheries (see table below), a skate trip declaration requirement for vessels intending to land more than 500 lbs. of whole skates or 220 lbs. of skate wings (Section 5.2.3), plus an annual review and bi-annual specification process (Section 5.2.3).

As an accountability measure, when landings meet or are projected to meet the TAL (by fishery), the Regional Administrator would issue a notice to prohibit skate landings that exceed the incidental possession limit (Section 5.2.4) and also invoke the time/area closures that would apply to vessels declared to be fishing in the skate wing or skate bait fishery.

Skate possession limits would be the primary management measure to control landings in the skate wing and skate bait fisheries. Since there is no effect from time/area management, lower skate possession limits than those in Alternative 1B would be required, as shown in the table below.

Table 16. Proposed alternative 2 skate possession limits (in pounds) for vessels on declared skate trips.

	Skate wing fishery trips		Skate bait fishery trips	
TAL allocation option and limit	2005-2007 basis 6,882 mt[27]	1995-2006 basis 6,269 mt[28]	2005-2007 basis 2,545 mt[29]	1995-2006 basis 2,469 mt[30]
Landings disposition	Wings (whole)	Wings (whole)	Whole	Whole
Skate possession limit	2,500 (5,675)	1,900 (4,313)	8,200	14,200

Rationale: Except when landings exceed the TAL and accountability measures are invoked, this alternative allows vessels to fish for skates in the most productive areas, minimizing the fishing time needed to catch skates. For species that are more abundant outside of the proposed skate management areas, this could reduce non-target catch and discards. On the other hand, lower skate possession limits would be needed to achieve the mortality reduction, making trips less efficient.

5.2.8.5 Alternative 3A – Hard TAC with skate possession limits

This alternative is exactly the same as Alternative 1A, but does not use time/area management as a primary tool to control skate landings. This alternative controls landings and discards through a hard TAC and accountability measures (Section 5.2.1.3), possession limits for the skate wing and skate bait fisheries (see table below), a skate trip declaration requirement for vessels intending to land more than

[27] Previously 8,426 mt in the DEIS
[28] Previously 7,677 mt in the DEIS
[29] Previously 3,118 mt in the DEIS
[30] Previously 3,867 mt in the DEIS

500 lbs. of whole skates or 220 lbs. of skate wings (Section 5.2.3), plus an annual review and bi-annual specification process (Section 5.2.2). When the Regional Administrator determines that skate catches (landings plus dead discards) will exceed the TAC, skate landings would be prohibited during the remainder of the fishing year. Adjustments to the TAC and TAL would occur in the next fishing year if there are overages in the current fishing year.

Skate possession limits would be the primary management measure to control landings in the skate wing and skate bait fisheries. Since there is no effect from time/area management, lower skate possession limits than those in Alternative 1A would be required, as shown in the table below.

Table 17. Proposed alternative 3 skate possession limits (in pounds) for vessels on declared skate trips.

	Skate wing fishery trips		Skate bait fishery trips	
TAL allocation option and limit	2005-2007 basis 6,882 mt[31]	1995-2006 basis 6,269 mt[32]	2005-2007 basis 2,545 mt[33]	1995-2006 basis 2,469 mt[34]
Landings disposition	Wings (whole)	Wings (whole)	Whole	Whole
Skate possession limit	2,500 (5,675)	1,900 (4,313)	8,200	14,200

Rationale: This alternative allows vessels to fish for skates in the most productive areas, minimizing the fishing time needed to catch skates. For species that are more abundant outside of the proposed skate management areas, this could reduce non-target catch and discards. On the other hand, lower skate possession limits would be needed to achieve the mortality reduction, making trips less efficient. A hard TAC approach would monitor landings and estimate discards to ensure that the limits on total catch are not exceeded, particularly if different skate discard patterns emerge.

5.2.8.6 Alternative 3B – Target TAC with skate possession limits

This alternative is exactly the same as Alternative 1B, but does not use time/area management as a primary tool to control skate landings. This alternative controls landings and discards through a Target TAC approach to keep the catch from exceed the limits (Section 5.2.1.4), possession limits for the skate wing and skate bait fisheries (see table below), a skate trip declaration requirement for vessels intending to land more than 500 lbs. of whole skates or 220 lbs. of skate wings (Section 5.2.3), plus an annual review and bi-annual specification process (Section 5.2.2). With a target TAC approach, the Regional Administrator would determine when the landings will meet or likely to meet the TAL (by fishery). When this occurs, the Regional Administrator will issue a notice to prohibit skate landings that exceed the incidental possession limit (Section 5.2.4).

Skate possession limits would be the primary management measure to control landings in the skate wing and skate bait fisheries. The skate possession limits would be exactly the same as those specified in Alternative 3A.

Rationale: This alternative allows vessels to fish for skates in the most productive areas, minimizing the fishing time needed to catch skates. For species that are more abundant outside of the proposed skate management areas, this could reduce non-target catch and discards. On the other hand, lower skate

[31] Previously 8,426 mt in the DEIS
[32] Previously 7,677 mt in the DEIS
[33] Previously 3,118 mt in the DEIS
[34] Previously 3,867 mt in the DEIS

possession limits would be needed to achieve the mortality reduction, making trips less efficient. A target TAC approach would monitor landings in real time, but assume that discards would be a constant fraction of the total catch.

5.2.8.7 Alternative 4 – Target TAC with skate possession limits for the wing fishery, and a seasonal quota for the skate bait fishery

This alternative is exactly the same as Alternative 1B, but there would be no skate bait fishery possession limit. Instead, the skate bait fishery would be regulated with a seasonal quota and when landings meet or are expected to meet the quota, the Regional Administrator would issue a notice to prohibit skate landings by vessels holding an active Skate Bait Letter of Authorization.

This alternative controls landings and discards through a Target TAC approach to keep the catch from exceed the limits (Section 5.2.1.4), possession limits for the skate wing fishery (see table below), an annual or seasonal quotas for the skate bait fishery (Section 5.2.7), a skate trip declaration requirement for vessels intending to land more than 500 lbs. of whole skates or 220 lbs. of skate wings (Section 5.2.3), plus an annual review and bi-annual specification process (Section 5.2.2). With a target TAC approach, the Regional Administrator would determine when the landings will meet or likely to meet the TAL (by fishery). When this occurs, the Regional Administrator will issue a notice to prohibit skate landings that exceed the incidental possession limit (Section 5.2.4).

Skate possession limits would be the primary management measure to control landings in the skate wing and a quota would limit landings in the skate bait fishery. The skate possession limits are shown in the table below and the skate bait fishery quotas are described in Section 5.2.7.

Table 18. Proposed alternative 4 skate possession limits (in pounds) for vessels on declared skate trips.

	Skate wing fishery trips		Skate bait fishery trips	
TAL allocation option and limit	2005-2007 basis 6,882 mt[35]	1995-2006 basis 6,269 mt[36]	2005-2007 basis 2,545 mt[37]	1995-2006 basis 2,469 mt[38]
Landings disposition	Wings (whole)	Wings (whole)	Whole	Whole
Alternative 4	4,800 (10,896)	3,800 (8,626)	Quota managed, no possession limit	

Rationale: This alternative also allows vessels to fish for skates in the most productive areas, minimizing the fishing time needed to catch skates. For species that are more abundant outside of the proposed skate management areas, this could reduce non-target catch and discards. On the other hand, lower skate possession limits would be needed to achieve the mortality reduction, making trips less efficient. A target TAC approach would monitor landings in real time, but assume that discards would be a constant fraction of the total catch.

The skate bait fishery would have more flexibility to match skate landings with lobster bait demand, if vessels are not restricted by a possession limit. Fishermen and processors claim that the bait market needs a large volume of landings at specific times to meet market demand. Since landings are regulated by this market demand, there is little incentive for vessels to fish more frequently before a quota is reached, as

[35] Previously 8,426 mt in the DEIS
[36] Previously 7,677 mt in the DEIS
[37] Previously 3,118 mt in the DEIS
[38] Previously 3,867 mt in the DEIS

might happen if a derby-style response develops. If derby-style fishing develops, skate bait prices would plummet to near zero, squashing the incentive to land as much skates as possible before the season ends.

5.3 Considered and Rejected Management Measures

The following measures were considered during the development of Amendment 3, but were rejected for the draft amendment due to concerns about their effectiveness to control catch and their enforceability. Also some measure required additional analysis or development, which would delay the amendment and cause it to miss deadlines and postpone winter and thorny skate rebuilding.

5.3.1 Require vessels to land whole skates

Possession of skate wings and parts while at sea and landings of skate wings or parts would be prohibited.

Rationale: Although it is easier to identify and ensure compliance with possession and landings limits for a species when skates are landed in whole form, the Council did not choose this alternative because of compelling concerns about safety, hold capacity and ice costs, product quality, and at shore processing costs. Other management measures (a wing possession limit, for example) can be effective without identifying species of skates when landed.

5.3.2 Annual catch limit specification by species

The FMP regulates the catch of seven skate species and the Magnuson Act requires an annual limit on total catch for each managed species. This measure would set seven annual catch limits, one for each species, including a specification on maximum discards for species whose landings are prohibited.

Rationale: This measure was rejected because of the difficulty fishermen and processors have to properly identify and report species identification. Although mature adults can be identified by trained scientists and observers, it is much more difficult to do so for juvenile skates (particularly winter and little skates) which are more often landed in the bait fishery and are discarded in all fisheries.

5.3.3 Prohibit possession of winter skates

Vessels would be prohibited from possessing and landing winter skates until the species is rebuilt to the target biomass.

Rationale: Although possession of thorny, smooth (in the Gulf of Maine regulated mesh area only), and barndoor skate is currently prohibited, but prohibitions on other skates would be more difficult. Thorny, smooth, and barndoor skate are much easier to distinguish from other skate species although landings of these species are still reported and observed. Small winter skate, on the other hand, are often very difficult to distinguish from little and clearnose skates. Compliance would be problematic, particularly if the catch contains a mix of juvenile winter and little skates. This measure would also eliminate the skate wing fishery. For these reasons, the Council determined that other ways of controlling skate catch would be more effective at achieving the conservation goals for winter skate.

5.3.4 Gear restricted areas for gears capable of catching skates

All vessels using trawls, gillnets, or dredges would be prohibited from fishing in the areas and seasons in Section 5.2.5 (the areas were chosen for gear restrictions and/or time/area management based on high

CPUE). Vessels would be allowed to obtain a special letter of exemption from the Regional Administrator, provided they use a gear which has been scientifically tested and certified to reduce skate catches by no less than 75% compared to standard fishing gear (as sampled by the observer program). Vessels may also be granted a limited ability to fish with trawls, gillnets, or dredges in these areas when participating in an experimental fishery designed to reduce the catch of winter and/or thorny skates.

Rationale: These area closures are similar to the existing groundfish closed areas, which are closed to all vessels capable of catching the managed species. Not only would the area closures prevent vessels from targeting skates, but would also reduce discarding in areas which the PDT has identified as having high winter and thorny skate catches. This measure would maximize the amount of mortality reduction achieved through area management measures.

On the other hand, there are already large amounts of fishing areas closed to skate fishing (see Map 3) and further restrictions on where vessels fishing for other species are likely to be costly and highly controversial. Discard estimates since 2002 have declined substantially and the effects of Multispecies Framework 42 have not been reflected yet in new estimates of recent discards. Although a substantial amount (and sometimes the majority) of the catch is associated with discards of dead skates, the Council decided to reduce skate mortality and enhance skate rebuilding by focusing on landings in the wing fishery which have been rising. Area management by gear restrictions may also have mitigating effects, because vessels may have to fish longer in the remaining open areas to catch the TAC for the target species. This measure could not only increase the amount of fishing time, but might also increase discards of non-skate species. The Council would prefer to look to improvements in gear selectivity and efficiency as a means to reduce bycatch.

5.3.5 Sector allocations

Vessels with a to-be-defined baseline history would be allowed to form self-selecting sectors and fish a portion of the TAL as a quota. The specifics of a skate sector allocation program would follow most rules and adhere to the Council's policy on sector programs and sector formation. Certain regulations (for example those that limit time at sea) could be waived in lieu of accurate catch reporting and a sector quota. The sector quota could be fished by any set of vessels that belong to the sector, to improve efficiency, reduce costs, or achieve any other objective.

Rationale: The Council rejected this measure for Amendment 3, because it would take substantial time to evaluate the effects and equity of various baseline history periods. Furthermore, the large number of groundfish sector applications may also complicate matters, induce changes in the Council's sector policy and rules under the Multispecies FMP, and also have unknown effects on skate fishing by sector vessels. Therefore the Council postponed taking action on skate sector programs and formation at this time.

5.3.6 Winter skate possession limit

The amendment would establish a secondary possession limit for winter skates, less than the overall limit for skate wings which is currently 20,000 lbs. per trip, or 10,000 lbs. for trips less than 24 hours in duration. Vessels fishing for skates could land no more winter skates than the specified possession limit, even if they are fishing under a Bait Letter of Authorization.

Rationale: Although it is difficult to identify winter skate from other species especially when they are small, this measure would allow vessels to target other species of skates that are not under a rebuilding program. Vessels operating under a Bait Letter of Authorization would be less affected by this measure, since they catch more little skate (and mis-identify some fraction of winter skates). At the same time, however, the vessels fishing under a Bait Letter of Authorization would be prohibited from landing more than the winter skate possession limit, provided they can be identified as such.

The Council rejected this management measure, because fishermen would not be able to take the time to separate and measure winter skates at sea and as a result compliance would be poor. The measure would also increase on deck processing time, either increasing employment costs because a vessel would require more crew or fish would remain on deck longer and increase discard mortality.

5.3.7 Day boat and trip boat skate possession limits

Trips whose duration is less than 24 hours would have a lower skate possession limit than longer trips, consistent with a level that would cause an equivalent percent decline in landings by the two fleet sectors. This day boat possession limit would be different from that calculated by dividing an overall skate possession limit by the average trip length to derive a daily possession limit.

Rationale: A daily skate possession limit value was estimated to be 68-72% of a trip boat skate possession limit, when achieving equivalent reductions in landings. Since the values for the two fleets would be close, the Council predicted that vessels would make day trips more frequently in response. Alternatively, vessels that traditionally made day trips might be enticed to extend trips into a second day to take advantage of a higher trip boat skate possession limit, possibly having some effects on vessel safety. And although vessels may make more frequent and shorter trips in response to a uniform skate possession limit, the Council did not want to enhance that potential effect with a high day boat possession limit.

5.3.8 Maximum size restriction during peak spawning

Possession of female skates whose total length is more than 31.5 inches (80 cm) would be prohibited from June 1 to August 31 while east of 71°W longitude. Possession of female skates whose total length is more than 18 inches (45.72 cm) would be prohibited from June 1 to August 31 and from November 1 to December 31 while west of 71°W longitude and north of 40°N latitude.

Rationale: These limits would reduce the catch of large female skates during peak spawning times. The first limit, east of 71°W longitude, is intended to reduce the catch of spawning female winter skates. The second limit, west of 71°W longitude and north of 40° N latitude, is intended to reduce the catch of spawning female little skates. Both measures are intended to enhance reproduction, rebuilding potential, and sustainable yield. While the measures would increase discarding, conservation is achieved by discard survival and by dissuading vessels from targeting concentrations of large spawning skates. For both little and winter skates, males and females are easily identified by the presence of alar spines on the outer perimeter of the wings of males. Thus during the above seasons, vessels would be prohibited from possessing skate or skate wings without alar spines (see photo below) when greater than the maximum size.

The Council rejected this measure for the same reasons as those for the winter skate possession limit. Not only would fishermen need to identify the species of skates, but also would need to check whether a skate is male or female. While this is not difficult for large, mature skates, fishermen commented that this measure would increase fishing costs and trip length.

5.3.9 Minimum gillnet and trawl mesh for vessels targeting skates

Vessels that have skate permits and possess more than 500 lbs. of whole skates or 220 lbs. of skate wings would be required to use trawls having mesh no less than 10 inches square or 12 inches , or gillnets having mesh no less than 12 inches.

Rationale: Many vessels that target skates commonly use mesh larger than current regulations dictate, particularly when using gillnets. Larger mesh may reduce discards of other species while targeting skates and there is some evidence of size selectivity for skates.

Preliminary analysis of observed trawl and gillnet trips showed that most vessels were using 6" trawl mesh and 12" gillnet mesh. While size selectivity was much better for the gillnet mesh, there were insufficient observations of vessels using different size mesh nets to detect a statistically significant (or even visual) difference in skate size selection. The Council rejected this measure because it required additional analysis which would have otherwise caused an unacceptable delay in developing this amendment.

6.0 COMPLIANCE WITH NATIONAL STANDARDS AND REQUIRED PROVISIONS OF THE MAGNUSON ACT

6.1 Consistency with National Standards

Section 301 of the Magnuson-Stevens Act requires that regulations implementing any fishery management plan or amendment be consistent with the ten national standards listed below.

6.1.1 National Standard 1: Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

The measures in this action are primarily intended to bring the FMP in conformity with this national standard, reducing skate catch to a sustainable level while preventing overfishing and promoting rebuilding of thorny skate. The amendment also establishes an acceptable biological catch (ABC) control rule and accountability measures (AM) to achieve National Standard 1 objectives.

After the 2007 bottom trawl survey, NMFS declared smooth and winter skates to be overfished based on the survey results. The biomass for both declined to a value less than the minimum biomass threshold. In addition, thorny skate, which was overfished, declined faster than the maximum fishing mortality threshold allow and was therefore experiencing overfishing. The Northeast Fisehries Science Center held a Data Poor Assessment Workshop (DPWS) which developed new catch data sets, updated data used in assessments, and attempted analytical stock assessments. While the analytical stock assessments were deemed unreliable for management at this time, the DPWS recommended updating the survey time series that had been used to calculate the skate biological reference points. As a result, the current biomass of smooth and winter skates is above the minimum biomass threshold, and as such would not be classified as overfished. Nonetheless, the Council's SSC was concerned about the status of these species and recommended using the median catch/biomass exploitation ratio to limit catches to prevent these species from becoming overfished.

MSY is defined by the FMP as a level of catch that causes biomass declines of more than acceptable limits, which vary by skate species. OY is also defined by the plan in a way that is consistent with plan objectives, but there are differences for species in a rebuilding program (barndoor, smooth, and thorny) in which OY is defined as zero. For the other four skate species, OY is generally defined as "the amount of skates that are harvested legally under the provisions of this FMP and the yield that results from the management measures in other fisheries to the extent that these measures further impact (and likely reduce) the harvest." This definition of OY is consistent with and recognizes the role of skates as a non-targets species in the multispecies, monkfish, and scallop fisheries, all controlled by limits on DAS and other measures to limit fishing activity.

This amendment proposes a new ABC control rule which is consistent with new National Standard 1 guidelines (FR vol. 74, No. 11, pages 3178-3213). Using new catch data developed by the Data Poor Assessment Workshop, the PDT analyzed the observed effect that the catch/biomass exploitation ratio had on changes in survey biomass. Out of several options put forth by the PDT, the Council's Scientific and Statistical Committee (SSC) approved an ABC that will reduce the potential for overfishing (see Appendix I, Documents 16 and 17), and the limit is likely to increase biomass for species that are overfished, rebuilding, or near the minimum biomass threshold. Although uncertainty could not be quantified, the ABC inherently accounts for scientific uncertainty because it incorporates the variability the effect that catch has on skate biomass. The Council furthermore approved a target (or ACT) that is 75 percent of the ABC. Triggers are also included in the proposed action to curtail skate fishing before the TALs39 are reached. The proposed action includes AMs that modify the ABC control rule if scientific and management uncertainty are higher than expected and observed catch exceeds the ABC and reported landings exceed the TALs.

The stocks in the skate fishery include the seven managed skate species. Due to the way the fishery is prosecuted, the catch on non-target species is thought to be low, but skates are often caught in association with multispecies (particularly flounders), monkfish, and scallops. These species are however managed under their own FMPs. Nothing in the Skate FMP prevents those plans from meeting their objectives. Other than the above managed species, no other species caught in the skate fishery have been identified as an ecosystem component.

6.1.2 National Standard 2: Conservation and management measures shall be based on the best scientific information available.

The measures in this action are based on analysis of the fishery which are presented in the 2007 SAFE Report and on data developed during the Data Poor Workshop held by the Northeast Fisheries Science Center in December 2008 (DPWS reports available at: http://www.nefsc.noaa.gov/nefsc/saw/datapoor/Data Poor - Review Panel Report Final-1-20-09.pdf and http://www.nefsc.noaa.gov/publications/crd/crd0902/). The skate possession limit and two-bin models were derived from a frequently used and well reviewed model applied to the multispecies fishery, both reviewed by the Council's SSC (technical reports available at http://www.nefmc.org/skates/tech docs/Possession limit model results.pdf and http://www.nefmc.org/skates/tech docs/Two Bin Model results.pdf). Although the model currently being used to predict the effectiveness of the management measures to reduce mortality from commercial fishing has evolved into the Closed Area Model (CAM), this model has not been developed for the skate fishery and is therefore not available for use in estimating the effects on skate fishing. The SSC has reviewed the methods that were used and found them to be an appropriate substitute.

6.1.3 National Standard 3: To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

All skate stocks are managed as a unit throughout their range. There are some differential measures that apply to skate fisheries, but these are meant to focus conservation on skate stocks that need more attention. Since the skate wing fishery targets and lands predominantly winter skate, the measures that apply to that fishery are more conservative than those that apply to the bait fishery.

6.1.4 National Standard 4: Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various United States fishermen, such allocation shall be (A) fair and equitable to all such fishermen; (B) reasonably calculated to promote conservation; and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

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39 TAL is the amount of landings allowed after the expected discards are deducted from the ACT.

The proposed measures are applied to all vessels regardless of the state of residence of the owner or operator of the vessels. Some measures apply to specific areas, and vessels that fish only in those areas are affected by these measures more than vessels that fish in other areas. This is necessary in order to reduce mortality on specific stocks of fish in the most effective manner while allowing opportunities to fish for other stocks of fish. While some argue that any fishing mortality control (including possession limits and quotas) results in the allocation of resources, the measures adopted by this action are reasonably expected to promote conservation by reducing skate fishing mortality.

6.1.5 National Standard 5: Conservation and management measures shall, where practicable consider efficiency in the utilization of fishery resources; except that no such measure shall have economic allocation as its sole purpose.

The DAS limits in related FMPs which limit the amount of fishing effort targeting skates coupled with skate possession limits reduce the efficiency of fishing vessels. These measures are necessary because they help control the catch by reducing or limiting the catch and/or catch rates of individual fishing vessels. The measures are considered practicable because they prevent the ACLs and quotas from inducing derby-style fishing behavior and market reactions which would otherwise undermine the profitability of vessels that target skates or land them as incidental catch while targeting other species. None of the measures in this action have economic allocation as their sole purpose – all are designed to contribute to the control of fishing mortality.

6.1.6 National Standard 6: Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

Although this amendment would create limits on total catch and lower skate possession limits to reduce the incentive to fish for skates, the primary effort control measure is the limit on DAS which are controlled by related FMPs (i.e. multispecies, monkfish, and scallop). This flexibility is important, because it allows for each vessel operator to fish when and how it best suits his or her business, and also decide whether to target skates or other species managed by the NEFMC. By coupling the skate mortality control to the DAS programs, it allows fishermen to respond to changes in relative availability of the various bottom fish, respond to changing prices, and respond to changing regulations that affect the profitability of his/her vessel in various ways. Vessels can make short or long trips, and can fish in any open area at any time of the year. The management plan also allows vessels to use trawls or gillnets, with few constraints on configuration of that gear with the exception of minimum mesh sizes that are designed to limit the harvest of undersized fish.

6.1.7 National Standard 7: Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

While some of the measures used in the management plan, and proposed by this action, tend to increase costs, those measures are necessary for achieving the plan's objectives. As an example, measures that reduce the efficiency of fishing vessels (such as possession limits or minimum mesh size) tend to increase the costs of fishing vessels since for a given amount of time fishing catches are reduced. These measures accomplish other goals, however, reducing the catch of undersized fish in the case of minimum mesh sizes and keeping an even and constant supply of fish in the marketplace.

For the most part, measures are not duplicative. In particular, the reliance of this plan on measures in other related FMPs allows the Council to achieve its mortality objectives while minimizing the amount of rules that vessels must follow while fishing for a mix of species (including skates). Moreover, the proposed action would also rely on existing reporting requirements to monitor the catch to ensure it does not exceed the ABC. Several alternatives in the draft amendment included new trip declaration requirements to determine when a vessel was on a skate trip, and whether it would be fishing to supply the wing or bait market. The trip's landings would be attributed to the appropriate TAL based on this trip declaration. To minimize costs and avoid unnecessary duplication, the proposed alternative will instead rely on a combination of product form (whole or wings) and market (wings or bait) both currently reported by the dealer to determine how to count the skate landings.

6.1.8 National Standard 8: Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse impacts on such communities.

In order to meet the requirement to end overfishing and rebuild overfished stocks, in the short term fishing catches and revenues will be reduced by the proposed action. The proposed action is expected to foster increases in skate biomass to levels consistent with MSY and thus provide for the long-term sustained participation of all port groups in the fishery.

6.1.9 National Standard 9: Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

While the adoption of lower skate possession limits is expected of increase the ratio of discarded to kept catch in some cases, many vessels that target and land large amounts of skates do not catch sufficient amounts of other species to continue fishing (and discard the excess skates). It is expected that these vessels will curtail fishing effort, which will also have a beneficial effect of reducing the discard amounts of undersized (or oversized in the case of the skate bait fishery) skates. The impacts of the alternatives, and in particular skate possession limits, on discards is evaluated in Sections 8.3.1.7 and 8.3.1.10 of this amendment.

The reduced skate catch limits (TALs) will also reduce discards in the fishery, unless vessels with unused DAS can re-direct effort onto other species which may have a higher bycatch rate than if the vessel were to continue fishing for skates. Based on public comment and advice of the Advisory Panel, the proposed action includes a higher incidental skate possession limit (1135 vs. 500 lbs of whole skates) than had been proposed in the draft alternatives. This change was made to minimize the effect of the incidental skate possession limit on skate discards.

6.1.10 National Standard 10: Conservation and management measures shall, to the extent practicable, promote safety of human life at sea.

Although possession limits and quotas can have a negative impact on vessel safety, the Council does not anticipate that they will cause vessels to remain at sea for excessively long periods or fish during periods that are adverse to safety. The vessels would not be forced to remain at sea to run out their DAS clocks to account for their catch, or to take their skate trips and use their DAS during a particular part of the year. Some fishermen may however fish during adverse periods to maximize their revenue as seasonal prices rise. Due in part to spot pricing of fish, such has been the characteristic of deep sea fisheries for many years. Seasonal quotas do, however, change the motivation to fish, possibly in adverse conditions however. The purpose of three seasonal, rather than one annual, quota is intended to minimize the duration of potential closures. In addition, the Council added a 20,000 lb. skate possession limit for the bait fishery to reduce the incentive to land large volumes of skates before a closure, largely as a safety measure.

6.2 Other M-SFCMA requirements

Section 303 (a) of FCMA contains 14 required provisions for FMPs. These are discussed below. It should be emphasized that the requirement is imposed on the FMP. In some cases noted below, the M-S Act requirements are met by information in the Skate FMP, as amended. Any fishery management plan that is prepared by any Council, or by the Secretary, with respect to any fishery, shall—

6.2.1 Conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States which are consistent with the Magnuson Stevens Fishery Conservation and Management Act

Contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States, which are-- (A) necessary and appropriate for the conservation and management of the fishery to prevent overfishing and rebuild overfished stocks, and to protect, restore, and promote the long-term health and stability of the fishery; (B) described in this subsection or subsection (b), or both; and (C) consistent with the national standards, the other provisions of this Act, regulations implementing recommendations by international organizations in which the United States participates (including but not limited to closed areas, quotas, and size limits), and any other applicable law;

Foreign fishing is not allowed under this management plan or this action, so specific measures are not included that specify and control allowable foreign catch. The measures in this management plan and in the proposed action are designed to prevent overfishing and rebuild overfished stocks. There are not international agreements or recommendations by international organizations that are germane to multispecies management.

6.2.2 Description of the fishery

Contain a description of the fishery, including, but not limited to, the number of vessels involved, the type and quantity of fishing gear used, the species of fish involved and their location, the cost likely to be incurred in management, actual and potential revenues from the fishery, any recreational interest in the fishery, and the nature and extent of foreign fishing and Indian treaty fishing rights, if any;

The Skate FMP and the 1999 SAFE Report included a thorough description of the skate fishery through 2002, including the gears used, number of vessels, landings and revenues, and effort used in the fishery. The 2008 SAFE Report (Section 7.0) updates this information, including new information on skate biology and life history characteristics (Section 7.2), the commercial skate fishery (Section 7.5.1), recreational fishing interests (Section 7.5.1.6), and the skate marketing/processing sector (Sections 7.5.2 and 7.5.3). There is no foreign fishing interest in skate fishing within the US EEZ and there are no Indian treaty fishing rights associated with this fishery.

6.2.3 Maximum sustainable yield and optimum yield

Assess and specify the present and probable future condition of, and the maximum sustainable yield and optimum yield from, the fishery, and include a summary of the information utilized in making such specification;

The present biological status of the fishery is described in Section 7.2.6, but are updated in the DPWS reports (DPWS reports available at: http://www.nefsc.noaa.gov/nefsc/saw/datapoor/Data Poor - Review Panel Report Final-1-20-09.pdf and http://www.nefsc.noaa.gov/publications/crd/crd0902/). Future conditions of the resource are impossible to quantify due to poor information with which to derive these estimates. However, the intent of the proposed action is to increase biomass to a level that is consistent with MSY. The maximum sustainable yield and optimum yield for the fishery are described in the Skate FMP in Section 4.3.3, and are not changed by this action.

6.2.4 Capacity

Assess and specify-- (A) the capacity and the extent to which fishing vessels of the United States, on an annual basis, will harvest the optimum yield specified under paragraph (3), (B) the portion of such optimum yield which, on an annual basis, will not be harvested by fishing vessels of the United States and can be made available for foreign fishing, and (C) the capacity and extent to which United States fish processors, on an annual basis, will process that portion of such optimum yield that will be harvested by fishing vessels of the United States;

U.S. fishing vessels are capable of, and expected to, harvest the optimum yield from this fishery as specified in the Skate FMP in Section 4.3.3. U.S. processors are also expected to process the harvest of U.S. fishing vessels. None of the optimum yield from this fishery can be made available to foreign fishing.

6.2.5 Specify pertinent data

Specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used, catch by species in numbers of fish or weight thereof, areas in which fishing was engaged in, time of fishing, number of hauls, and the estimated processing capacity of, and the actual processing capacity utilized by, United States fish processors;

Current reporting requirements for this fishery have been in effect since 2003, and since 1994 for many fisheries that catch skates while targeting other species. The requirements include Vessel Trip Reports (VTRs) that are submitted by each fishing vessel. Dealers are also required to submit reports on the purchases of regulated skates from permitted vessels. Current reporting requirements are detailed in 50 CFR 648.7.

6.2.6 Consider and provide for temporary adjustments

Consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery; except that the adjustment shall not adversely affect conservation efforts in other fisheries or discriminate among participants in the affected fishery;

Relying on the measures in place for the multispecies, monkfish, and scallop fisheries, the proposed action continues to allow the carry-over of a small number of DAS from one fishing year to the next. If a fisherman is unable to use all of his DAS because of weather or other conditions, this measure allows his available fishing time to be used in the subsequent fishing year. This practice does not require consultation with the Coast Guard.

6.2.7 Describe and identify essential fish habita

Describe and identify essential fish habitat for the fishery based on the guidelines established by the Secretary under section 305(b)(1)(A), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat;

Essential fish habitat was defined in an earlier action. This action does not change those designations. The Council may review those designations in an omnibus EFH amendment that is currently in development.

6.2.8 Assess and specify the nature and extent of scientific data

In the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

Scientific needs are continuously reviewed and revised by the Council's Research Steering Committee who consult with NMFS and the various PDTs to set priorities, and are not revised by this action.

6.2.9 Assess, specify, and describe the likely effects, if any, of the conservation and management measures

Include a fishery impact statement for the plan or amendment (in the case of a plan or amendment thereto submitted to or prepared by the Secretary after October 1, 1990) which shall assess, specify, and describe the likely effects, if any, of the conservation and management measures on--(A) participants in the fisheries and fishing communities affected by the plan or amendment; and (B) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants;

Impacts of this amendment on fishing communities directly affected by this action can be found in Sections 8.8.

6.2.10 Specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished

Specify objective and measurable criteria for identifying when the fishery to which the plan applies is overfished (with an analysis of how the criteria were determined and the relationship of the criteria to the reproductive potential of stocks of fish in that fishery) and, in the case of a fishery which the Council or the Secretary has determined is approaching an overfished condition or is overfished, contain conservation and management measures to prevent overfishing or end overfishing and rebuild the fishery;

Objective and measurable criteria for determining when the fishery is overfished, including an analysis of how the criteria were determined, can be found in the FMP in Section 4.4 and in the DPWS document available at http://www.nefsc.noaa.gov/publications/crd/crd0902/. This amendment updates the survey time series and recalculates the overfishing definition biological reference points using the 75th percentile of the survey biomass time series, which are found in Section 5.1.1. Both fishing mortality and stock biomass are measured using an annual bottom trawl survey (spring survey for little skate, fall survey for the other six managed species). A stock is classified as overfished when the three year biomass moving average is below ½ of the 75th percentile of the selected time series40 for a stock. A stock is classified as overfished when the three year biomass moving average declines more than a specified threshold value[41] for the stock. Both criteria can be determined annually when the final survey data become available for analysis.

6.2.11 Establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery

Establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority-- (A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided;

The U.S. District Court of Washington, DC, found in the case of *Conservation Law Foundation et al v. Evans* that Amendment 13 did not meet the requirement to describe a standardized bycatch reporting methodology for the multispecies fishery. The Council and the NMFS developed a Standardized Bycatch Reporting Methodology Omnibus Amendment (Amendment 1 to the Skate FMP) for all of the Council's FMPs to *assess the amount and type of bycatch occurring in the fishery*. Relying on management measures that specify gear restrictions for vessels using Multispecies, Monkfish, and Scallop DAS, the Skate FMP minimizes discards to the extent practicable.

In Sections 8.3.1.7 and 8.3.1.10, Amendment 3 also analyzes the effect that the proposed skate possession limits will have on discards. The Council balanced the achievement of the mortality objectives with the effect on skate and other discards to specify wing and bait fishery possession limits. In addition, the Council raised the incidental skate possession limit (Section 5.1.8) from 500 lbs. (an

40 The selected time series varies by species due to changes in survey coverage.
41 This threshold ranges from 20 to 60%, depending on the skate species because the normal variation survey biomass varies for each species.

alternative in the DEIS) to 1135 lbs. (whole weight equivalent) to minimize discards on trips that target species other than skates.

6.2.12 Assess the type and amount of fish caught and released alive during recreational fishing

Assess the type and amount of fish caught and released alive during recreational fishing under catch and release fishery management programs and the mortality of such fish, and include conservation and management measures that, to the extent practicable, minimize mortality and ensure the extended survival of such fish;

This management plan does not include a catch and release recreational fishery management program and thus does not address this requirement. The recreational fishery catch (including live and dead discards) is analyzed and discussed in Section 7.5.1.6.

6.2.13 Include a description of the commercial, recreational, and charter fishing sectors

Include a description of the commercial, recreational, and charter fishing sectors which participate in the fishery and, to the extent practicable, quantify trends in landings of the managed fishery resource by the commercial, recreational, and charter fishing sectors

As noted above, the description of the commercial and recreational, fishing sectors was updated in the 2008 SAFE Report and is described in Section 7.5 of this document.

6.2.14 Allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors

To the extent that rebuilding plans or other conservation and management measures which reduce the overall harvest in a fishery are necessary, allocate any harvest restrictions or recovery benefits fairly and equitably among the commercial, recreational, and charter fishing sectors in the fishery.

Proposed management measures restrict harvest for all sectors of the fishery. Preventing overfishing and the anticipated increases in biomass is expected to benefit both the wing and bait skate fishery participants. Recovery benefits will be allocated equitably and benefit fishermen who have DAS allocations. In addition, since the skate bait fishery is conducted by a well defined group of vessels, the Council is contemplating setting a control data for the skate bait fishery which may be used to restrict future access to this fishery. It is anticipated that increases in skate biomass, particularly for little skate, will benefit vessels that participate in the bait fishery and who would be likely to qualify for future limited access using the control date as a qualification criterion.

6.2.15 EFH provisions

The EFH provisions of the SFA (50 CFR Part 600.815) require the inclusion of the following components of FMPs. The Council has fully met these obligations as detailed below each mandatory component.

(A) Identify and description of EFH

(B) Fishing activities that adversely affect EFH

(i) Evaluation of potential adverse effects

(ii) Minimizing adverse effects

(C) Identification of non-Magnuson-Stevens Act fishing activities that may adversely affect EFH

(D) Identification of non-fishing related activities that may adversely effect EFH.

(E) Cumulative impacts analysis

(F) Identification of conservation and enhancement actions.

(G) List the major prey species and discussion the location of the prey species' habitat

(H) Identification of habitat areas of particular concern

(I) Recommendations for research and information needs

(J) Review and revision of EFH components of FMPs.

(A) Identify and description of EFH

(B) Fishing activities that adversely affect EFH

(i) Evaluation of potential adverse effects

The EFH Final Rule (50 CFR Part 600) provides guidance to the Regional Fishery Management Councils for identifying fishing activities that adversely impact essential fish habitat (EFH). In addition to the EFH Final Rule, guidance provided by the Habitat Conservation Division (HCD) headquarters office in the form of a memo dated October 2002. This evaluation should primarily include the impacts of activities associated with the fishery that is the subject of the management action, as well as other federally-managed and state-managed fishing activities. Based on the guidance provided by the EFH Final Rule and the HCD office, this determination focuses on the effects of fishing activities in the New England multi-species fishery on groundfish EFH. It also includes information on the effects of other federally-managed fishing activities on groundfish EFH, and identifies gears used in state-managed fisheries that could affect groundfish EFH.

In Phase I, the Council identified EFH for its managed species and fishing activities that adversely impact EFH. The Essential Fish Habitat Omnibus Amendment for phase I was Amendment 13 to the NE Multispecies FMP, Amendment 10 to the Atlantic Sea Scallop FMP, and Amendment 2 to the Monkfish FMP. Since these related plans manage fisheries which often catch skates as bycatch, or as a non-target catch, the analysis for the skate fishery is found in these documents, particularly in more detail in previous sub-sections of Section 9.3.1 of Amendment 13 to the NE Multispecies FMP.

Section 9.3.1.2 of Amendment 13 to the NE Multispecies FMP describes commercial fishing gears used in the Northeast region of the U.S. and the geographic distribution and use of the principal bottom-tending gears in three broadly-defined habitat types. It also evaluates the effects of bottom trawls and dredges on benthic marine habitats in the region. The information in this section serves as the basis for evaluating which gear types, if any, are most likely to have an adverse impact on essential fish habitat for federally-managed species in the NE region.

Section 9.3.1.3 of Amendment 13 to the NE Multispecies FMP evaluates the vulnerability of all 37 federally-managed species to gear types found to have potential adverse impacts on EFH. Vulnerability was evaluated according to four broad categories: none (0); low (L); moderate (M); and high (H), based upon a matrix analysis of habitat function, habitat sensitivity and gear use. Results are summarized by species and life stage.

Section 9.3.1.8 of Amendment 13 to the NE Multispecies FMP summarizes the results and findings of this section, identifying the potential adverse impacts of the three principal mobile, bottom-tending gears on three principal bottom types in the region. These results serve as the basis for analyzing proposed alternatives to minimize the adverse impacts of these gears on EFH.

(ii) Minimizing adverse effects

The EFH Final Rule stipulates "each FMP must minimize to the extent practicable the adverse effects of fishing on EFH that is designated under other federal FMPs". Federally-managed species that could be affected by the New England groundfish fishery are listed in Section 9.3.1.7 of Amendment 13 to the NE Multispecies FMP.

In order to minimize and mitigate the adverse effects of the fishery on EFH the Council implemented effort reductions, gear restrictions and habitat closed areas for bottom tending mobile gear. The Council has determined that the combination of these measures minimizes, to the extent practicable, the adverse effects of fishing on EFH. This includes the adverse effects of the groundfish and skate fisheries on all federally-designated EFH as well as the adverse effects of other federally-managed fisheries on groundfish EFH. No measures in Amendment 3 would have an adverse or mitigating effect on the measures in Amendment 13 to the Multispecies FMP, or in the Scallop or Monkfish FMPs.

(C) Identification of non-Magnuson-Stevens Act fishing activities that may adversely affect EFH

This section will be thoroughly updated in the upcoming omnibus habitat amendment (to be Amendment 2 to the Skate FMP).

(D) Identification of non-fishing related activities that may adversely effect EFH.

The Essential Fish Habitat Omnibus Amendment for Phase I addresses the requirements of this component. This section will be thoroughly updated in the upcoming omnibus habitat amendment (to be Amendment 2 to the Skate FMP).

(E) Cumulative impacts analysis

Section 8.1 of this amendment addresses the requirement of this component.

(F) Identification of conservation and enhancement actions.

This section will be thoroughly updated in the upcoming omnibus habitat amendment (to be Amendment 2 to the Skate FMP).

(G) List the major prey species and discussion the location of the prey species' habitat

This section will be thoroughly updated in the upcoming omnibus habitat amendment (to be Amendment 2 to the Skate FMP).

(H) Identification of habitat areas of particular concern

This section will be thoroughly updated in the upcoming omnibus habitat amendment (to be Amendment 2 to the Skate FMP).

(I) Recommendations for research and information needs

This section will be thoroughly updated in the upcoming omnibus habitat amendment (to be Amendment 2 to the Skate FMP).

(J) Review and revision of EFH components of FMPs.

This section will be thoroughly updated in the upcoming omnibus habitat amendment (to be Amendment 2 to the Skate FMP).

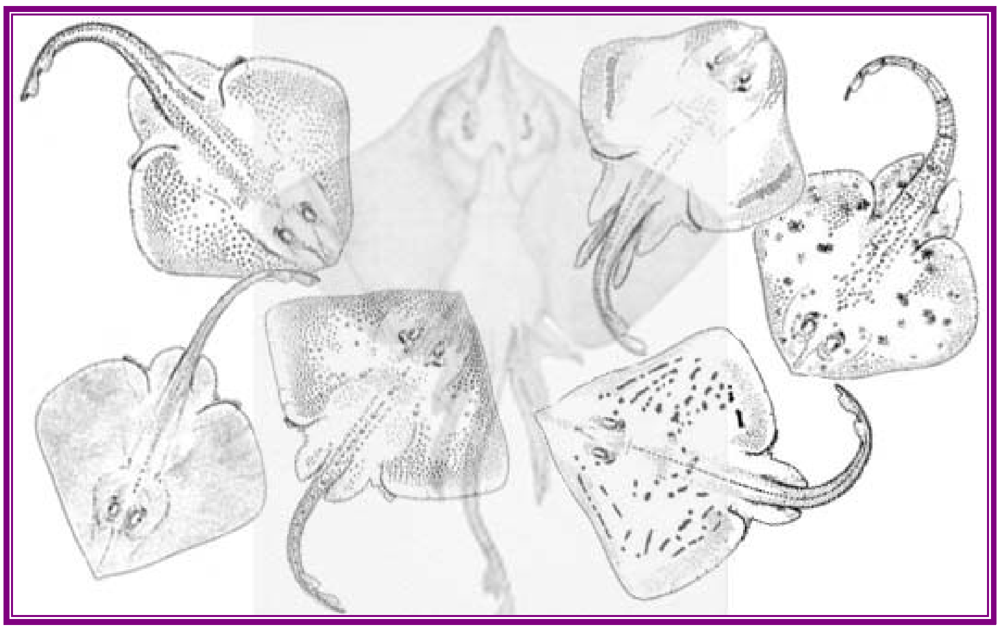
7.0 DESCRIPTION OF THE RESOURCE AND THE AFFECTED ENVIRONMENT (EIS) (SAFE REPORT); SOCIO-ECONOMIC ENVIRONMENT AND FISHERY IMPACT STATEMENT

STOCK ASSESSMENT AND FISHERY EVALUATION (SAFE Report) REPORT

And

Affected Environment (DEIS) FOR SKATE AMENDMENT 3

2008



Prepared by the
New England Fishery Management Council
in consultation with
National Marine Fisheries Service

September 2008

7.0 SAFE REPORT

7.1 Introduction

This document serves two purposes: an update of the Stock Assessment and Fishery Evaluation Report (SAFE) and a Description of the Affected Environment (Section 7) for the Draft Environmental Impact Statement for Skate Amendment 3. Since the document serves as Section 7 of the DEIS in Amendment 3, it is numbered beginning with Section 7 in this stand-alone SAFE Report to reduce confusion. There is therefore no Sections 1-6 in the stand-alone SAFE Report.

This section is intended to provide background information for assessing the impacts, to the extent possible, of the proposed management measures on related physical, biological, and human environments. It includes a description of the stocks and the physical environment of the fishery as well as life history information, habitat requirements, and stock assessments for relevant stocks and a discussion of additional biological elements such as endangered species and marine mammals. This descriptive section also describes the human component of the ecosystem, including socioeconomic and cultural aspects of the commercial and recreational fisheries and the impacts of other human activities on the fisheries in question. Much of the information contained in this section is a compilation of information used to make choices from a range of alternatives during the development of the proposed management action.

This Stock Assessment and Fishery Evaluation (SAFE) Report was prepared by the New England Fishery Management Council's Skate Plan Development Team (PDT). It presents available biological, physical, and socioeconomic information for the northeast's region skate complex and its associated fisheries. It also serves as the Affected Environment description for the DEIS associated with Amendment 3.

Table 19 presents the seven species in the northeast region's skate complex, including each species common name(s), scientific name, size at maturity (total length, TL), and general distribution.

Table 19. Skate Species Identification for Northeast Complex

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	GENERAL DISTRIBUTION	SIZE AT MATURITY cm (TL)	OTHER COMMON NAMES
Winter Skate	*Leucoraja ocellata*	Inshore and offshore Georges Bank (GB) and Southern New England (SNE) with lesser amounts in Gulf of Maine (GOM) or Mid Atlantic (MA)	Females: 76 cm Males: 73 cm 85 cm	Big Skate Spotted Skate Eyed Skate

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	GENERAL DISTRIBUTION	SIZE AT MATURITY cm (TL)	OTHER COMMON NAMES
Barndoor Skate	*Dipturus laevis*	Offshore GOM (Canadian waters), offshore GB and SNE (very few inshore or in MA region)	Males (GB): 108cm Females (GB): 116 cm	
Thorny Skate	*Amblyraja radiata*	Inshore and offshore GOM, along the 100 fm edge of GB (very few in SNE or MA)	Males (GOM): 87 cm Females (GOM): 88 cm 84 cm	Starry Skate
Smooth Skate	*Malacoraja senta*	Inshore and offshore GOM, along the 100 fm edge of GB (very few in SNE or MA)	56 cm	Smooth-tailed Skate Prickly Skate
Little Skate	*Leucoraja erinacea*	Inshore and offshore GB, SNE and MA (very few in GOM)	40-50 cm	Common Skate Summer Skate Hedgehog Skate Tobacco Box Skate
Clearnose Skate	*Raja eglanteria*	Inshore and offshore MA	61 cm	Brier Skate
Rosette Skate	*Leucoraja garmani*	Offshore MA	34 – 44 cm; 46 cm	Leopard Skate

Abbreviations are for Gulf of Maine (GOM), Georges Bank (GB), southern New England (SNE) and the Mid-Atlantic (MA) regions.

7.2 Biological Environment

The Essential Fish Habitat Source Documents prepared by the Northeast Fisheries Science Center (NEFSC) of the National Marine Fisheries Service for each of the seven skate species, provide most available biological and habitat information on skates. These technical documents are available at http://www.nefsc.noaa.gov/nefsc/habitat/efh/:

Life history, including a description of the eggs and reproductive habits

Average size, maximum size and size at maturity

Feeding habits

Predators and species associations

Geographical distribution for each life history stage

Habitat characteristics for each life history stage

Status of the stock (in general terms, based on the Massachusetts inshore and NEFSC trawl surveys)

A description of research needs for the stock

Graphical representations of stock abundance from NEFSC trawl survey and Massachusetts inshore trawl survey data

Graphical representations of percent occurrence of prey from NEFSC trawl survey data

7.2.1 Species Distribution

Maps of biomass distribution are included in Section 7.2.3, but additional maps of the abundance distribution for juveniles and adults are published in the 2002 SAFE Report (http://www.nefmc.org/skates/fmp/skate_SAFE.htm).

7.2.2 Stock assessment and status (SAW 44)

The Stock Assessment Review Committee (SARC) meeting of the 44th Northeast Regional SAW was held in the Aquarium Conference Room of the Northeast Fisheries Science Center's (NEFSC) Woods Hole Laboratory in Woods Hole, Massachusetts from October 24 – 26, 2006. The SARC Chairman was Dr. Paul Rago, Northeast Fisheries Science Center, NOAA, Woods Hole, Massachusetts. Members of the SARC included scientists from the NEFSC, NMFS Northeast Regional Office (NERO), NMFS Headquarters, the Mid-Atlantic Fishery Management Council (MAFMC), Atlantic States Marine Fisheries Commission (ASMFC), the States of Rhode Island and Massachusetts, DFO-Canada, and the Virginia Institute of Marine Sciences. The 44th SAW was held in Woods Hole in December 2007 and reviewed the SARC results. The SAW rejected the analytic assessment models that were presented by the SARC because they had not been adequately tested using simulated populations. The SAW recommended using the existing status determination criteria for determining whether skates were overfished or whether overfishing had occurred, as a proxy for MSY-based reference points. Preliminary results from SAW 44 were presented to the Council at its February 2007 meeting and the final results were published in May 2007 (http://www.nefsc.noaa.gov/nefsc/saw/).

The following Terms of Reference were provided by the SAW Steering Committee as the context for the assessment of the northeast region skate complex reviewed by SARC 44 in October 2006:

- Characterize the commercial and recreational catch including landings and discards.
- Estimate fishing mortality, spawning stock biomass, and total stock biomass for the current year and characterize the uncertainty of those estimates. If possible, also include estimates for earlier years.
- Either update or redefine biological reference points (BRPs; proxies for B_{MSY} and F_{MSY}).
- Evaluate current stock status with respect to the existing BRPs, as well as with respect to updated or redefined BRPs (from TOR 3).
- Review, evaluate and report on the status of the SARC/Working Group Research Recommendations offered in recent SARC-reviewed assessments.
- Examine the NEFSC Food Habits Database to estimate diet composition and annual consumptive demand for seven species of skates for as many years as feasible.

For the purposes of simplification, not all of the information contained in the SAW 44 documents is presented in this SAFE Report. The SAW 44 documents (see http://www.nefsc.noaa.gov/nefsc/saw/) are referenced in this SAFE Report and should be consulted for more information about population stock assessment, long term landings, long term discard estimates, and long term survey trends.

The SARC at SAW 30 developed the following biological reference points for each of the seven species of skates in the northeast complex. Alternative reference points were proposed by the SARC at SAW 44. However, these proposed reference points were rejected, resulting in the previous reference points being retained. An evaluation of each species' status in the context of the following reference points is provided in the following section of this document.

7.2.3 Research Survey Data

This section presents data collected through seasonal NEFSC trawl surveys and state research surveys. Information has been updated through the 2005 autumn survey and the 2006 spring survey.

Indices of relative abundance have been developed from NEFSC bottom trawl surveys for the seven species in the skate complex, and these form the basis for most of the conclusions about the status of the complex. All statistically significant NEFSC gear, door, and vessel conversion factors were applied to little, winter, and smooth skate indices when applicable (Sissenwine and Bowman, 1978; NEFSC 1991). For the aggregate skate complex, the spring survey index of biomass exhibited an increase in the late 1990s to early 2000s has recently begun to decline again (http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0710/b.pdf).

The biomass of large-sized skates has steadily declined since the mid-1980s but has remained relatively stable since the late 1990s. An increase in little skate drove the higher abundance of small skates in 1999, but recently the abundance of little skate has declined.

7.2.3.1 Winter Skate

NEFSC bottom trawl surveys indicate that winter skate are most abundant in the Georges Bank (GB) and Southern New England (SNE) offshore strata, with few fish caught in the Gulf of Maine (GOM), or Mid-Atlantic (MA) regions **(**Map 4**)**.

The median length of winter skates sampled by the survey generally, in both the spring and autumn surveys, increased from the mid 1990s through 2002, and then declined slightly to about 45 – 52 cm TL (18 – 20 in). Length frequency distributions from the NEFSC spring and autumn surveys are presented in the SAW 44 documents and are not reproduced in this SAFE Report. Truncation of the length distributions is evident in the NEFSC spring and autumn series since 1990.

Recent spring survey catches have equated to 3.1 fish or 3.0 kg per tow in 2006; recent autumn catch equates to 1.7 fish or 2.6 kg per tow in 2005 (Table 21 and Table 22). The 2006 stratified mean catch is 18.2 fish per tow or 32.4 kg per tow, the highest index since 1991(Table 23). NEFSC survey indices of winter skate abundance are below the time series mean, at about the same value as during the early 1970s. This downward trend is observed in the fall, spring and summer surveys (Figure 3). Current NEFSC indices of winter skate biomass are about 38% of the peak observed during the mid 1980s.

In 2007, winter skate was determined to be overfished, because the biomass index dropped below the threshold. This status remained unchanged in 2008 upon examination of the autumn 2007 survey data. Overfishing is not occurring on this species because the consecutive three-year moving average of the biomass indices did not exceed the maximum threshold which according to the FMP defines when overfishing is occurring.

Table 20. Summary by species of recent survey indices, survey strata used and biomass reference points.

	BARNDOOR	**CLEARNOSE**	**LITTLE**	**ROSETTE**	**SMOOTH**	**THORNY**	**WINTER**
Survey (kg/tow) Time series basis Strata Set	**Autumn 1963 – 1966 Offshore 1 – 30, 33-40**	**Autumn 1975-1998 Offshore 61-76, Inshore 15-44**	**Spring 1982-1999 Offshore 1-30, 33-40, 61-76, Inshore 1-66**	**Autumn 1967-1998 Offshore 61-76**	**Autumn 1963-1998 Offshore 1-30, 33-40**	**Autumn 1963-1998 Offshore 1-30, 33-40**	**Autumn 1967-1998 Offshore 1-30, 33-40, 61-76**
1997	0.11	0.61	2.71	0.01	0.23	0.85	2.46
1998	0.09	1.12	7.47	0.05	0.03	0.65	3.75
1999	0.30	1.05	9.98	0.07	0.07	0.48	5.09
2000	0.29	1.03	8.60	0.03	0.15	0.83	4.38
2001	0.54	1.61	6.84	0.12	0.29	0.33	3.89
2002	0.78	0.89	6.44	0.05	0.11	0.44	5.60
2003	0.55	0.66	6.49	0.03	0.19	0.74	3.39
2004	1.30	0.71	7.22	0.05	0.21	0.71	4.03
2005	1.04	0.52	3.24	0.07	0.13	0.22	2.62
2006	1.17	0.53	3.32	0.06	0.21	0.73	2.48
2007	0.80	0.85	4.46	0.07	0.09	0.32	3.71
2002-2004 3-year average	0.88	0.75	6.72	0.04	0.17	0.63	4.34
2003-2005 3-year average	0.96	0.63	5.65	0.05	0.18	0.56	3.34
2004-2006 3-year average	1.17	0.59	4.59	0.06	0.19	0.55	3.04
2005-2007 3-year average	1.00	0.64	3.67	0.06	0.14	0.42	2.93
Percent change 2005-2007 compared to 2004-2006	-14.2	8.1	-20	12.7	-22.4	-23.7	-3.6
Percent change for overfishing status determination in FMP	-30	-30	-20	-60	-30	-20	-20
Biomass Target	1.62	0.56	6.54	0.029	0.31	4.41	6.46
Biomass Threshold	0.81	0.28	3.27	0.015	0.16	2.2	3.23
CURRENT STATUS	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Not Overfished Overfishing is Not Occurring	Overfished Overfishing is Not Occurring	Overfished Overfishing is Occurring	Overfished Overfishing is Not Occurring

Distribution of winter skate in Canadian waters was examined using research surveys and commercial fishery data by Simon et al. (2003). Winter skate are found from Georges Bank north into the Gulf of St. Lawrence (Simon et al. 2003). Lower concentrations are found on the southern part of the Grand Banks and in nearshore areas of Newfoundland. Research surveys conducted on Georges Bank indicate a higher abundance of winter skate on the USA side of the Bank. No trend in abundance was found in the Georges Bank region; the series average is 1.8 million individuals. In the Gulf of St Lawrence, declines have been evident in the Southern Gulf (decadal averages range from 650,000 individuals in the 1970s, 450,000 individuals in the 1980s, and 170,000 individuals in the 1990s) but have remained stable in the northern area. Since 1998 a noted decline in abundance was observed on the Scotian Shelf; the average from 1998 to 2003 was 1.4 million individuals, which is below the long-term series average of 2.6 million individuals. Frisk et al. (2008) propose that connectivity exists between skate populations, in particular between the Scotian Shelf and Georges Bank. If this connectivity really exists, movement between the two populations would partially explain the increase in winter skate on Georges Bank during the 1980s, if Georges Bank indeed received an influx of winter skates from the Scotian Shelf.

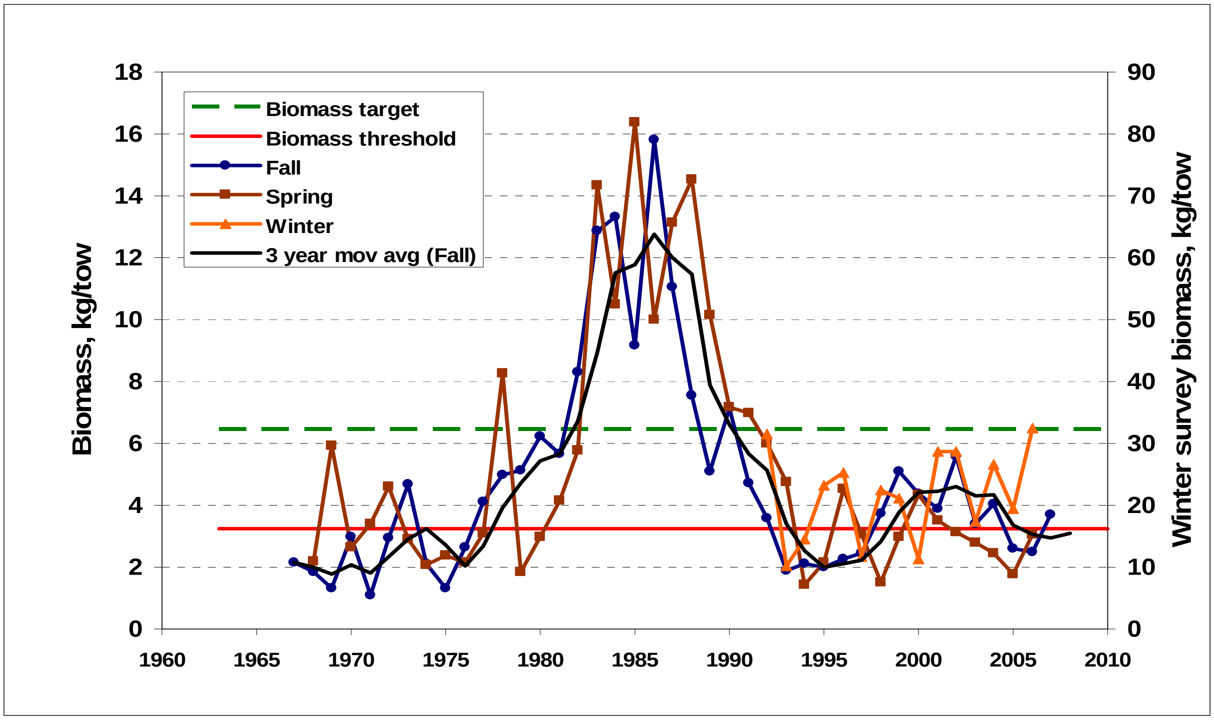
Biological data are limited for this species in Canadian waters. For part of the Scotian Shelf region (NAFO division 4VsW) 50% maturity was considered to be at 75cm total length for both sexes (Simon et al. 2003). In Division 4VsW, the number of mature individuals has been declining throughout the time series, with no individuals above 75cm being caught in 2001 and 2002. Maturity at length estimates are not available for other regions.

In 2005, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) released a status assessment on winter skate that designated this species to be endangered, threatened, and is of special concern and data deficient, based primarily on its life history characteristics and the low frequency of occurrence in catches (Anonymous, 2005).

Indices of abundance for winter skate are available from the Massachusetts Division of Marine Fisheries (MADMF) spring and autumn research trawl surveys in the inshore waters of Massachusetts during 1978-2006. The spring survey index rebounded to moderate levels during 1992-1996 before dropping again to low values in the late 1990s and remaining low through 2006 (SAW44 2006). The autumn index is more variable, but generally shows the same pattern. Indices of abundance for winter skate are also available from the Connecticut Department of Environmental Protection (CTDEP) spring and autumn finfish trawl surveys in Long Island Sound during 1984-2006. Annual CTDEP survey catches have ranged from 0 to 115 skates. CTDEP survey indices suggest that after increasing to a time series high from 1984 through 1989, winter skate in Long Island Sound has declined slightly (SAW44 2006).

Figure 3. Winter skate stratified mean weight and number per tow for the winter, spring, and fall NEFSC trawl surveys.

Survey Biomass (kg/tow)



Survey Abundance (#/tow)

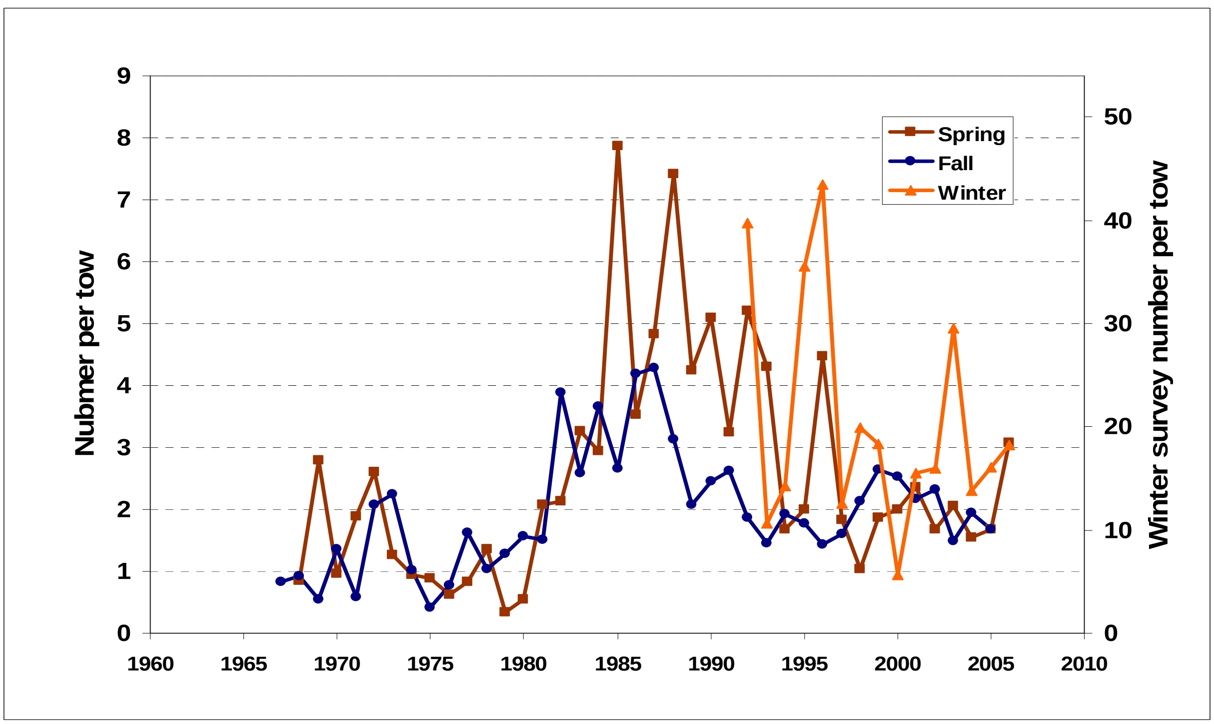


Table 21. Abundance and biomass from NEFSC spring surveys for winter skate for the Gulf of Maine to Mid-Atlantic region (offshore strata 1-30,33-40,61-76). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006.

	Weight/tow			**Number/tow**				**Length (cm TL)**						**nonzero**	
	Mean	Lower	Upper	Mean	Lower	Upper	Ind wt	Min	5%	50%	Mean	95%	Max	Tows	No fish
2000	4.358	2.273	6.443	1.998	1.041	2.954	2.181	15	34	62	62.2	82	99	57	457
2001	3.496	1.889	5.103	2.350	0.912	3.787	1.488	20	27	44	52.1	82	100	48	556
2002	3.132	1.650	4.614	1.688	0.949	2.426	1.856	15	29	59	58.6	82	93	48	407
2003	2.799	1.471	4.127	2.047	1.164	2.931	1.367	15	29	49	53.4	82	100	61	606
2004	2.446	1.512	3.379	1.547	1.015	2.080	1.581	18	29	50	54.6	85	97	58	356
2005	1.757	0.869	2.645	1.672	0.470	2.874	1.051	15	30	45	48.6	75	97	52	375
2006	3.041	1.020	5.062	3.067	0.465	5.668	0.992	15	24	43	47.2	75	99	55	779

Table 22. Abundance and biomass from NEFSC autumn surveys for winter skate for the Gulf of Maine to Mid-Atlantic region (offshore strata 1-30, 33-40, 61-76). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2005.

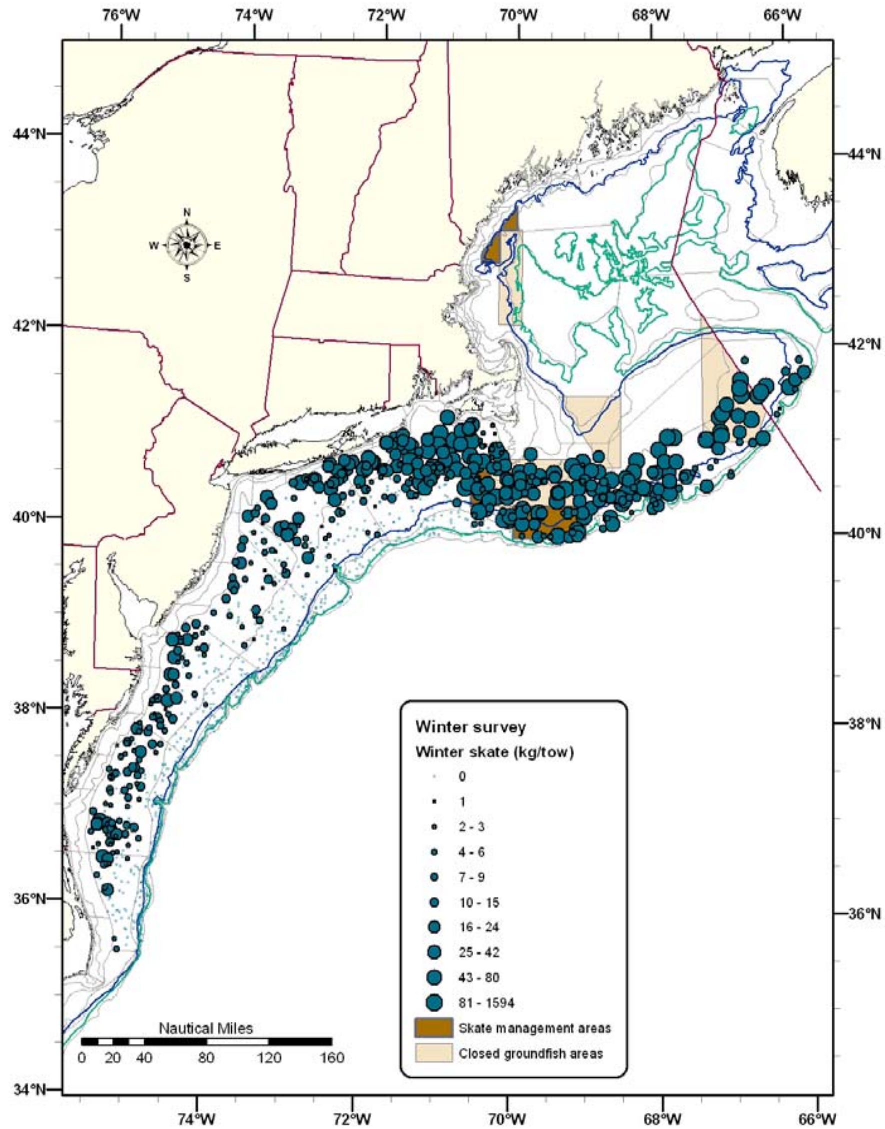
	Weight/tow			**Number/tow**				**Length (cm TL)**						**nonzero**	
	Mean	Lower	Upper	Mean	Lower	Upper	Ind wt	Min	5%	50%	Mean	95%	Max	Tows	No fish
2000	4.378	2.390	6.366	2.535	1.351	3.718	1.727	18	25	56	55.5	82	99	45	756
2001	3.887	2.442	5.333	2.165	1.415	2.914	1.796	15	32	58	57.8	83	98	53	601
2002	5.600	3.417	7.782	2.323	1.535	3.111	2.411	16	33	66	63.9	87	101	55	743
2003	3.386	2.111	4.662	1.498	0.928	2.068	2.260	16	33	62	63.0	87	104	43	435
2004	4.031	2.632	5.430	1.942	1.343	2.542	2.075	26	33	62	60.4	87	102	50	611
2005	2.615	1.791	3.439	1.671	1.005	2.337	1.565	18	31	52	55.1	81	98	54	475

Table 23. Abundance and biomass from NEFSC winter surveys for winter skate for the Georges Bank to Mid-Atlantic region (offshore strata 1-3,5-7,9-11,13-14,16,61-63,65-67,69-71,73-75). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006. Stratum 16 not sampled in 1993, 2000, 2002-2006. Strata 13 and 14 not sampled in 2003. Stratum 63 not sampled in 1993. Stratum 14 not sampled in 2005.

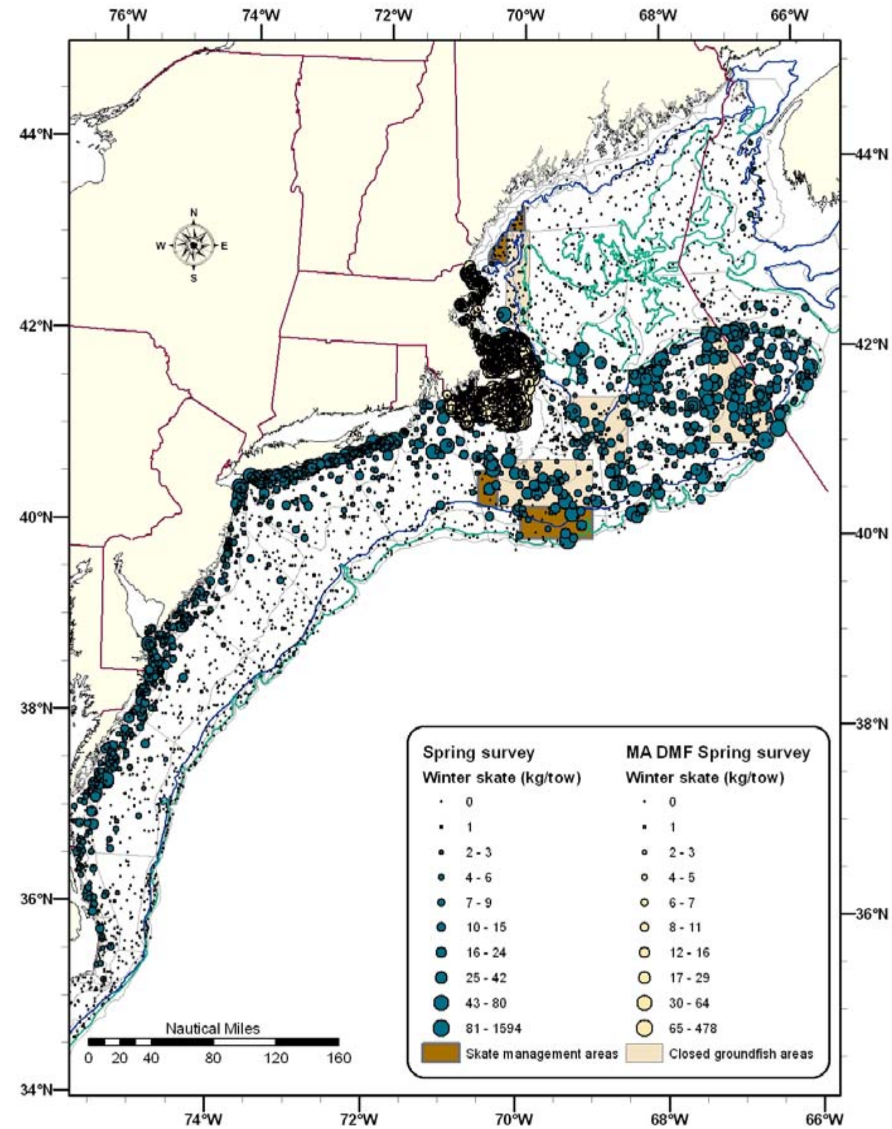
	Weight/tow			**Number/tow**				**Length (cm TL)**						**nonzero**	
	Mean	Lower	Upper	Mean	Lower	Upper	Ind wt	Min	5%	50%	Mean	95%	Max	Tows	No fish
2000	11.315	4.814	17.815	5.697	2.799	8.596	1.968	18	27	56	57.6	88	101	33	486
2001	28.634	19.682	37.585	15.555	9.234	21.875	1.841	16	30	58	57.5	84	100	76	2025
2002	28.733	17.246	40.220	15.982	6.565	25.400	1.798	15	24	49	55.1	88	107	53	1849
2003	17.425	7.871	26.979	29.540	-6.318	64.399	0.590	15	15	28	34.8	75	99	34	1662
2004	26.618	13.793	39.444	13.833	9.244	18.422	1.924	15	31	55	58.0	86	102	58	1342
2005	19.424	8.976	29.872	16.081	6.327	25.836	1.208	16	26	48	50.3	76	95	46	972
2006	32.411	12.125	52.697	18.233	9.593	26.874	1.778	15	30	56	57.4	86	102	60	1776

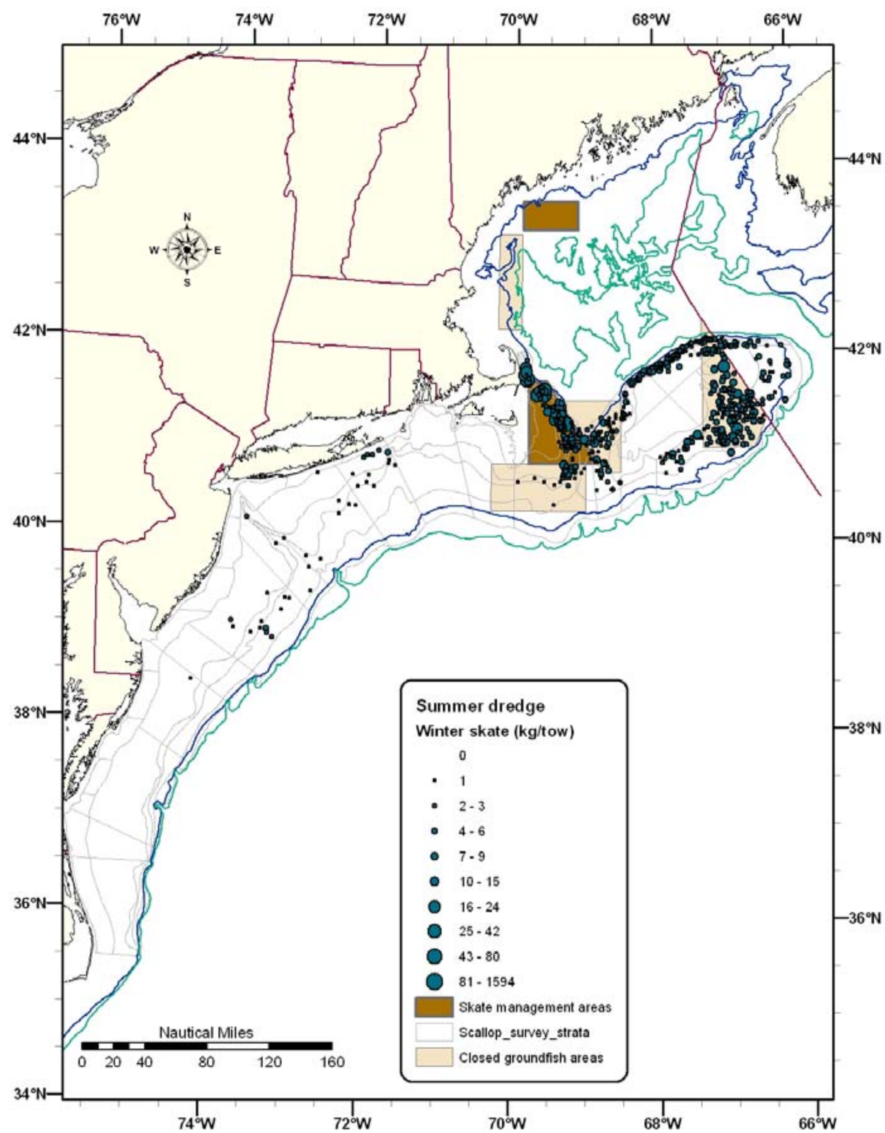
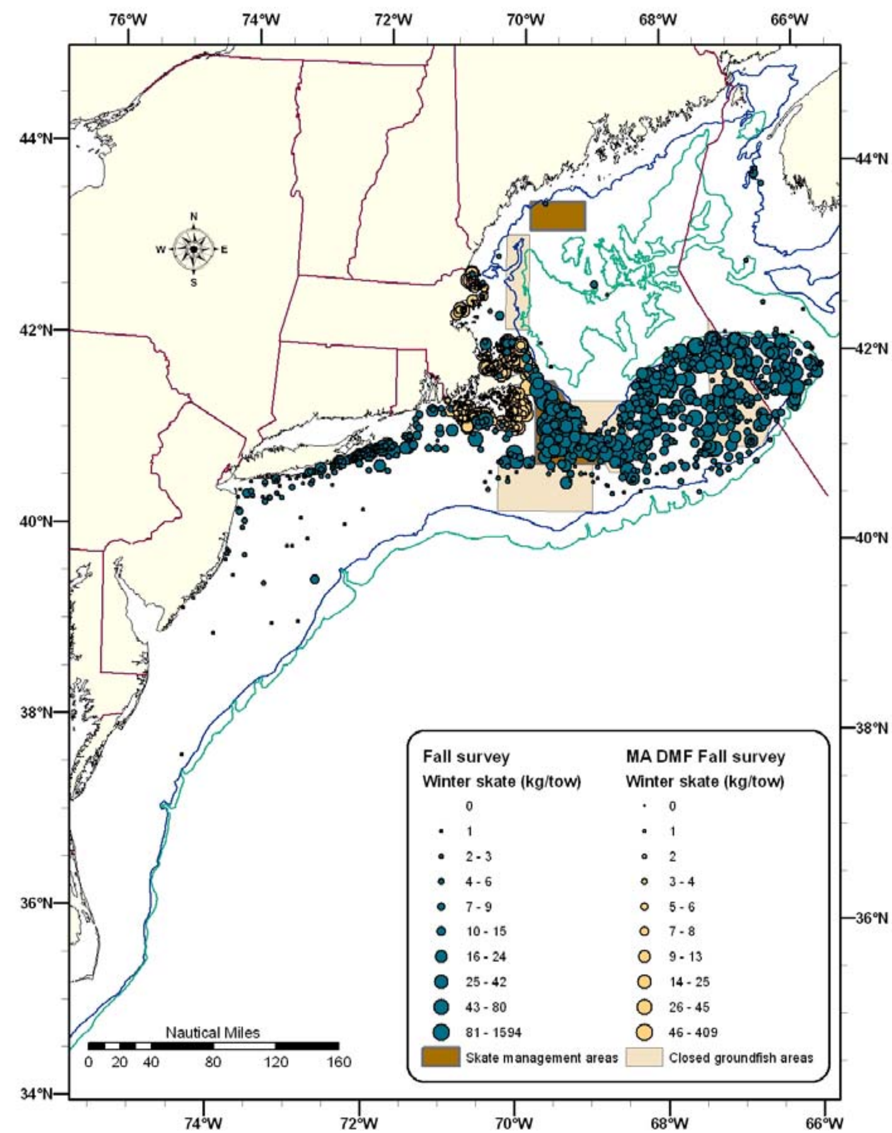
Map 4. Winter skate biomass distribution in the winter trawl (2000-2007), spring trawl (2000-2008), summer dredge (2000-2007), and autumn trawl (2000-2007) surveys.

Winter (Feb/Mar)



Spring (Apr/May)



Summer (Jul/Aug)	Autumn (Sep/Oct)
	

7.2.3.2 Little Skate

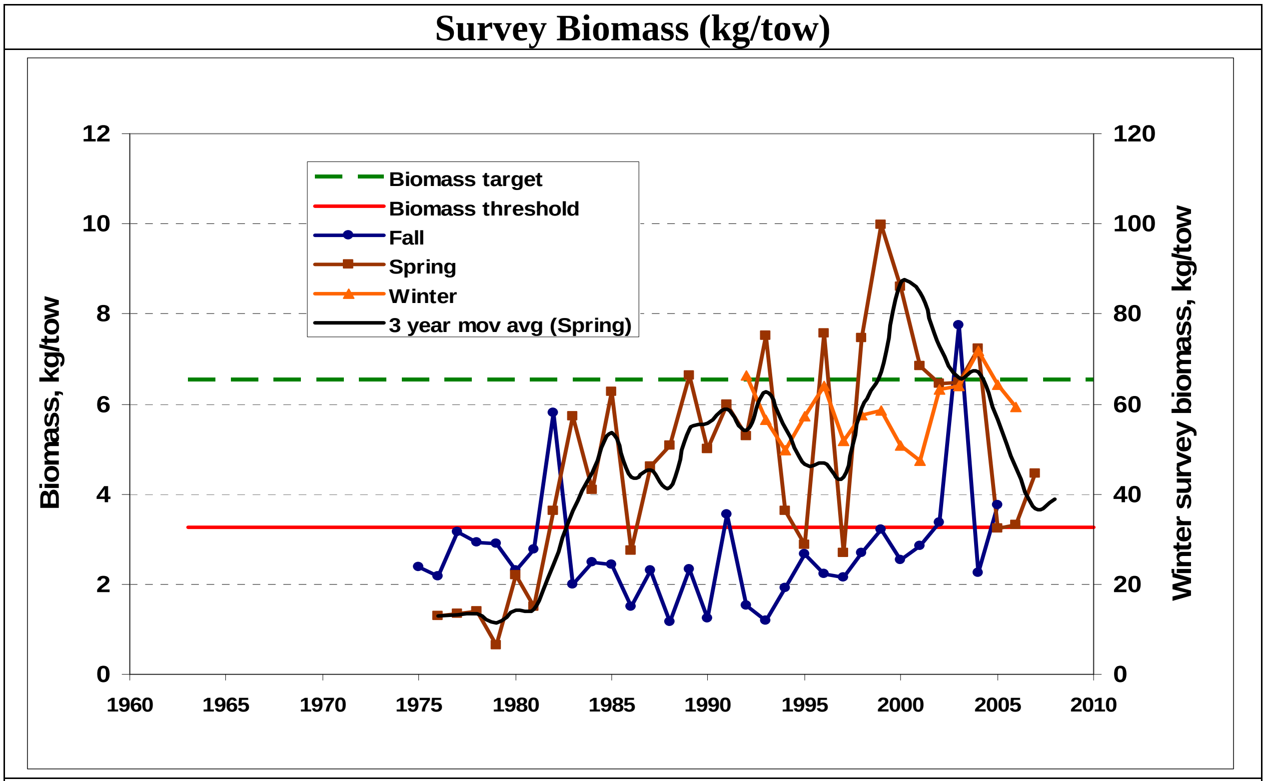
NEFSC bottom trawl surveys indicate that little skate are abundant in the inshore and offshore strata in all regions of the northeast US coast, but are most abundant on Georges Bank and in Southern New England **(**Map 5**)**. In the NEFSC autumn surveys (1975-2005), the annual total catch of little skate in offshore strata reached 6,523 fish in 2003. Calculated on a per tow basis, these spring survey catches equate to maximum stratified mean number per tow indices for the GOM-MA inshore and offshore strata autumn maximum catches equate to indices of 18 fish, or 7.7 kg, per tow in 2003 (Table 24 and Table 25). Recent spring catches have equated to 7.9 fish or 3.3 kg per tow in 2006; recent autumn catch equates to 7.6 fish or 3.8 kg per tow in 2005 (Table 24 and Table 25). NEFSC winter survey (2000-2006) annual catches of little skate reached a low of 8,870 fish in 2003, equating to a maximum stratified mean catch per tow of 151 fish or 64 kg per tow (Table 26).

Indices of little skate abundance and biomass from the NEFSC spring survey were stable, reached a peak in 1999, and declined thereafter. Autumn survey indices slightly increased in recent years. Little skate biomass decreased in the spring survey since 1999. Little skate was approaching an overfished status as a result of this decline. However, an increase in biomass in 2007 produced an increase in the three year moving average, resulting in little skate not being listed as overfished in the latest assessment. Abundance of little skate closely reflects patterns in biomass (Figure 4). Autumn survey biomass and abundance are generally lower than those of spring or winter surveys.

The median length of little skates sampled in the survey reached 44 cm TL in the 2005 autumn survey. The median length of the survey catch was generally stable over the duration of the spring and autumn surveys and is currently about 42 cm TL in the spring and 43 cm TL in the autumn (SAW 44 2006). Length frequency distributions from the NEFSC spring and autumn surveys are presented in the SAW 44 documents and are not reproduced in this SAFE Report. In general, the length frequency distributions for little skate show several modes, most often at 10, 20, 30, and 45 cm, which are believed to represent ages 0, 1, 2, and 3 and older little skate.

Indices of abundance for little skate are available from Massachusetts Division of Marine Fisheries (MADMF) spring and autumn research trawl surveys in the inshore waters of Massachusetts during 1978-2006. Since the mid 1990s, MADMF biomass indices have fluctuated without trend. Indices of abundance for little skate are available from Connecticut Department of Environmental Protection (CTDEP) spring and autumn finfish trawl surveys in Long Island Sound during 1984-2006 (1992 and later only for biomass). Little skate are the most abundant species in the skate complex in Long Island Sound, with annual CTDEP survey catches ranging from 142 to 837 skates. CTDEP survey indices suggest a decline in recent years (SAW 44 2006).

Figure 4. Little skate stratified mean weight and number per tow for the winter, spring, and fall NEFSC trawl surveys.



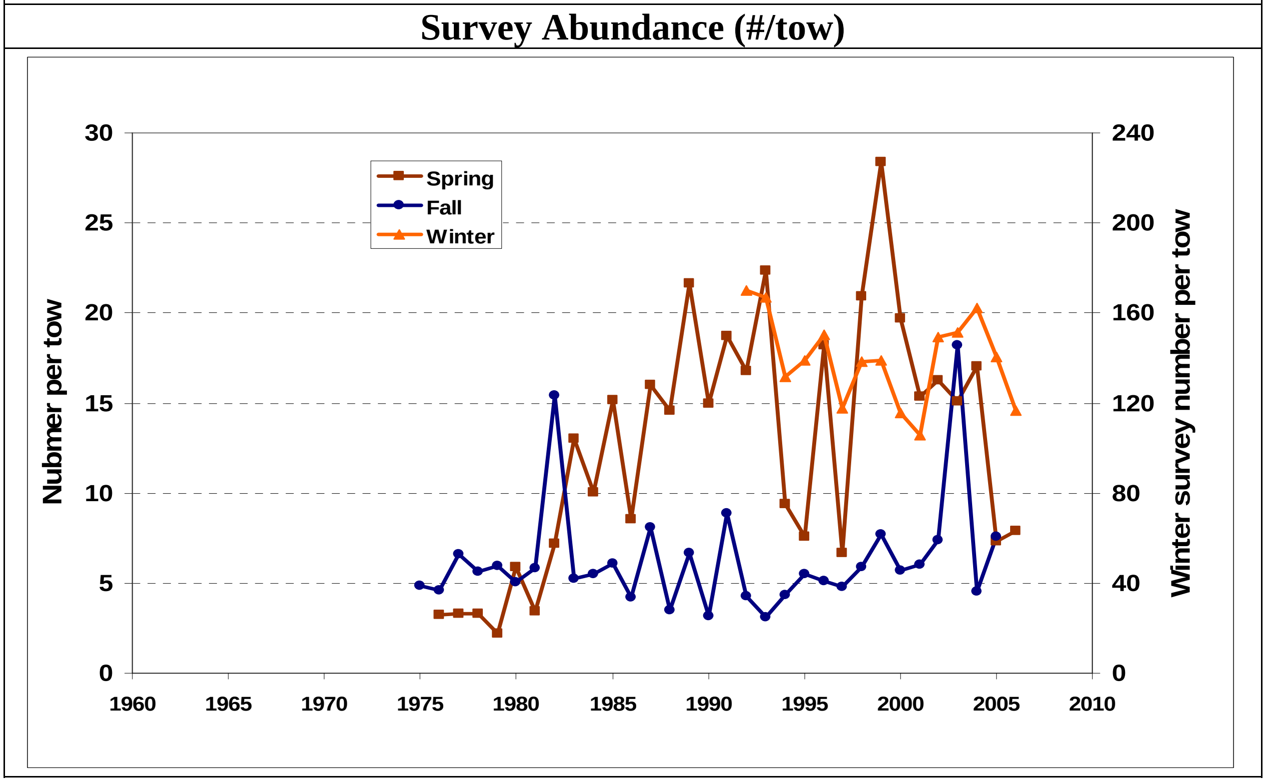


Table 24. Abundance and biomass from NEFSC spring surveys for little skate for the Gulf of Maine to Mid-Atlantic region (offshore strata 1-30, 33-40, 61-76, and inshore strata 1-66). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006.

	Weight/tow			**Number/tow**				**Length (cm TL)**						**nonzero**	
	Mean	Lower	Upper	Mean	Lower	Upper	Ind wt	Min	5%	50%	Mean	95%	Max	Tows	No fish
2000	8.596	6.647	10.545	19.677	15.270	24.083	0.437	9	21	41	38.9	47	57	179	15367
2001	6.835	4.297	9.372	15.347	9.900	20.794	0.445	8	18	42	39.5	48	58	154	6978
2002	6.444	4.546	8.341	16.280	11.306	21.254	0.396	8	11	42	37.7	48	57	154	11983
2003	6.486	4.505	8.486	15.116	10.195	20.036	0.429	9	22	42	40.1	48	55	169	6919
2004	7.219	5.374	9.064	17.039	11.917	22.162	0.424	7	25	42	39.9	47	57	147	9866
2005	3.241	2.305	4.177	7.328	5.515	9.141	0.442	8	13	43	38.9	48	53	138	3108
2006	3.323	1.892	4.753	7.878	4.544	11.211	0.422	7	11	42	38.4	48	55	138	2771

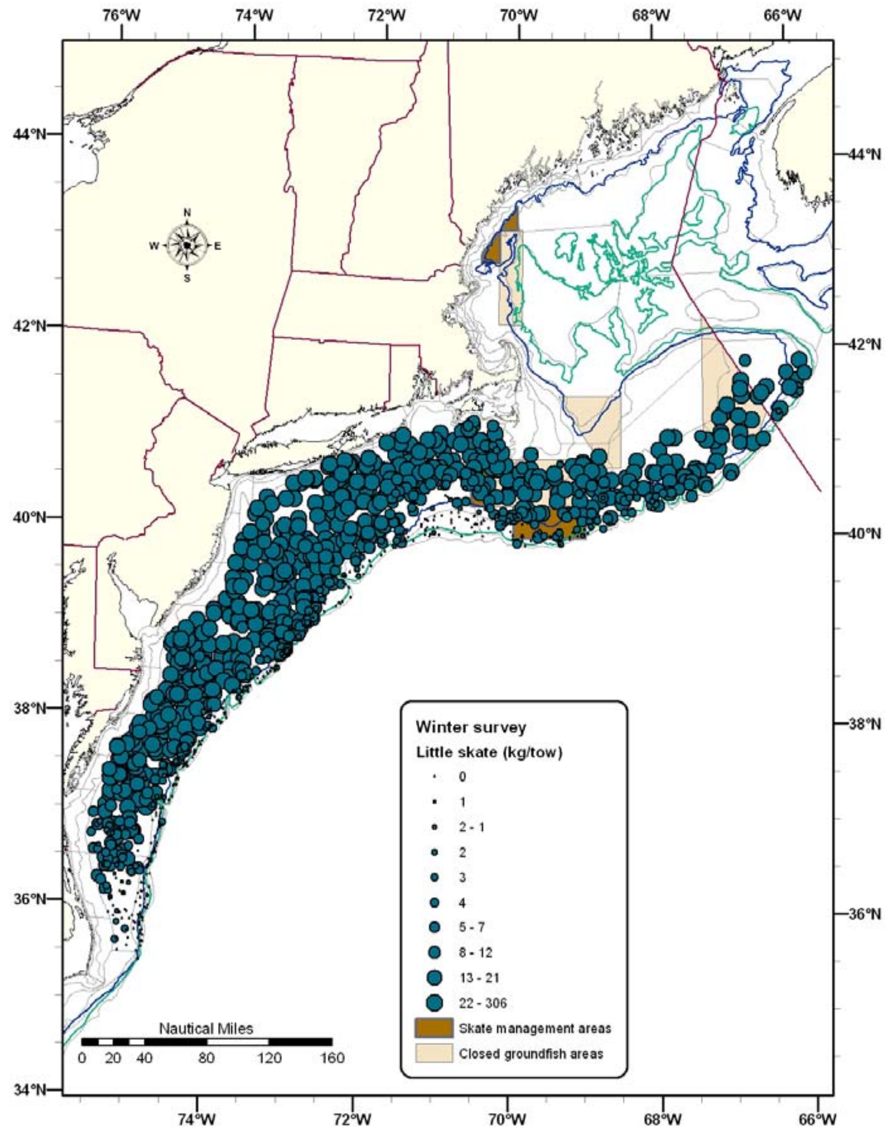
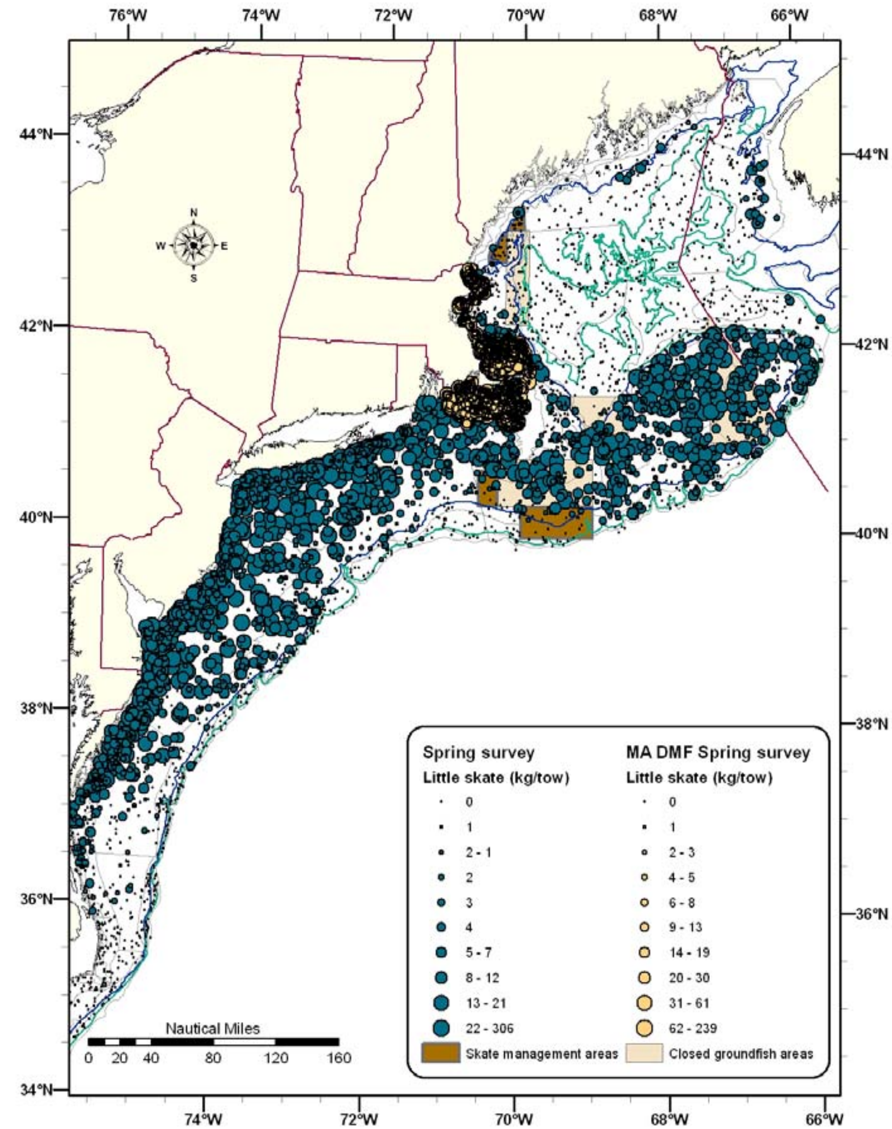
Table 25. Abundance and biomass from NEFSC autumn surveys for little skate for the Gulf of Maine to Mid-Atlantic region (offshore strata 1-30,33-40,61-76, and inshore strata 1-66). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2005.

	Weight/tow			**Number/tow**				**Length (cm TL)**						**nonzero**	
	Mean	Lower	Upper	Mean	Lower	Upper	Ind wt	Min	5%	50%	Mean	95%	Max	Tows	No fish
2000	2.550	1.607	3.493	5.711	3.761	7.661	0.447	10	22	43	40.1	49	63	116	1759
2001	2.845	2.032	3.658	6.044	4.265	7.823	0.471	10	22	43	41.4	49	57	130	1985
2002	3.375	2.371	4.379	7.358	5.170	9.545	0.459	9	23	43	40.8	49	54	135	2515
2003	7.740	5.218	10.261	18.199	11.697	24.702	0.425	10	18	41	39.3	48	55	141	6523
2004	2.265	1.388	3.141	4.556	2.714	6.399	0.497	8	26	43	42.3	49	57	122	2270
2005	3.766	2.281	5.252	7.606	4.698	10.515	0.495	9	21	44	41.8	49	55	122	2437

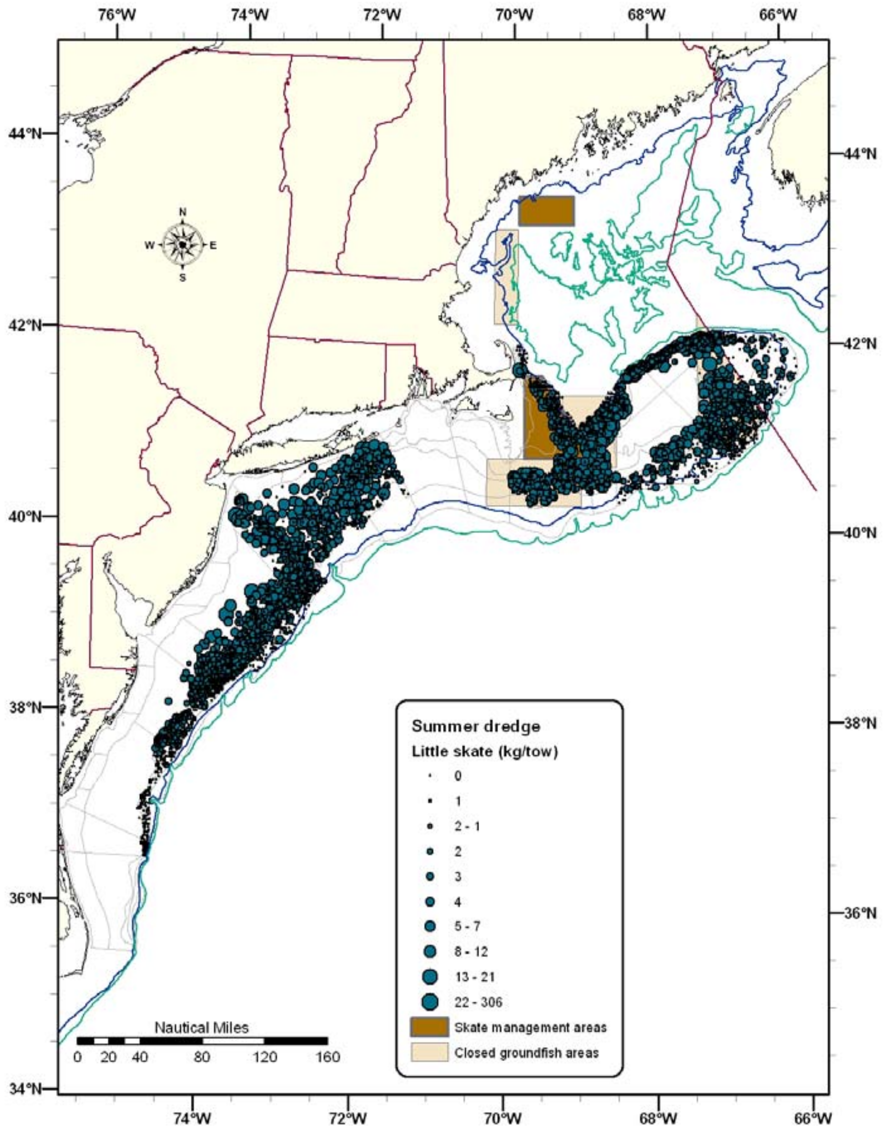
Table 26. Abundance and biomass from NEFSC winter surveys for little skate for the Georges Bank to Mid-Atlantic region (offshore strata 1-3,5-7,9-11,13-14,16,61-63,65-67,69-71,73-75). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006. Stratum 16 not sampled in 1993, 2000, 2002-2006. Strata 13 and 14 not sampled in 2003. Stratum 63 not sampled in 1993. Stratum 14 not sampled in 2005.

	Weight/tow			**Number/tow**				**Length (cm TL)**						**nonzero**	
	Mean	Lower	Upper	Mean	Lower	Upper	Ind wt	Min	5%	50%	Mean	95%	Max	Tows	No fish
2000	50.7247	37.806	63.643	115.572	87.597	143.547	0.439	8	20	42	39.5	47	53	92	10722
2001	47.429	38.584	56.274	105.749	85.050	126.447	0.449	8	11	42	39.7	48	63	120	12956
2002	63.3207	49.704	76.937	149.228	116.464	181.993	0.424	8	23	42	40.2	48	56	110	17329
2003	63.943	44.340	83.546	151.185	105.428	196.943	0.423	9	24	41	40.0	48	54	62	8870
2004	71.8027	50.398	87.208	162.456	128.807	196.106	0.442	10	25	41	40.5	47	54	94	13822
2005	64.149	45.820	82.478	140.444	93.239	187.648	0.457	9	25	42	40.9	47	54	68	9544
2006	59.2538	48.374	70.134	116.433	96.399	136.467	0.509	9	23	43	42.1	49	55	87	12687

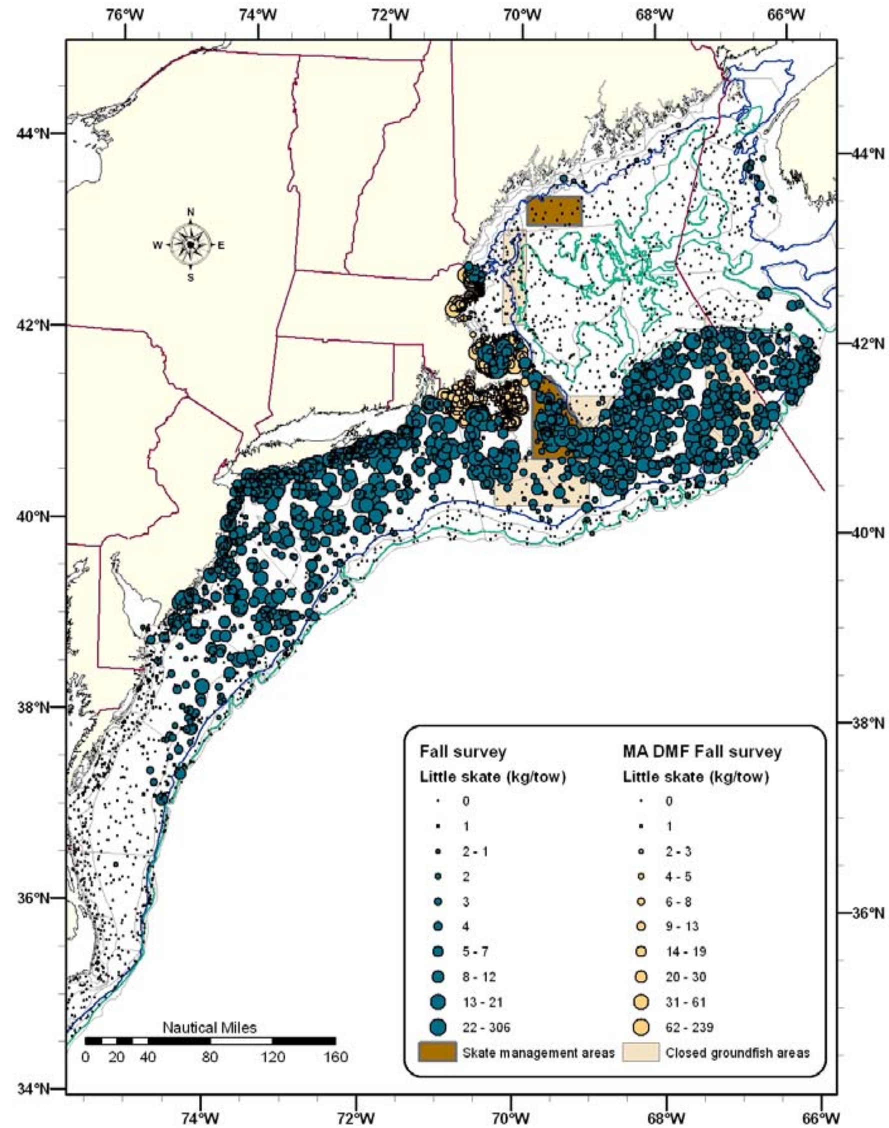
Map 5. Little skate biomass distribution in the winter trawl (2000-2007), spring trawl (2000-2008), summer dredge (2000-2007), and autumn trawl (2000-2007) surveys.

Winter (Feb/Mar)	Spring (Apr/May)
	

Summer (Jul/Aug)



Autumn (Sep/Oct)



7.2.3.3 Barndoor Skate

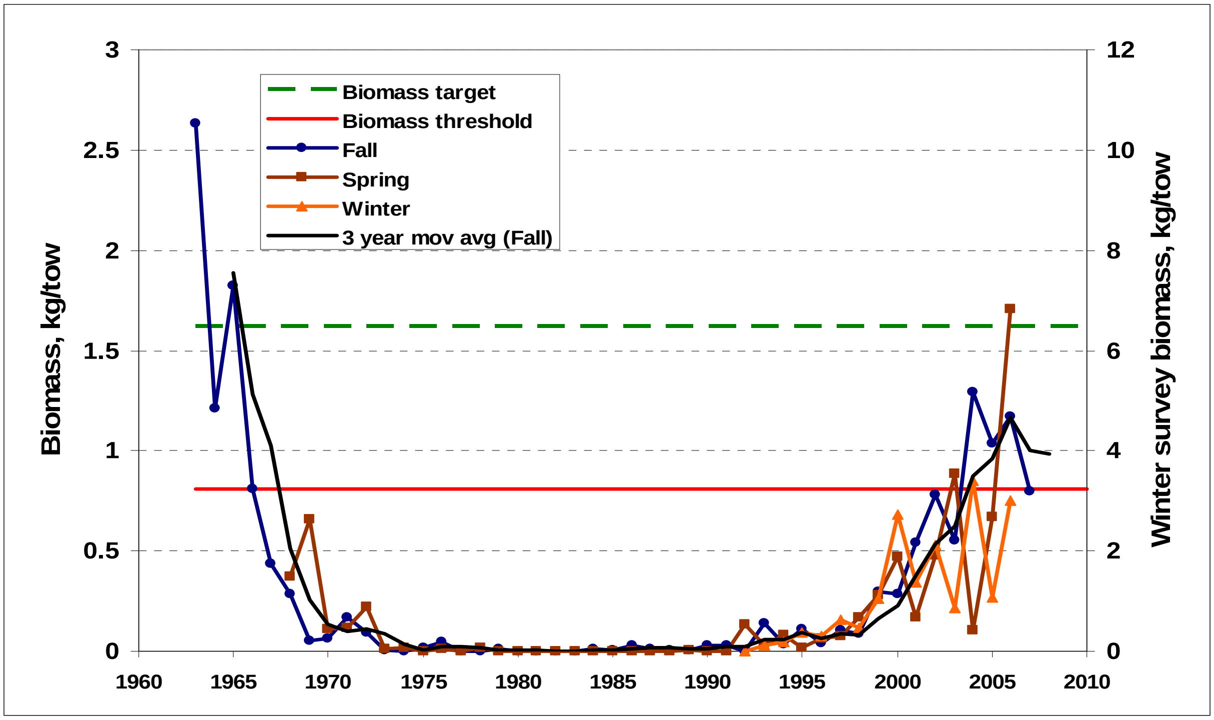
Barndoor skate are most abundant in the Gulf of Maine, Georges Bank, and Southern New England offshore strata, with very few fish caught in inshore (< 27 meters depth) or Mid- Atlantic regions (Map 6**)**. In the NEFSC spring survey (1968-2006), the annual total catch of barndoor skate has ranged from 0 fish (several years during the 1970s and 1980s) to 196 fish in 2006. The NEFSC autumn survey (1963-2005), has exhibited a similar trend. Recent spring catches have equated to 0.6 fish or 1.7 kg per tow in 2006; recent autumn catch equates to 0.4 fish or 1.0 kg per tow in 2005 (Table 27 and Table 28). Barndoor skate appear to be in a rebuilding phase that began in the 1990s. Since 1990, both spring and autumn survey indices have steadily increased, with the spring survey at the highest value in the time series and the autumn survey nearing the peak values found in the 1960s. In 2007, the NEFSC autumn survey showed a decline in biomass (Figure 5). This reduced the three year moving average; however it remains above the biomass threshold and is not considered to be overfished (Figure 5).

Annual catches of barndoor skate in the NEFSC winter survey (1992-2006) have been higher than those in the spring and autumn surveys. However, no fish were caught in 1992. This increased to 355 in 2006, equating to a maximum stratified mean catch per tow of 3.2 fish or 3.0 kg per tow in 2006 (Table 29).

The minimum length of barndoor skate caught in NEFSC surveys is 20 cm TL (8 in), and the largest individual caught was 136 cm TL (54 in) total length, during the 1963 autumn survey in the Gulf of Maine. The median length of barndoor skate in the survey has been stable in recent years in both the spring and autumn surveys, and is currently 70-75 cm TL (28-30 in NEFSC 2007). Recent catches include individuals as large as those recorded during the peak abundance of the 1960s, and the large number of fish between 40 and 80 cm TL evident during the 1960s is now apparent in recent surveys.

Figure 5. Barndoor skate stratified mean weight and number per tow for the winter, spring, and fall NEFSC trawl surveys.

Survey Biomass (kg/tow)



Survey Abundance (#/tow)

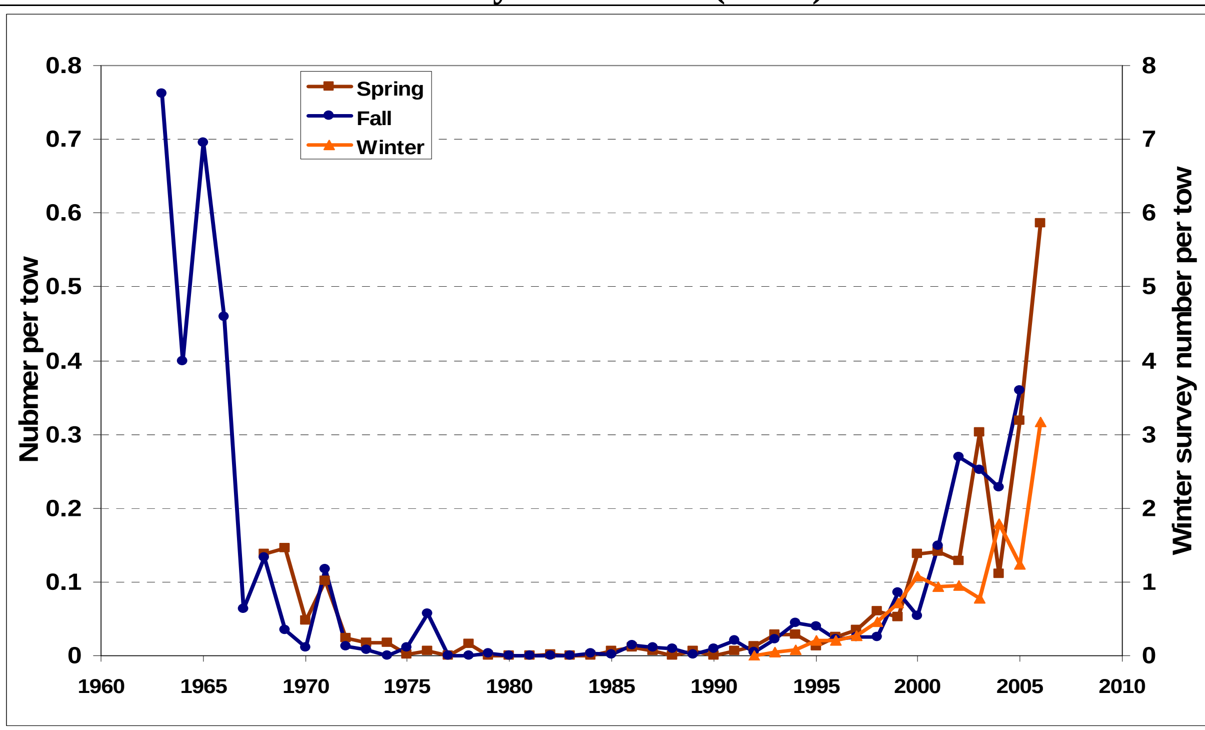


Table 27. Abundance and biomass from NEFSC spring surveys for barndoor skate for the Gulf of Maine to Southern New England region (offshore strata 1-30, 33-40). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006.

	Weight/tow			**Number/tow**				**Length (cm TL)**						**nonzero**	
	Mean	Lower	Upper	Mean	Lower	Upper	Ind wt	Min	5%	50%	Mean	95%	Max	Tows	No fish
2000	0.473	0.246	0.699	0.138	0.076	0.200	3.419	19	20	68	71.4	125	127	14	29
2001	0.170	0.032	0.307	0.141	0.048	0.234	1.200	20	20	52	54.8	77	115	13	30
2002	0.477	0.233	0.721	0.129	0.047	0.212	3.690	35	35	66	77.3	127	133	13	26
2003	0.885	0.341	1.429	0.302	0.172	0.432	2.928	19	19	54	64.0	126	132	23	64
2004	0.103	0.039	0.167	0.111	0.032	0.189	0.928	19	19	55	50.6	81	89	12	24
2005	0.670	0.120	1.221	0.319	0.073	0.565	2.101	26	33	68	68.1	109	122	15	59
2006	1.706	-0.995	4.407	0.586	-.0.87	1.260	2.910	19	19	69	69.9	123	134	22	196

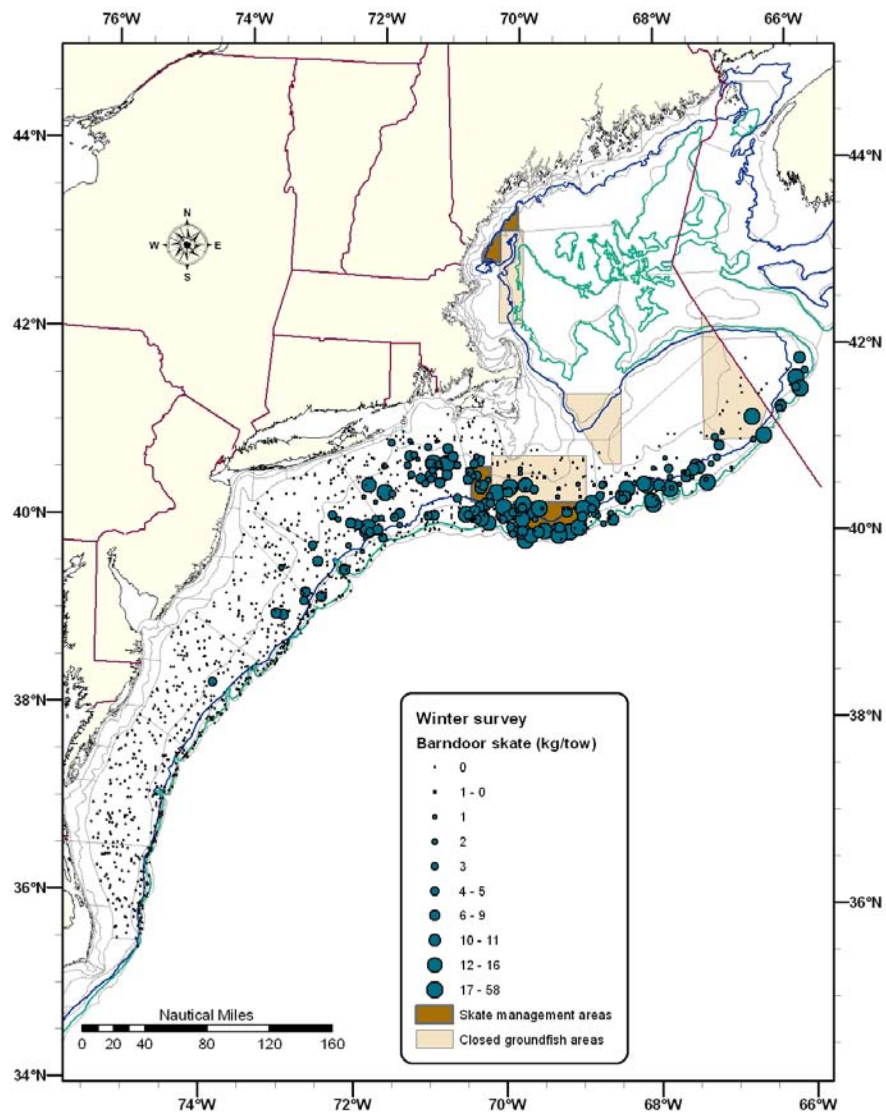
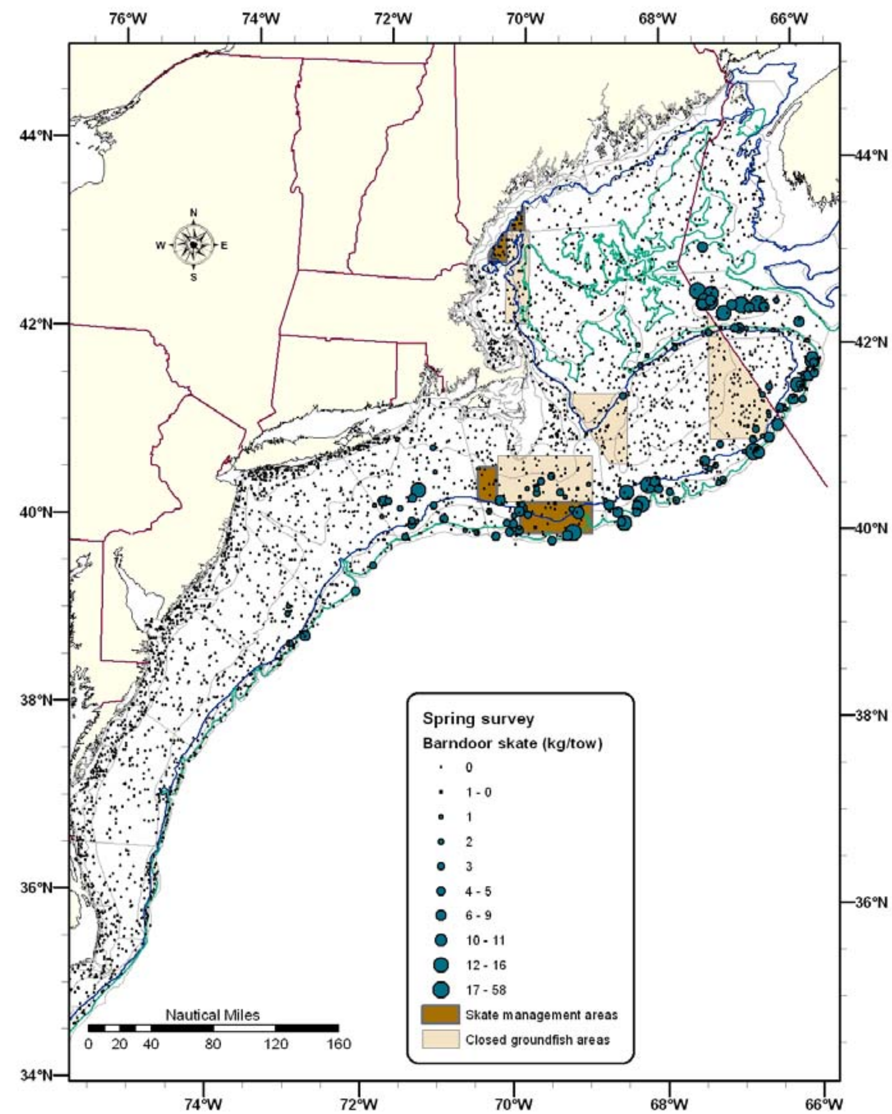
Table 28. Abundance and biomass from NEFSC autumn surveys for barndoor skate for the Gulf of Maine to Southern New England region (offshore strata 1-30, 33-40). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2005.

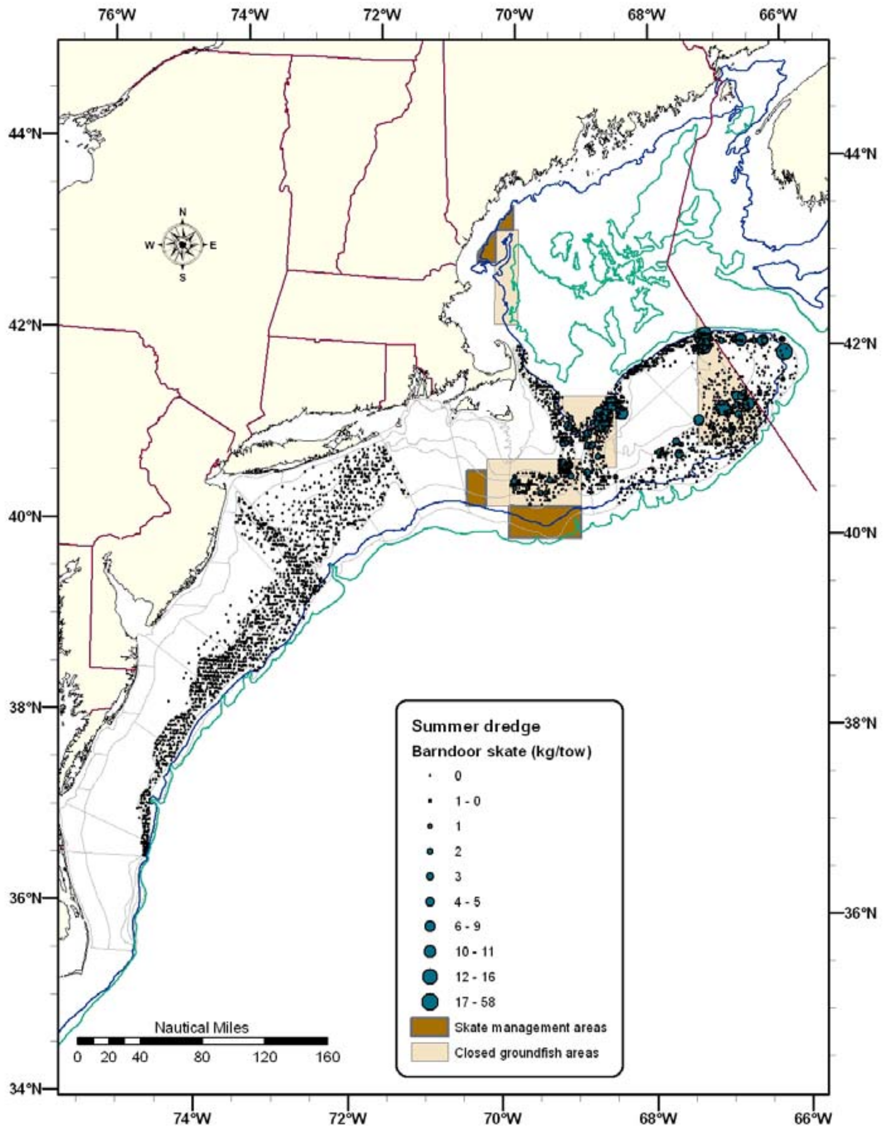
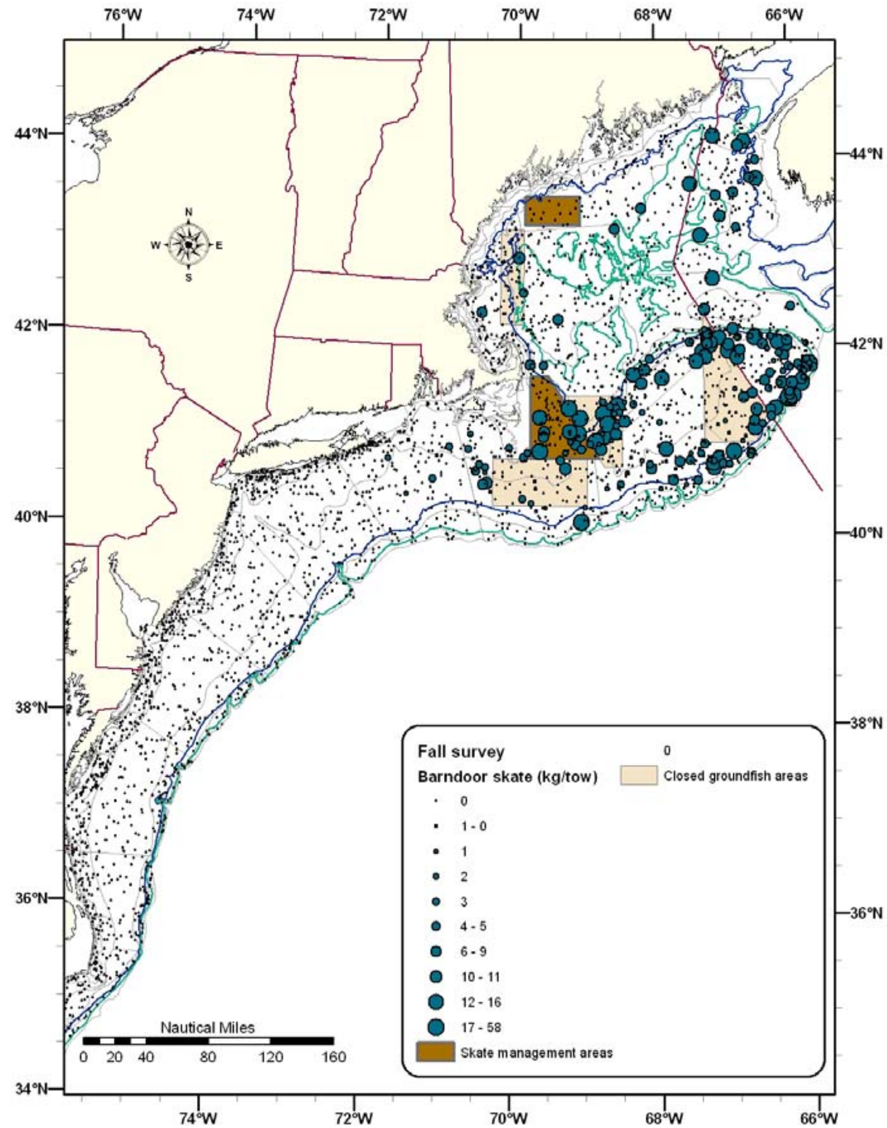
	Weight/tow			**Number/tow**				**Length (cm TL)**						**nonzero**	
	Mean	Lower	Upper	Mean	Lower	Upper	Ind wt	Min	5%	50%	Mean	95%	Max	Tows	No fish
2000	0.288	0.054	0.521	0.054	0.023	0.085	5.360	29	29	89	85.5	121	122	12	15
2001	0.543	0.050	1.036	0.149	0.052	0.247	3.635	24	40	75	75.5	121	126	16	34
2002	0.778	0.351	1.205	0.269	0.130	0.407	2.893	26	27	59	68.0	119	129	24	59
2003	0.553	0.255	0.852	0.251	0.157	0.345	2.203	22	22	48	57.1	115	120	29	55
2004	1.295	0.677	1.913	0.229	0.122	0.336	5.662	42	47	80	90.1	124	128	23	58
2005	1.036	0.482	1.590	0.360	0.207	0.513	2.877	18	25	64	68.1	118	132	29	73

Table 29. Abundance and biomass from NEFSC winter surveys for barndoor skate for the Georges Bank to Mid-Atlantic region (offshore strata 1-3,5-7,9-11,13-14,16,61-63,65-67,69-71,73-75). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006. Stratum 16 not sampled in 1993, 2000, 2002-2006. Strata 13 and 14 not sampled in 2003. Stratum 63 not sampled in 1993. Stratum 14 not sampled in 2005.

	Weight/tow			**Number/tow**				**Length (cm TL)**						**nonzero**	
	Mean	Lower	Upper	Mean	Lower	Upper	Ind wt	Min	5%	50%	Mean	95%	Max	Tows	No fish
2000	11.315	4.814	17.815	5.697	2.799	8.596	1.968	18	27	56	57.6	88	101	33	486
2001	28.634	19.682	37.585	15.555	9.234	21.875	1.841	16	30	58	57.5	84	100	76	2025
2002	28.733	17.246	40.220	15.982	6.565	25.400	1.798	15	24	49	55.1	88	107	53	1849
2003	17.425	7.871	26.979	29.540	-6.318	64.399	0.590	15	15	28	34.8	75	99	34	1662
2004	26.618	13.793	39.444	13.833	9.244	18.422	1.924	15	31	55	58.0	86	102	58	1342
2005	19.424	8.976	29.872	16.081	6.327	25.836	1.208	16	26	48	50.3	76	95	46	972
2006	32.411	12.125	52.697	18.233	9.593	26.874	1.778	15	30	56	57.4	86	102	60	1776

Map 6. Barndoor skate biomass distribution in the winter trawl (2000-2007), spring trawl (2000-2008), summer dredge (2000-2007), and autumn trawl (2000-2007) surveys.

Winter (Feb/Mar)	Spring (Apr/May)
	

Summer (Jul/Aug)	Autumn (Sep/Oct)
	

7.2.3.4 Thorny Skate

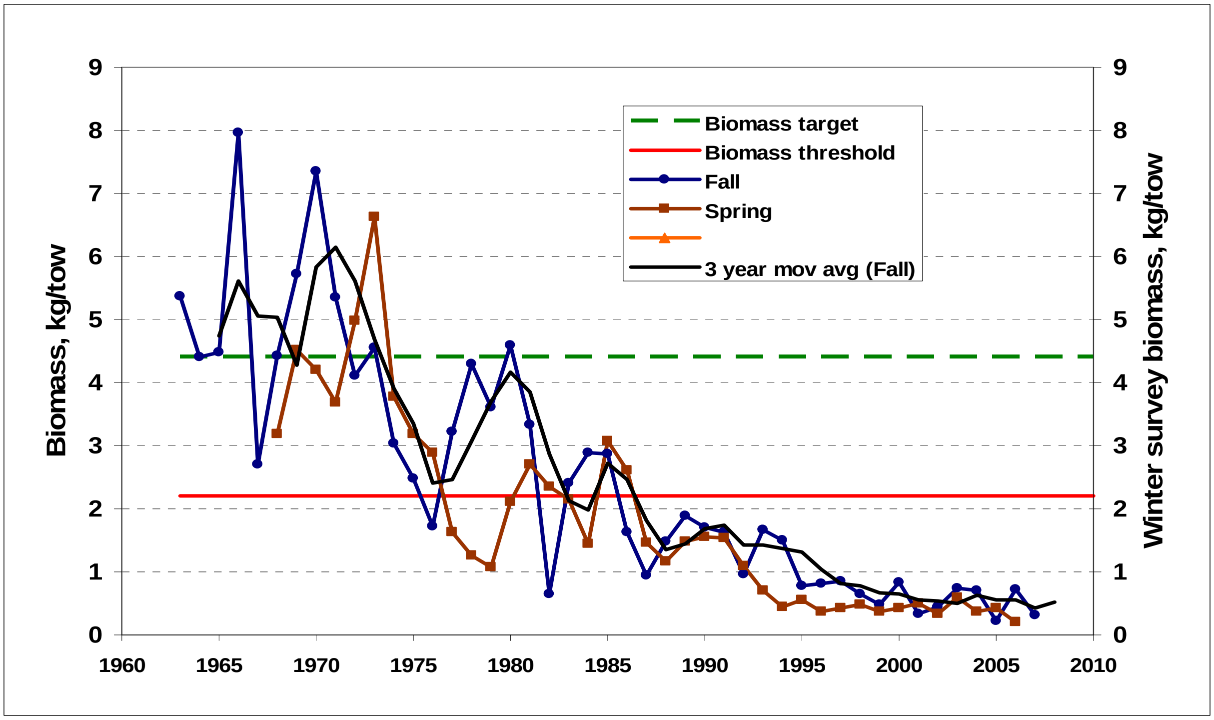
NEFSC bottom trawl surveys indicate that thorny skate are most abundant in the Gulf of Maine and Georges Bank offshore strata, with very few fish caught in inshore (< 27 meters depth), Southern New England, or Mid-Atlantic regions (Map 7). NEFSC spring and autumn survey indices for thorny skate have declined continuously over the last 40 years. NEFSC survey indices of thorny skate abundance declined steadily since the late 1970s, reaching historically low values in 2005 and 2006 that are less than 10% of the peak observed in the 1970s (Figure 6). The annual total catch of thorny skate in the NEFSC spring survey declined to 29 fish in 2006. This downward trend was also seen in the NEFSC autumn surveys reaching 35 fish in 2005. This equates to 0.2 fish or 0.2kg per tow in spring 2006 and 0.2 fish or 0.2 kg per tow in autumn 2006 (Table 30 and Table 31).

The median length of thorny skate in the survey catch ranged from 23 cm TL in the 2003 autumn survey to 63 cm in the 1971 autumn survey. The median length of the survey catch trended downward through most of the survey time series, but was stable in recent years in autumn surveys, and is currently 40-50 cm TL (16-20 in; SAW44 2006). Length frequency distributions from the NEFSC spring and autumn show a pattern of decline in abundance of larger individuals consistent with an increase in total mortality over the survey time series.

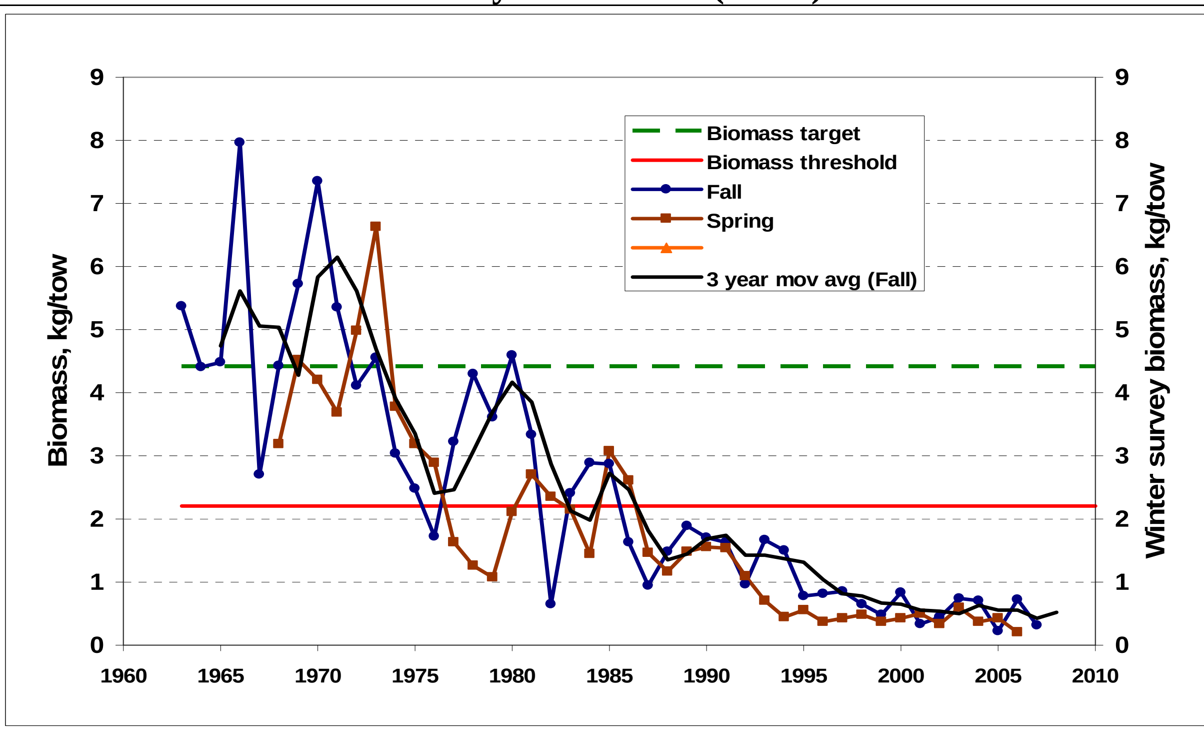
When the skate FMP was implemented in 2003, thorny skate was listed as overfished. This status remained unchanged since 2003. In 2007, overfishing was determined to be occurring on thorny skate as the 2005 – 2007 index was lower than the 2004 – 2006 index by 24%.

Figure 6. Thorny skate stratified mean weight and number per tow for the winter, spring, and fall NEFSC trawl surveys.

Survey Biomass (kg/tow)



Survey Abundance (#/tow)



Thorny skate dominates Canadian catches of skate species, comprising approximately 90% of rajids caught in survey trawls (Kulka and Miri, 2003). Thorny skate populations in Canadian waters are considered to be a single stock based on movement analyses (Kulka et al. 2006; Templeman, 1984) and biological characteristics. Two surveys are used to examine trends in thorny skate abundance in Canada; these are done in the spring and autumn. The spring survey catches fewer skates than the autumn survey, because the skates move to deeper waters in the spring season. However, the spring survey is the primary survey used in analyses because it is conducted throughout the entire area, whereas the autumn survey does not include a number of NAFO Divisions (Kulka et al. 2006). Similar to USA trends, Canadian indices of thorny skates declined in recent years. In the early 1990s, thorny skate abundance reached its lowest level in history. This was followed by a slight increase; the population stabilized at a low abundance in recent years. While the biomass has remained stable, the areal extent of this species has declined with density increasing near the center of the distribution indicating that hyper-aggregation is probably occurring in this species. This change in distribution is thought to be associated with temperature, because the area of high density coincides with the area of warmest bottom temperatures. Average weight in the spring survey has declined from 2 kg in the early 1970s to 1.2kg in 1996, with recent years being around 1.6 kg. The population was divided into immature and mature classes based on length. Immature thorny skates have experienced the largest fluctuations in the skate complex. Since the 1990s, the proportion of mature fish has increased while a decrease is evident in immature fish. A stock-recruitment relationship is evident in this population as a linear relationship exists between female spawning stock and young of the year. Age-based stock assessments are not currently possible owing to a lack of age and growth studies. An index of exploitation or relative F, defined as reported commercial catch/spring research survey biomass index, was examined (Kulka et al. 2006). Relative F has tripled since the mid-1980s, reaching 14% in 2003-2004. Reduced landings in 2005-2006 lowered the relative F to 4% (Kulka and Miri, 2007). It is estimated that a relative F of approximately 10% (equating to catches of 11,000 to 13,000 t) would allow recovery of the stock. Since 1999 average catch has been approximately 10,000 tons (average relative F or 9%) (Kulka et al. 2006).

Indices of abundance for thorny skate are available from MADMF spring and autumn research trawl surveys in the inshore waters of Massachusetts for the years 1978-2006. MADMF indices of thorny skate biomass have been variable over the time series, but there is a decreasing trend evident in both the spring and autumn time series. The spring index has stabilized around the median of 0.2 kg/tow throughout the 2000s, while the autumn index has been below the median of 0.6 kg/tow since 1994 except for 2001 and 2002 (SAW44 2006).

Table 30. Abundance and biomass from NEFSC spring surveys for thorny skate for the Gulf of Maine to Southern New England region (offshore strata 1-30, 33-40). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006.

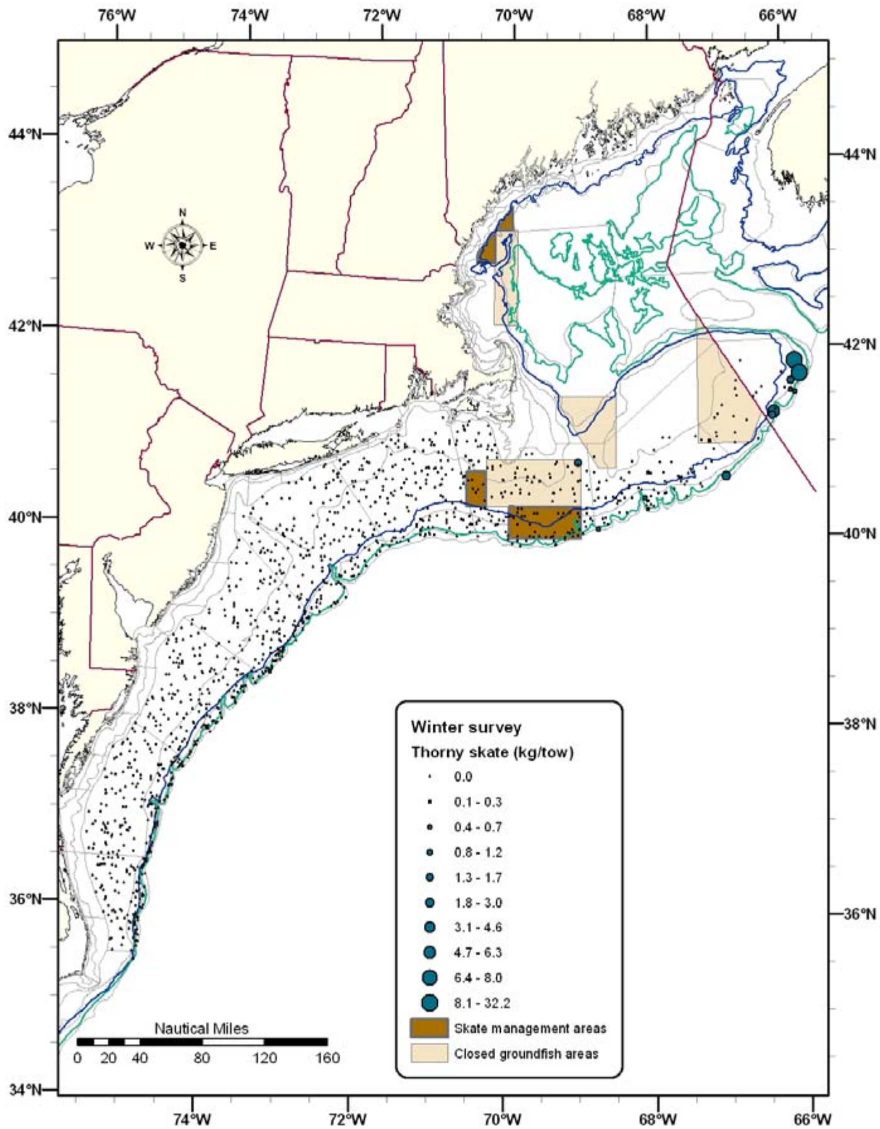
	weight/tow			**number/tow**				**Length (cm TL)**						**nonzero**	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	0.423	0.166	0.68	0.47	0.013	0.927	0.9	12	12	24	34	82	89	28	13
2001	0.493	0.217	0.769	0.221	0.08	0.362	2.234	14	33	56	57.7	80	92	16	35
2002	0.333	0.138	0.529	0.248	0.127	0.369	1.34	13	15	38	42	88	93	24	53
2003	0.594	0.268	0.92	0.332	0.203	0.461	1.79	19	19	50	50.9	86	102	30	57
2004	0.368	0.178	0.557	0.212	0.128	0.296	1.731	15	15	47	49.3	91	95	22	48
2005	0.435	0.154	0.716	0.371	0.167	0.576	1.171	16	17	44	44.4	76	89	19	62
2006	0.201	0.035	0.366	0.186	0.02	0.352	1.079	12	14	41	41.9	83	87	15	29

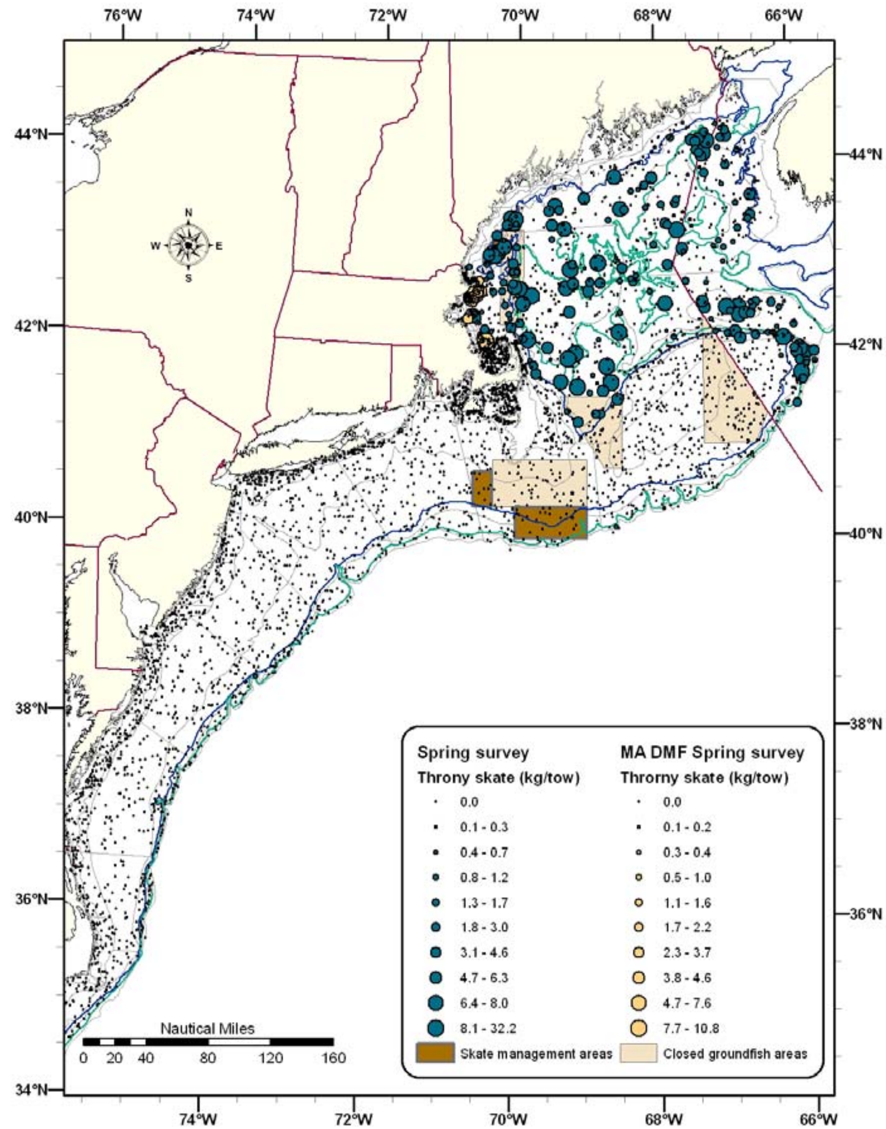
Table 31. Abundance and biomass from NEFSC autumn surveys for thorny skate for the Gulf of Maine to Southern New England region (offshore strata 1-30, 33-40). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2005

	weight/tow			**number/tow**				**Length (cm TL)**						**nonzero**	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	0.832	0.391	1.274	0.374	0.239	0.51	2.224	13	17	49	52.7	92	102	27	70
2001	0.332	0.087	0.577	0.294	0.157	0.43	1.129	16	17	44	44.1	74	82	23	60
2002	0.436	0.188	0.684	0.26	0.126	0.393	1.679	14	15	35	44.2	85	95	25	52
2003	0.742	0.45	1.035	0.93	0.168	1.691	0.798	12	14	23	34.2	74	89	34	175
2004	0.71	0.272	1.148	0.358	0.167	0.55	1.98	14	18	45	50.1	87	90	23	65
2005	0.224	0.092	0.357	0.205	-0.034	0.443	1.096	13	18	39	42.6	76	90	17	36

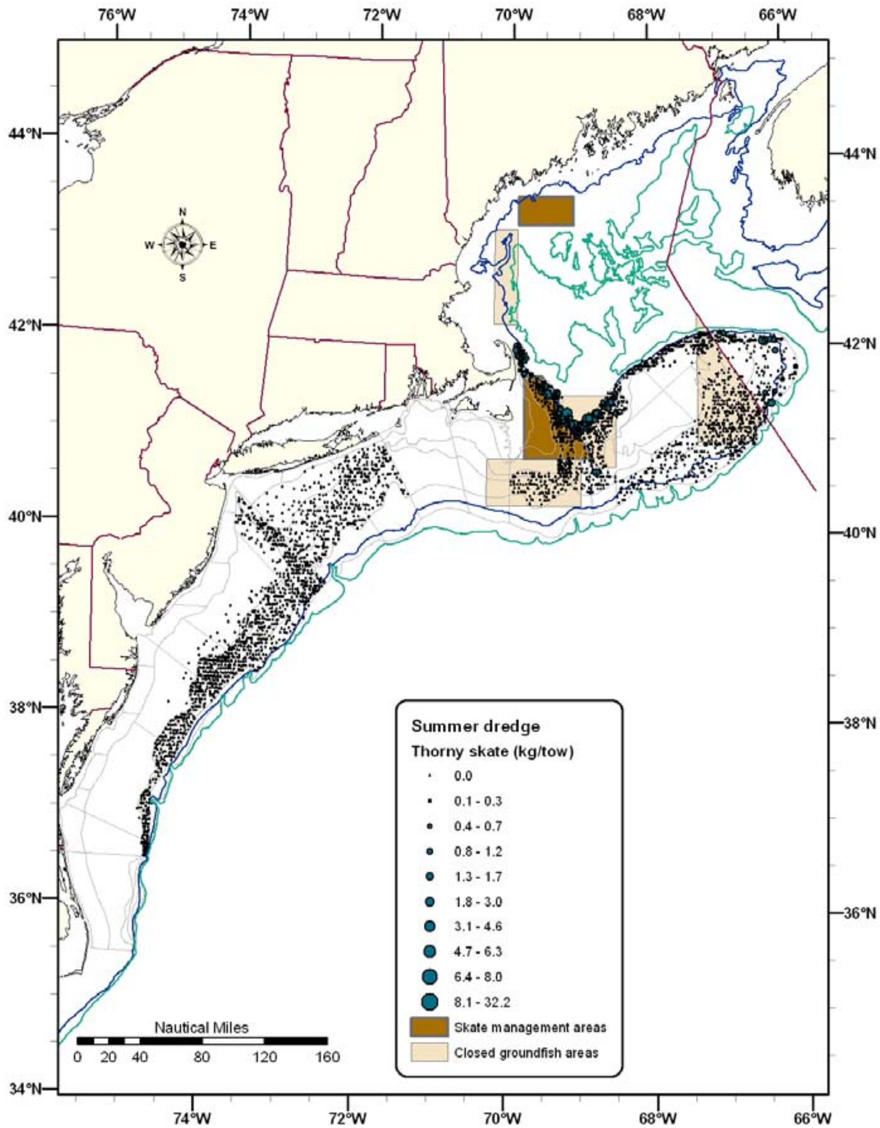
Map 7. Thorny skate biomass distribution in the winter trawl (2000-2007), spring trawl (2000-2008), summer dredge (2000-2007), and autumn trawl (2000-2007) surveys.

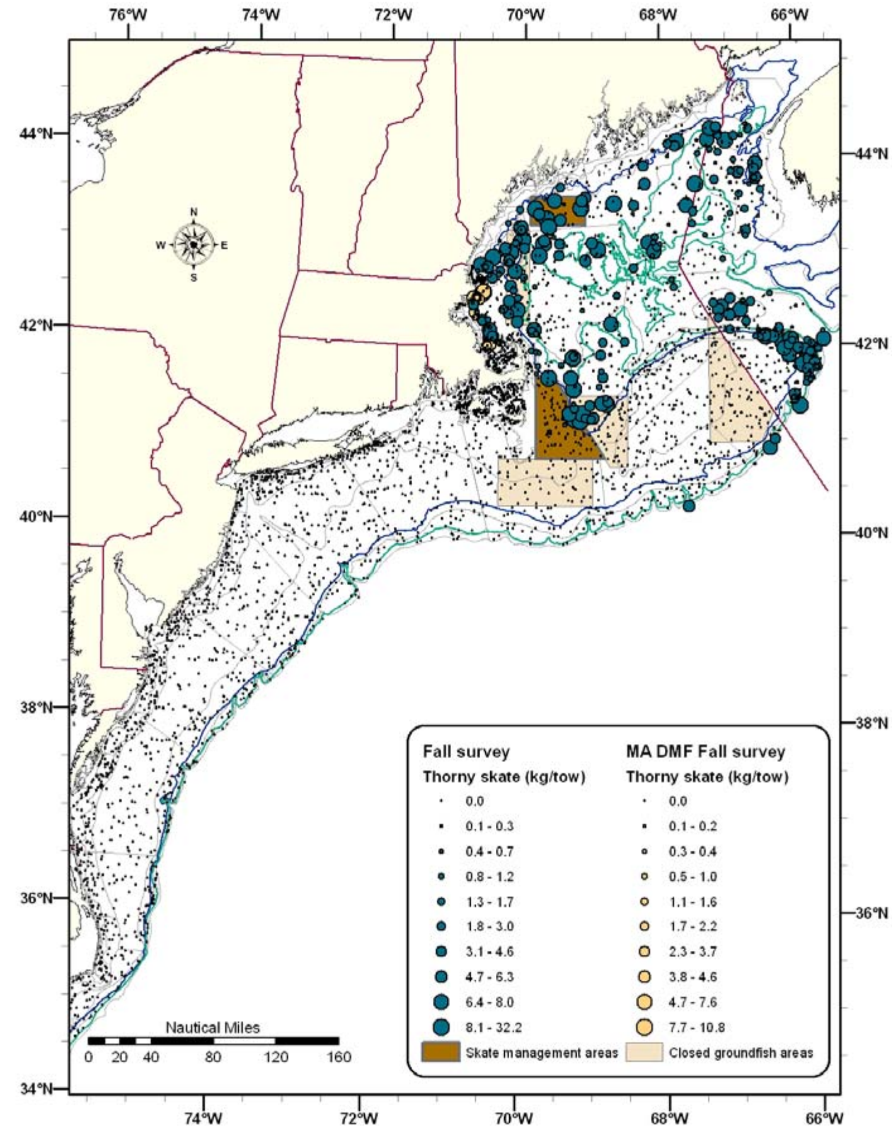
Winter (Feb/Mar)	Spring (Apr/May)





Summer (Jul/Aug)	Autumn (Sep/Oct)





7.2.3.5 Smooth Skate

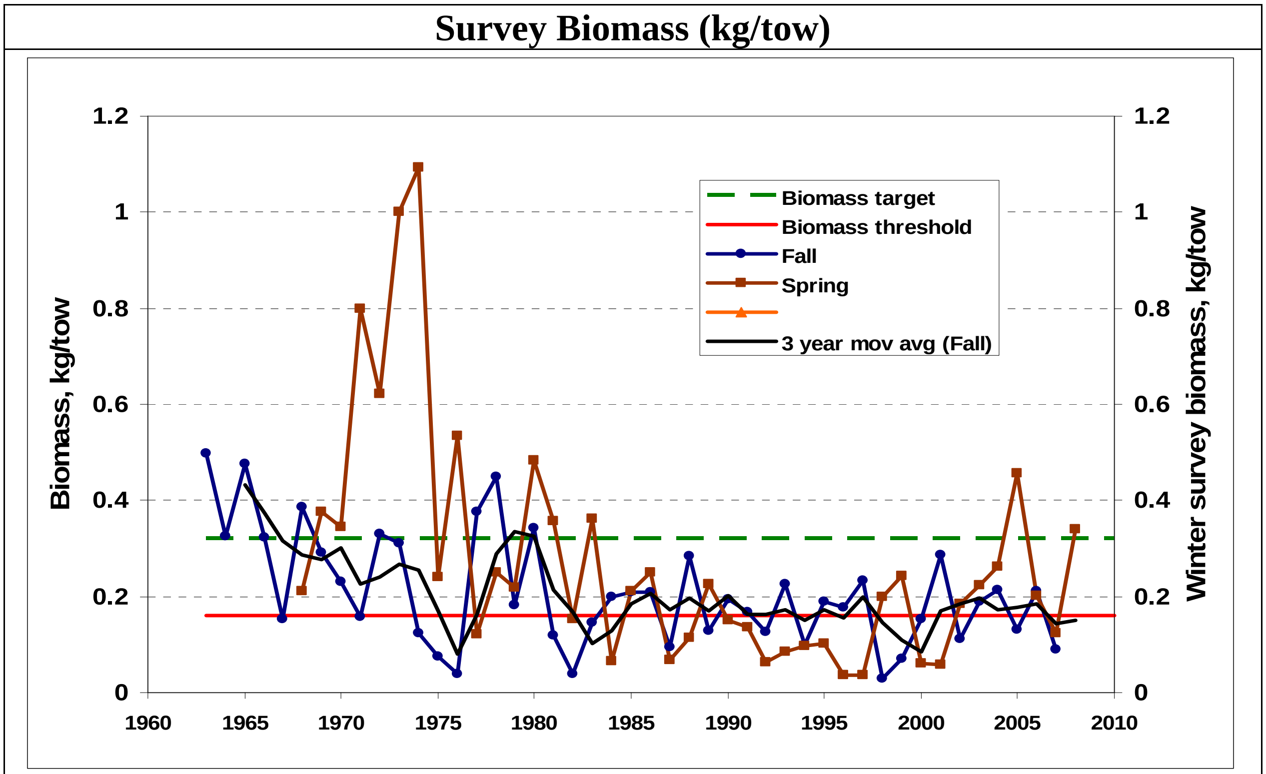
NEFSC bottom trawl surveys indicate that smooth skate are most abundant in the Gulf of Maine and Georges Bank offshore strata regions, with very few fish caught in inshore (< 27 meters depth), Southern New England, or Mid-Atlantic regions (Map 8). Since 2000, the total annual catch of smooth skate in the NEFSC spring surveys has ranged from 30 fish in 2000 to 71 fish in 2006 (Table 32). Since 2000, the total annual catch of smooth skate in the NEFSC autumn surveys has ranged from 55 fish in 2000 to 44 fish in 2006 (Table 33).

The median length of smooth skate in the survey catch in the GOM-SNE offshore region shows no trend over the full survey time series, and is currently at about 40 cm TL (16 in) (SAW44 2006). Length frequency distributions from the NEFSC spring and autumn surveys are presented in NEFSC 2007. In general, the length frequency distributions from the NEFSC spring and autumn surveys in the GOM offshore region show modes at 30 and 50 cm TL.

Indices of smooth skate abundance and biomass from the NEFSC surveys were at a peak during the early 1970s for the spring series and the late 1970s for the autumn series (Figure 7). NEFSC survey indices declined during the 1980s, before stabilizing during the early 1990s at about 25% of the autumn and 50% of the spring survey index values of the 1970s. In 2008, smooth skate was determined to be overfished based on the 2007 autumn survey data, because the three year moving average dropped below the threshold. Overfishing is not occurring on this species because the consecutive three-year moving average of the biomass indices did not exceed the maximum threshold which according to the FMP defines when overfishing is occurring
.

Smooth skate has been divided into five Designatable Units (DUs) based on their distribution in Canadian waters. For more detailed information regarding the 5 DUs, refer to McPhie (2006). Latitudinal differences in depth are apparent; depth increases with latitude. Changes in abundance are variable throughout the DUs. Smooth skate has generally declined throughout its range since the 1970s (Kulka et al. 2006b). The Funk DU appears to have experienced the greatest decline (91% for both adults and juveniles); declines in other DUs have been also been high (approximately 80%). In contrast to this, in the Hopedale Channel, an increase has occurred. The overall decline in abundance can be partially attributed to fishing activity but other factors are thought to play a role in the trend. The period of decline corresponds to cold water temperatures; an equivalent recovery in abundance has not occurred with the return of warmer water temperatures. Preliminary genetic analysis suggests a difference exists between smooth skate from Grand Banks and the Scotian Shelf; however, this is based on a limited number of samples and requires further analysis (Kulka et al. 2006b).

Figure 7. Smooth skate stratified mean weight and number per tow for the winter, spring, and fall NEFSC trawl surveys.



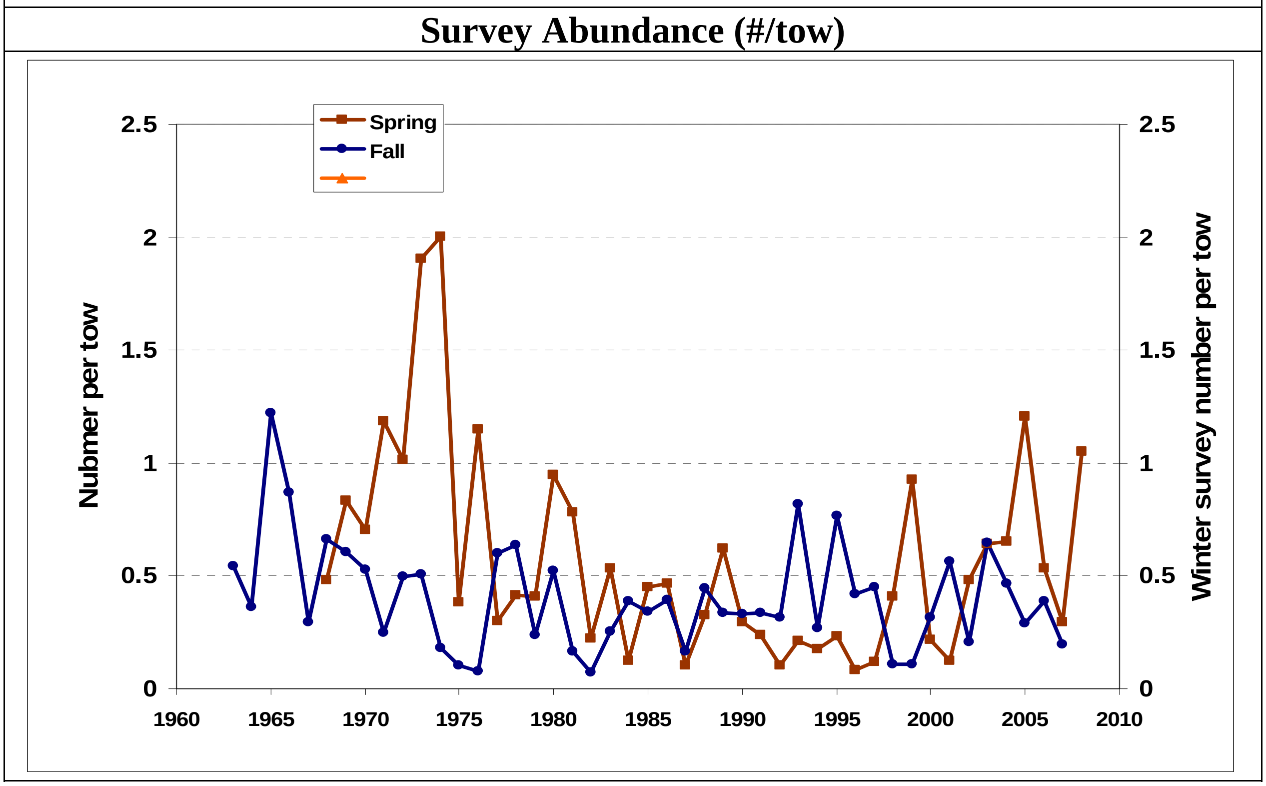


Table 32. Abundance and biomass from NEFSC spring surveys for smooth skate for the Gulf of Maine to Southern New England region (offshore strata 1-30, 33-40). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006.

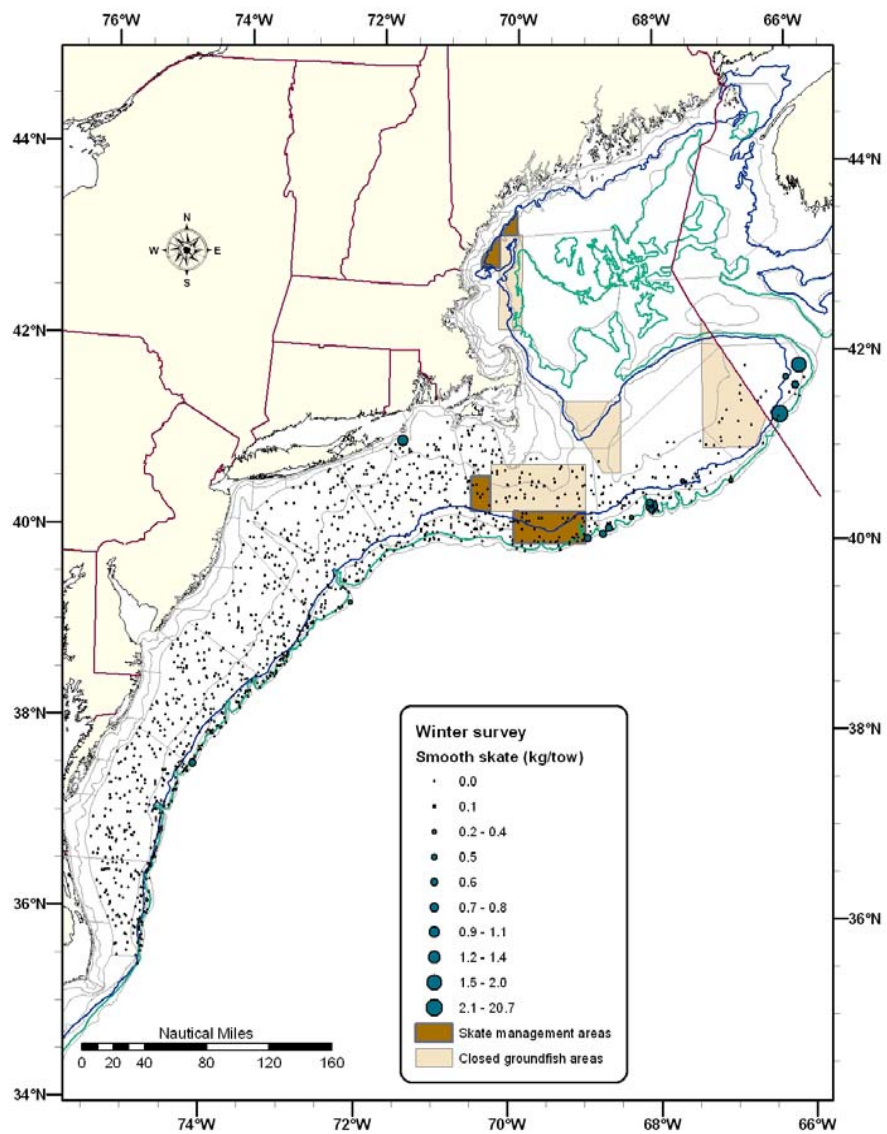
	weight/tow			**number/tow**				**Length (cm TL)**						**nonzero**	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	0.06	0.025	0.095	0.22	-0.021	0.46	0.272	10	10	27	30.9	59	62	13	30
2001	0.058	0.02	0.096	0.125	0.058	0.192	0.466	19	28	46	44.6	57	60	16	25
2002	0.184	0.096	0.271	0.482	0.297	0.667	0.381	10	13	45	40.4	55	61	26	78
2003	0.224	0.161	0.287	0.642	0.429	0.348	0.348	14	19	40	40.4	55	59	36	95
2004	0.262	0.141	0.383	0.65	0.278	1.022	0.403	12	19	43	42.3	56	60	32	125
2005	0.457	0.125	0.788	1.207	0.288	2.126	0.378	10	27	42	42.4	53	60	22	178
2006	0.203	0.005	0.401	0.531	-0.009	1.072	0.382	19	21	41	41.3	56	62	22	71

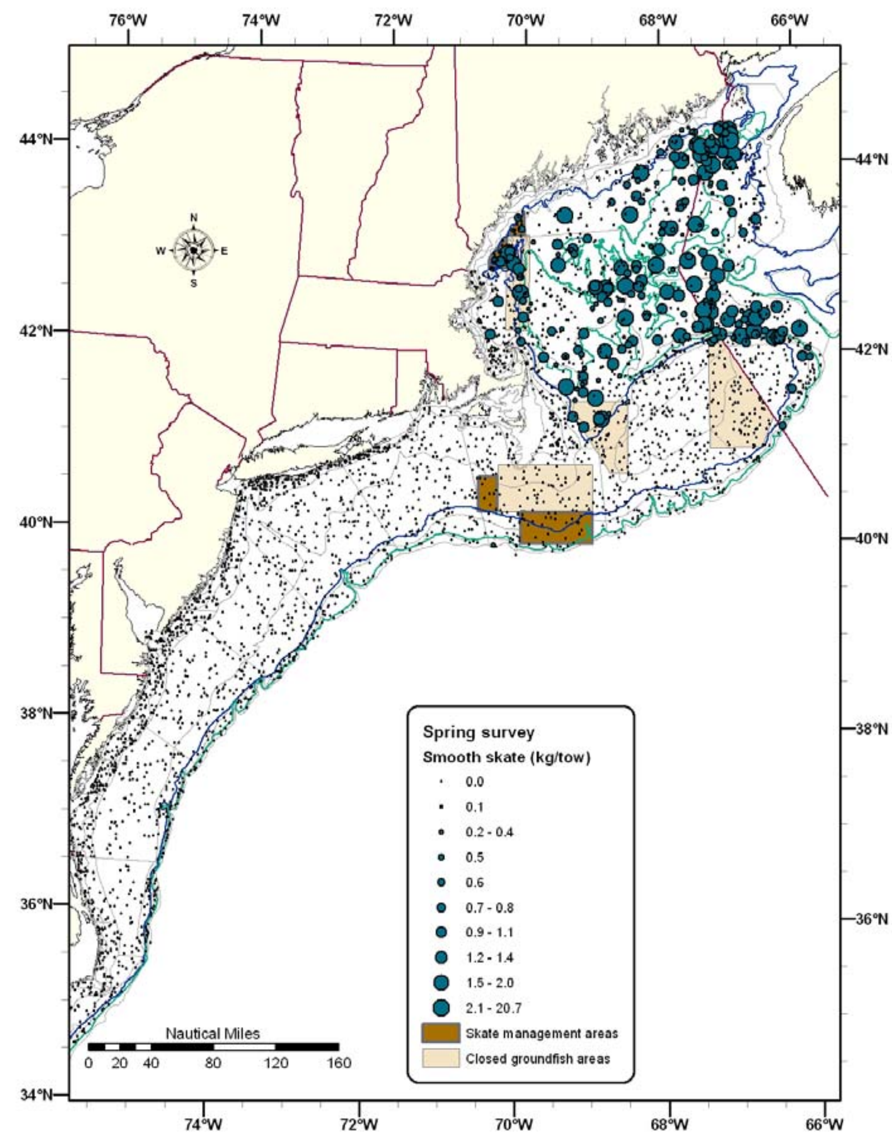
Table 33. Abundance and biomass from NEFSC autumn surveys for smooth skate for the Gulf of Maine to Southern New England region (offshore strata 1-30, 33-40). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2005.

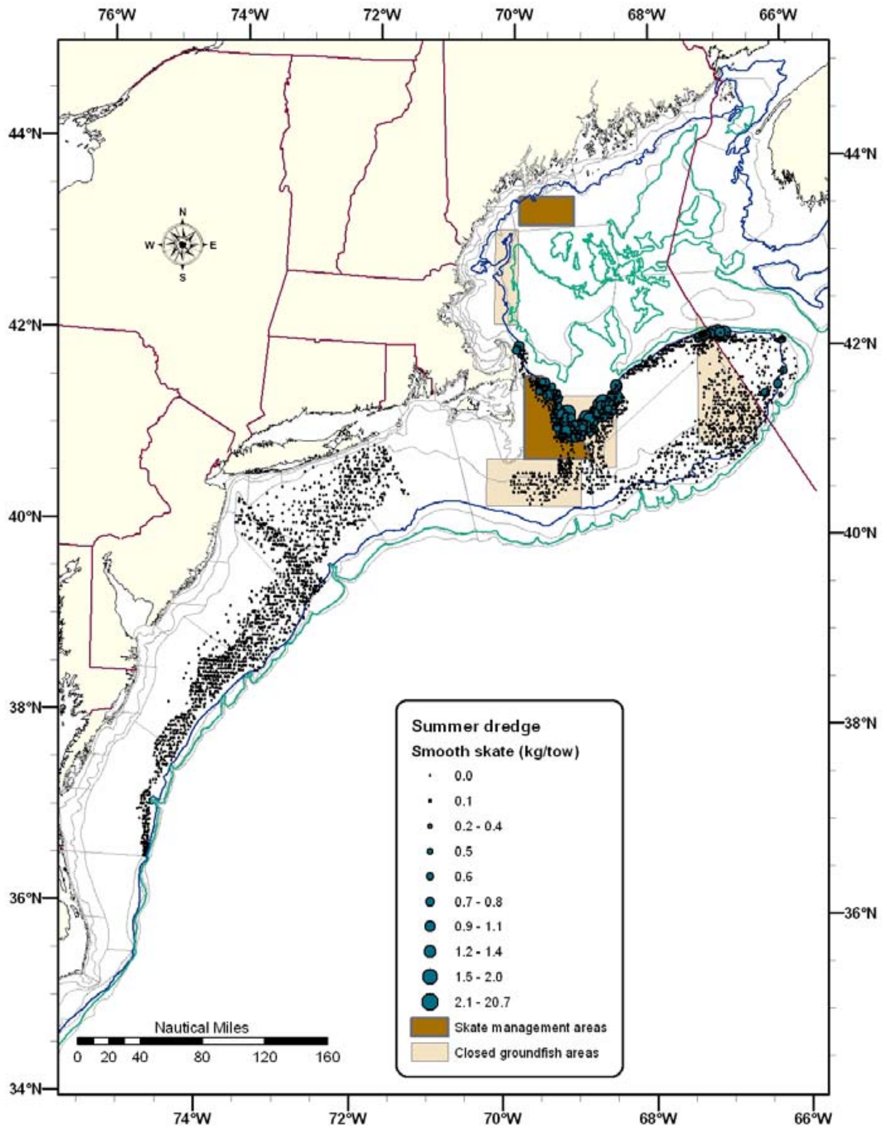
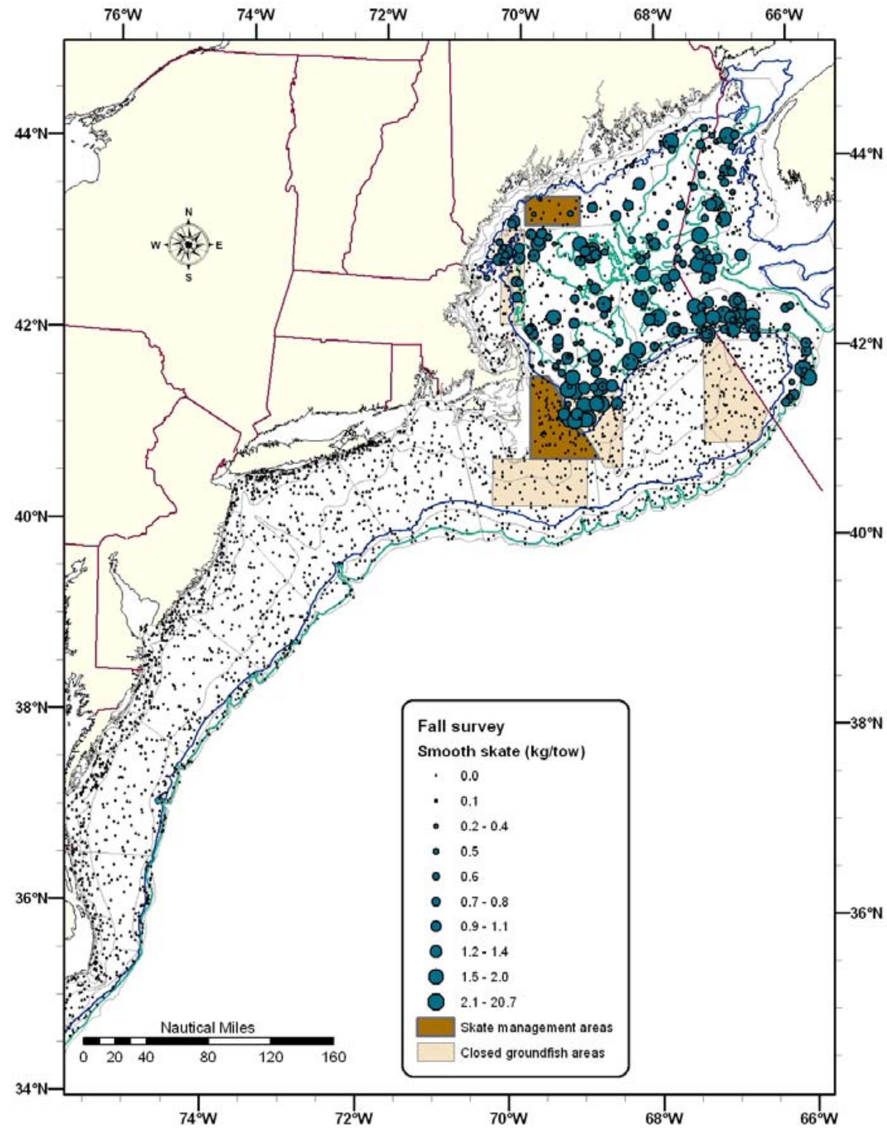
	weight/tow			**number/tow**				**Length (cm TL)**						**nonzero**	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	0.154	0.083	0.226	0.318	0.19	0.447	0.485	10	11	45	42.3	59	73	27	55
2001	0.287	0.169	0.405	0.565	0.349	0.781	0.507	17	23	49	46.5	58	62	29	84
2002	0.111	0.067	0.155	0.209	0.14	0.278	0.533	15	24	50	46.2	60	62	25	32
2003	0.19	0.076	0.304	0.646	0.248	1.045	0.294	10	14	39	36.3	52	62	30	84
2004	0.214	0.126	0.303	0.467	0.283	0.652	0.458	18	24	47	45.3	55	59	29	58
2005	0.131	0.039	0.224	0.291	0.143	0.439	0.451	15	17	47	43.1	59	62	18	44

Map 8. Smooth skate biomass distribution in the winter trawl (2000-2007), spring trawl (2000-2008), summer dredge (2000-2007), and autumn trawl (2000-2007) surveys.

Winter (Feb/Mar)	Spring (Apr/May)





Summer (Jul/Aug)	Autumn (Sep/Oct)
	

7.2.3.6 Clearnose Skate

NEFSC bottom trawl surveys indicate that clearnose skate are most abundant in the Mid-Atlantic offshore and inshore strata regions, with very few fish caught in Southern New England and no fish caught in other survey regions (Map 8). Since 2000, the total annual catch of clearnose skate in the NEFSC spring surveys has ranged from 126 fish in 2000 to 39 fish in 2006 (Table 34). Since 2000, the total annual catch of clearnose skate in the NEFSC autumn surveys has ranged from 61 fish in 2000 to 71 fish in 2006 (Table 35). Recent NEFSC winter survey (2000-2006) annual catches of clearnose skate have ranged from 1,449 fish in 2000 to 1,916 fish in 2006, equating to a maximum stratified mean catch per tow of 9 fish or 10 kg per tow in 2000 and 11 fish or 12 kg per tow in 2006 (Table 36).

The median length of clearnose skate in the spring survey catch has increased over the time series, from about 50 cm TL during the late 1970s to at about 60 cm TL in recent years (24 in; SAW44 2006). The median length of the autumn survey catch has been stable over the time series, and is also at about 60 cm TL. Length frequency distributions from the NEFSC spring and autumn surveys are presented in the SAW 44 documents and are not reproduced in this SAFE Report. In general, the length frequency distributions show a consistent mode at 60-70 cm TL that may represent the accumulated abundance of several older ages.

NEFSC spring and autumn survey indices for clearnose skate have increased since the mid-1980s, through 2000 and have since declined to about average values (SAW44 2006). Clearnose skate biomass index is currently above the biomass threshold reference point and the B_{MSY} proxy and is not considered to be overfished (Table 20). Overfishing is not occurring on this species because the consecutive three-year moving average of the biomass indices did not exceed the maximum threshold which according to the FMP defines when overfishing is occurring
.

Indices of abundance for clearnose skate are available from the CTDEP spring and autumn finfish trawl surveys in Long Island Sound for the years 1984-2006 (1992 and later only for biomass). The CTDEP survey has caught very few clearnose skate, with annual catches ranging from 0 to 20 skates through 1998, but the indices have increased in Long Island Sound over the time series.

Indices of abundance for clearnose skate are available from the Virginia Institute of Marine Science (VIMS) trawl survey in Chesapeake Bay and its' tributaries for the years 1988-1998. The VIMS trawl survey indices suggest no trend in clearnose skate abundance over this period (SAW44 2006).

Figure 8. Clearnose skate stratified mean weight and number per tow for the winter, spring, and fall NEFSC trawl surveys.

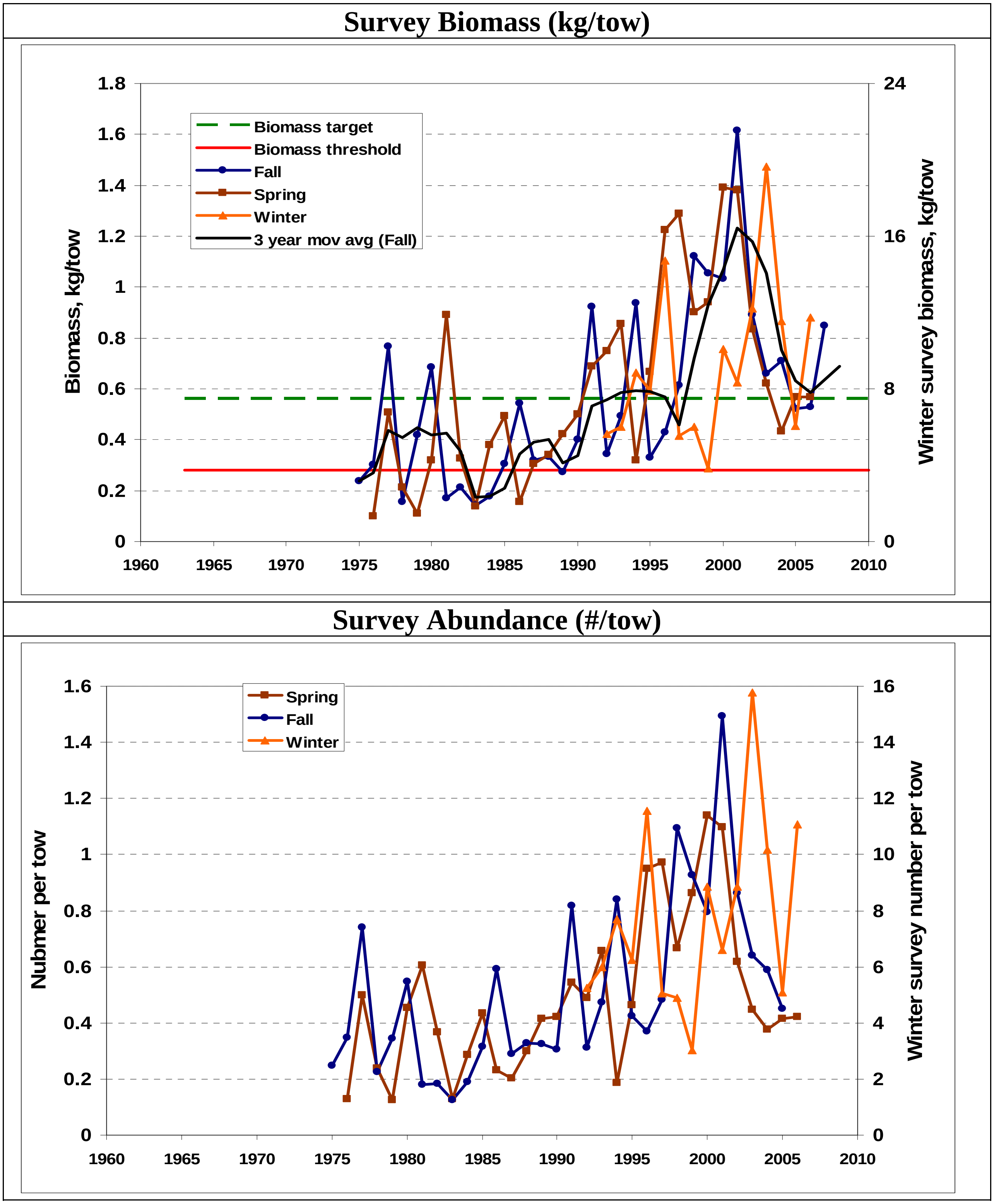


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Table 34. Abundance and biomass from NEFSC spring surveys for clearnose skate for the Mid-Atlantic region (offshore strata 61-76, inshore strata 15-44). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006.

	weight/tow			number/tow				Length (cm TL)						nonzero	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	1.391	1.046	1.736	1.14	0.789	1.491	1.221	24	40	59	59.4	70	76	31	126
2001	1.38	0.674	2.087	1.097	0.456	1.738	1.258	42	49	62	60.8	68	72	19	74
2002	0.836	0.281	1.392	0.617	0.241	0.993	1.355	29	42	62	60.5	69	74	23	59
2003	0.622	0.366	0.879	0.448	0.265	0.631	1.389	49	49	62	62.7	75	76	16	35
2004	0.433	0.05	0.815	0.376	0.049	0.703	1.151	35	35	59	56.2	70	72	9	23
2005	0.569	0.03	1.109	0.414	0.008	0.82	1.374	42	42	61	61.2	70	73	11	27
2006	0.567	0.189	0.946	0.42	0.179	0.661	1.35	36	41	63	60.7	68	72	18	39

Table 35. Abundance and biomass from NEFSC autumn surveys for clearnose skate for the Mid-Atlantic region (offshore strata 61-76, inshore strata 15-44). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2005.

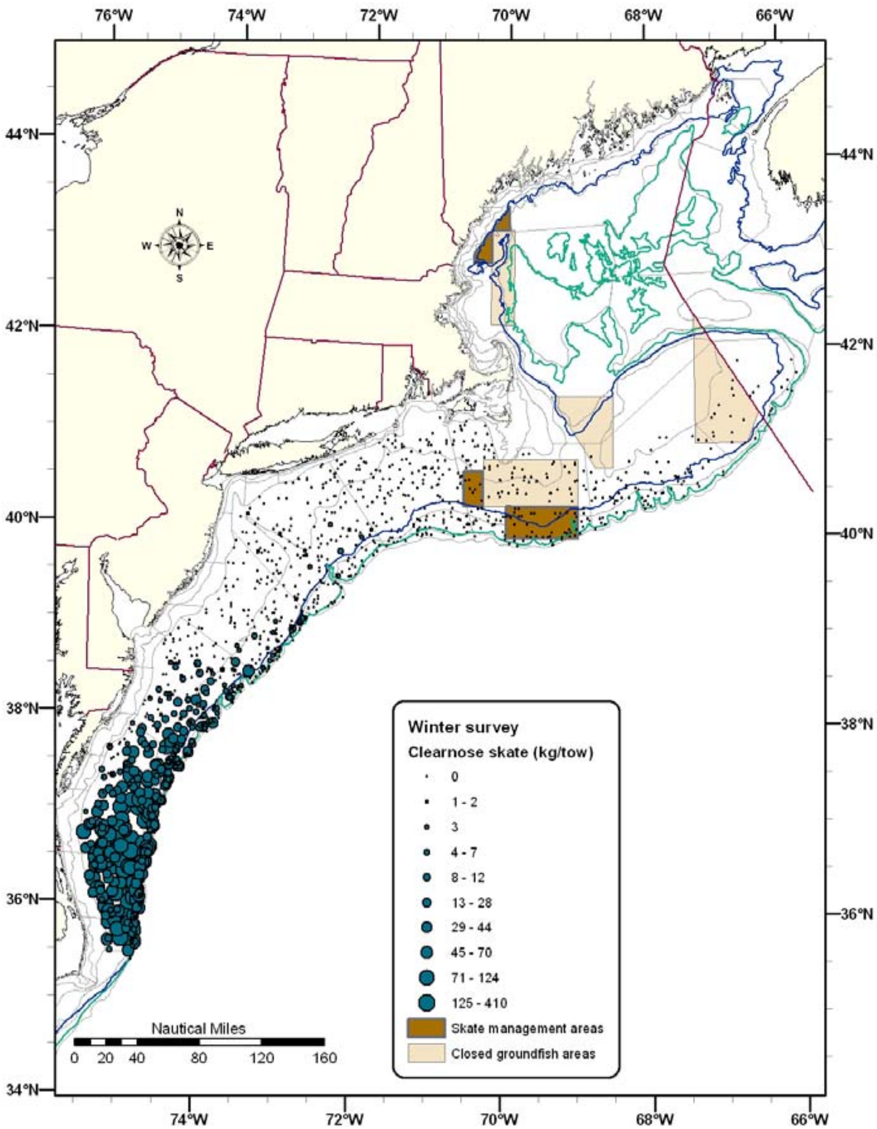
	weight/tow			number/tow				Length (cm TL)						nonzero	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	1.032	0.422	1.642	0.795	0.353	1.238	1.298	14	47	60	60.5	69	74	29	61
2001	1.614	1.092	2.136	1.494	0.984	2.004	1.081	13	15	59	55.2	68	73	41	221
2002	0.891	0.372	1.411	0.863	0.317	1.409	1.033	14	38	55	56	68	73	27	63
2003	0.661	0.417	0.906	0.64	0.456	0.823	1.034	15	30	54	54.5	71	78	38	81
2004	0.709	0.201	1.217	0.59	0.172	1.008	1.201	37	43	62	60.1	69	75	18	55
2005	0.524	0.192	0.855	0.452	0.207	0.697	1.159	26	37	62	59.6	71	74	30	71

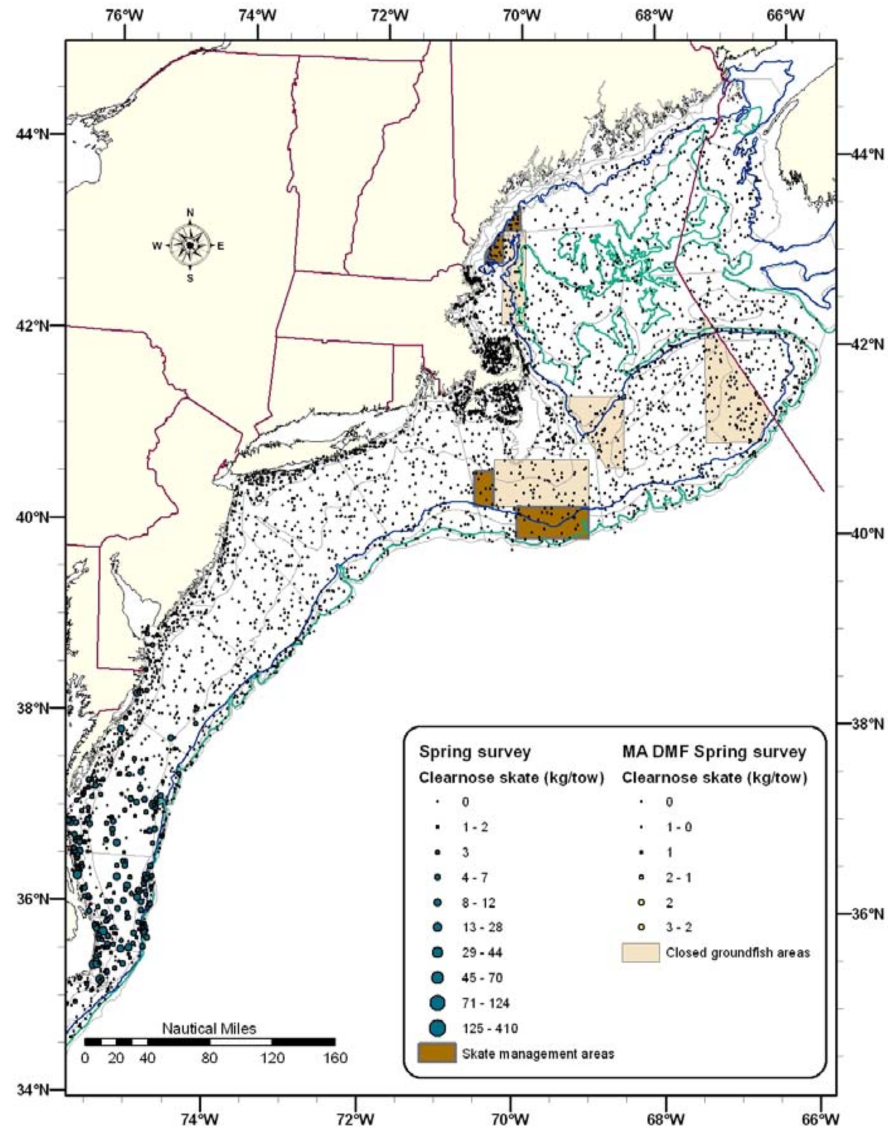
Table 36. Abundance and biomass from NEFSC winter surveys for clearnose skate for the Georges Bank to Mid-Atlantic region (offshore strata 1-3,5-7,9-11,13-14,16,61-63,65-67,69-71,73-75). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006. Stratum 16 not sampled in 1993, 2000, 2002-2006. Strata 13 and 14 not sampled in 2003. Stratum 63 not sampled in 1993. Stratum 14 not sampled in 2005.

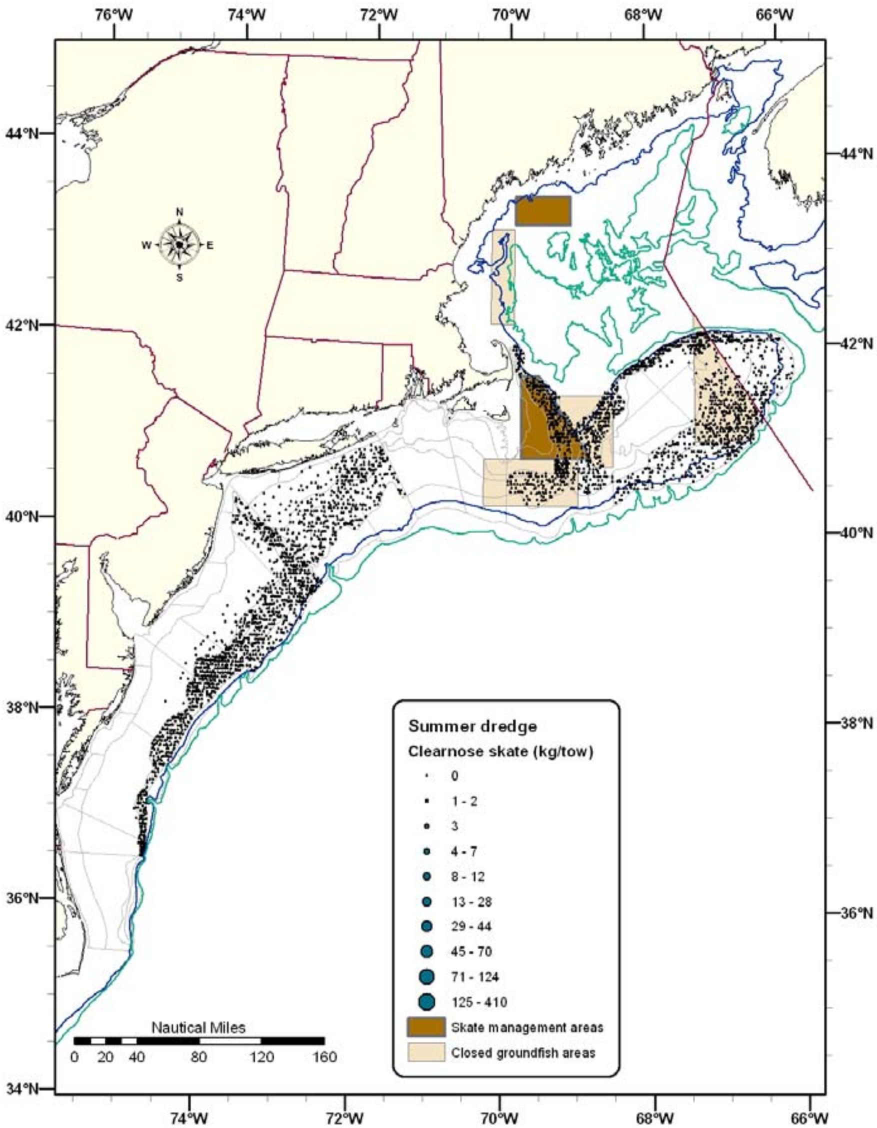
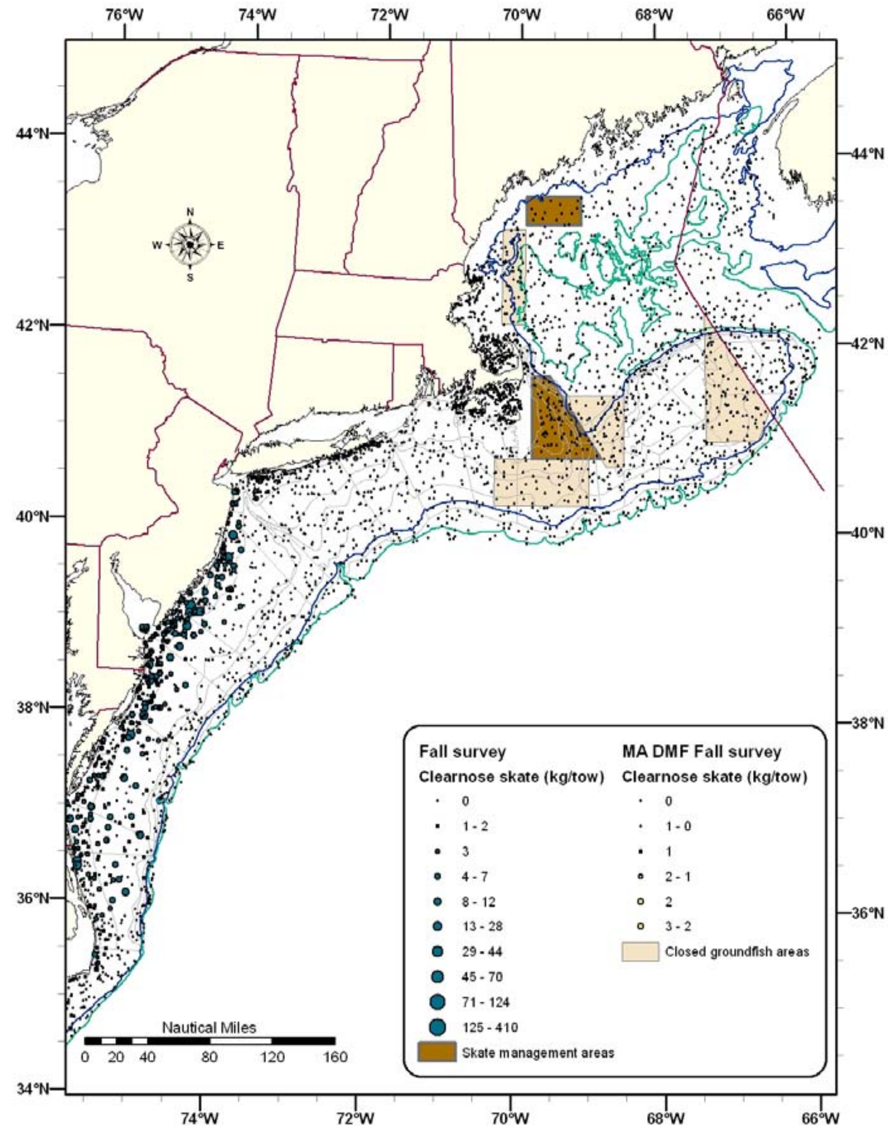
	weight/tow			number/tow				Length (cm TL)						nonzero	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	10.102	5.693	14.51	8.864	4.579	13.15	1.14	25	42	59	58.2	69	93	43	1449
2001	8.316	5.624	11.008	5.499	4.24	8.957	1.26	25	43	61	60.6	69	86	41	1300
2002	12.223	8.343	16.102	8.864	5.886	11.843	1.379	23	39	63	61.6	70	74	51	1704
2003	19.637	13.819	25.455	15.769	10.902	20.635	1.245	23	39	62	59.1	70	81	36	2260
2004	11.566	7.743	15.389	10.462	6.344	13.979	1.138	20	35	60	58.1	70	80	38	1880
2005	6.036	3.837	8.235	5.078	2.425	7.731	1.189	24	44	60	59.1	70	82	26	1047
2006	11.723	4.862	18.585	11.085	4.693	17.477	1.058	23	35	57	56.7	70	77	41	1916

Map 9. Clearnose skate biomass distribution in the winter trawl (2000-2007), spring trawl (2000-2008), summer dredge (2000-2007), and autumn trawl (2000-2007) surveys.

Winter (Feb/Mar)	Spring (Apr/May)





Summer (Jul/Aug)	Autumn (Sep/Oct)
	

7.2.3.7 Rosette Skate

NEFSC bottom trawl surveys indicate that rosette skate are most abundant in the Mid-Atlantic offshore strata region, with very few fish caught in Southern New England and Georges Bank and no fish caught in the Gulf of Maine or inshore (Map 9). Since 2000, the total annual catch of rosette skate in the NEFSC spring surveys has ranged from 15 fish in 2000 to 8 fish in 2006 (Table 37). Since 2000, the total annual catch of rosette skate in the NEFSC autumn surveys has ranged from 10 fish in 2000 to 24 fish in 2005 (Table 38). Calculated on a per tow basis, these spring survey catches equate to maximum stratified mean number per tow indices for the Mid-Atlantic offshore strata set of about 0.1 fish, or about 0.03 kg, per tow during 2000 and about 0.05 fish, or about 0.01 kg, per tow during 2006 (Table 37 and Table 38).

Recent NEFSC winter survey (2000-2006) annual catches of rosette skate have ranged from 740 fish in 2000 to 513 fish in 2006, equating to a maximum stratified mean catch per tow of 0.7 fish or 0.3 kg per tow in 2000 and 0.8 fish or 0.4 kg per tow in 2006 (Table 39).

The median length of rosette skate in the survey catch has been stable over the spring and autumn time series at about 36-37 cm TL (14 in; SAW44 2006). Length frequency distributions from the NEFSC spring and autumn surveys are presented in the SAW 30 documents. In general, the length frequency distributions show a consistent mode at 30-40 cm TL.

Indices of rosette skate abundance and biomass from the NEFSC surveys were at a peak during 1975-1980, before declining through 1986. NEFSC survey indices for rosette skate increased since 1986 through 2001, declined slightly and recent indices are near the peak values of the late 1970s (Figure 9). Rosette skate biomass index is currently above the biomass threshold reference point and the B_{MSY} proxy and is not considered to be overfished. Overfishing is not occurring on this species because the consecutive three-year moving average of the biomass indices did not exceed the maximum threshold which according to the FMP defines when overfishing is occurring
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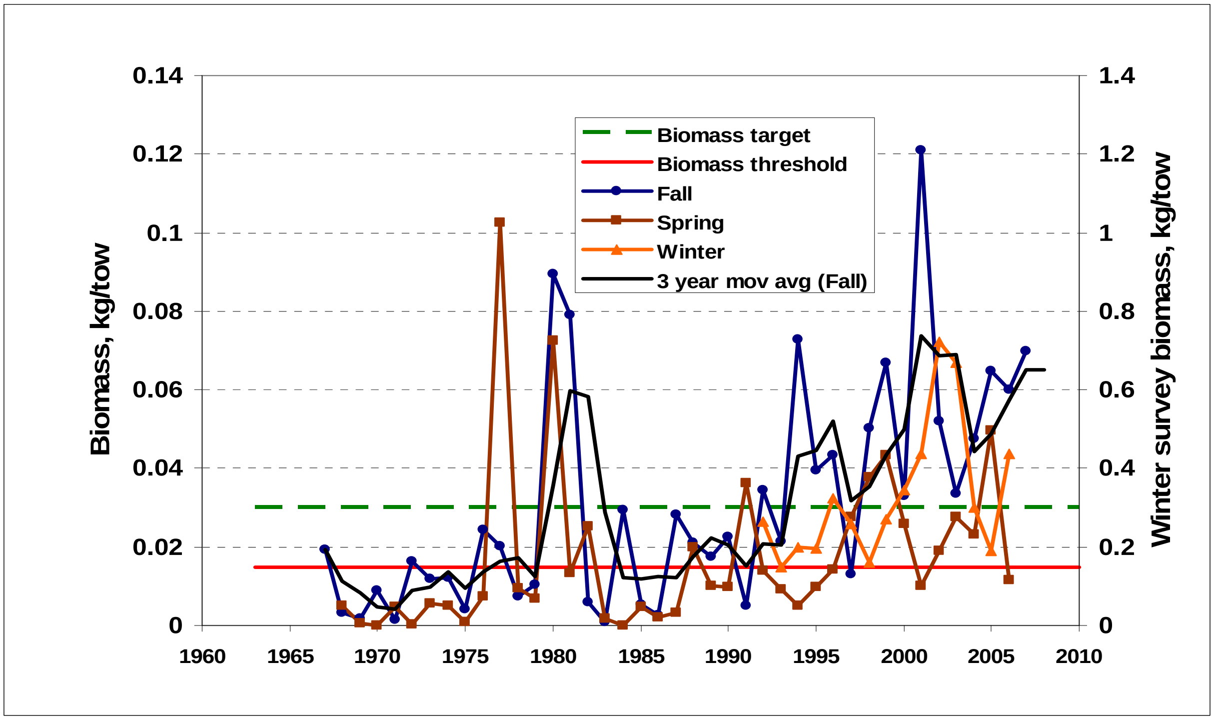
Figure 9. Rosette skate stratified mean weight and number per tow for the winter, spring, and fall NEFSC trawl surveys.

Survey Biomass (kg/tow)



Survey Abundance (#/tow)

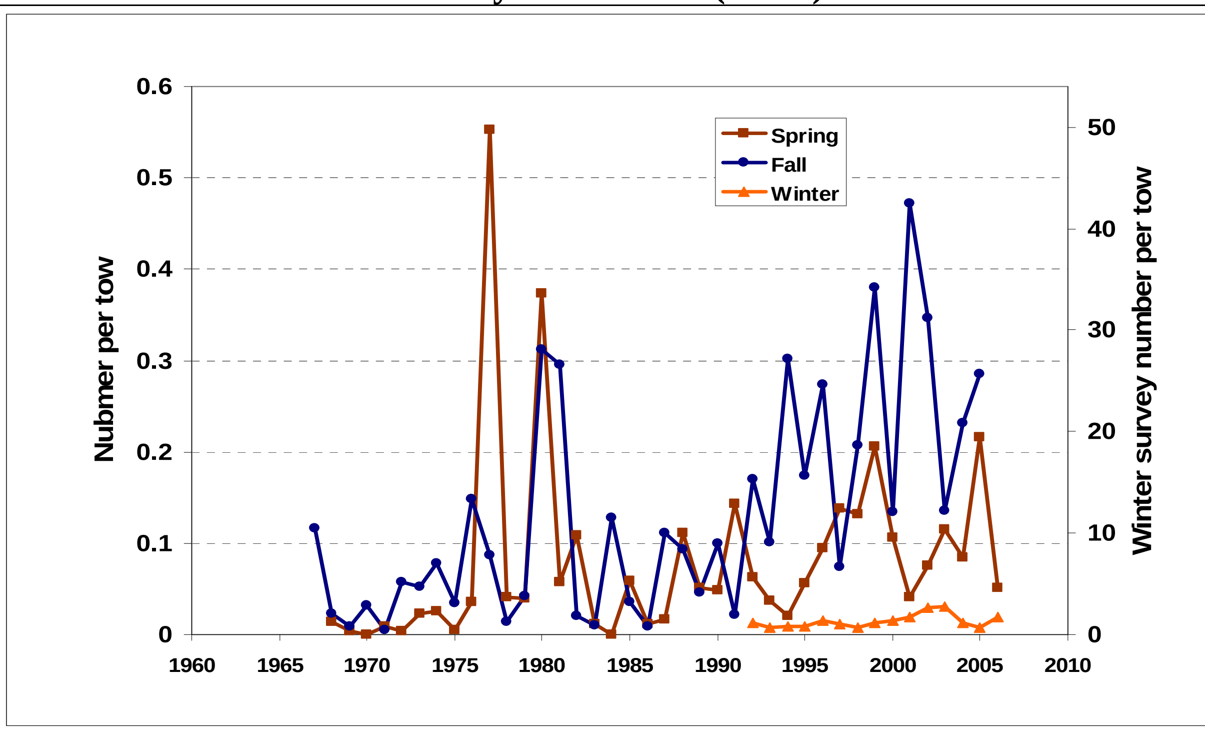


Table 37. Abundance and biomass from NEFSC spring surveys for rosette skate for the Mid-Atlantic region (offshore strata 61-76). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006.

	weight/tow			**number/tow**				**Length (cm TL)**						**nonzero**	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	0.026	0.009	0.043	0.106	0.04	0.171	0.247	30	32	37	38	41	42	7	15
2001	0.01	-0.005	0.025	0.041	-0.012	0.095	0.244	21	21	40	38.2	40	41	4	4
2002	0.019	-0.007	0.045	0.076	-0.029	0.18	0.252	12	12	38	34.1	39	40	3	5
2003	0.028	-0.002	0.057	0.115	0.003	0.226	0.241	9	24	38	37	39	41	5	17
2004	0.023	-0.009	0.055	0.084	-0.025	0.193	0.276	30	32	39	39.2	40	41	3	7
2005	0.05	-0.029	0.128	0.216	-0.131	0.564	0.229	13	31	37	36.7	40	41	5	21
2006	0.012	0.007	0.016	0.051	0.02	0.081	0.23	25	25	39	35.5	40	41	5	8

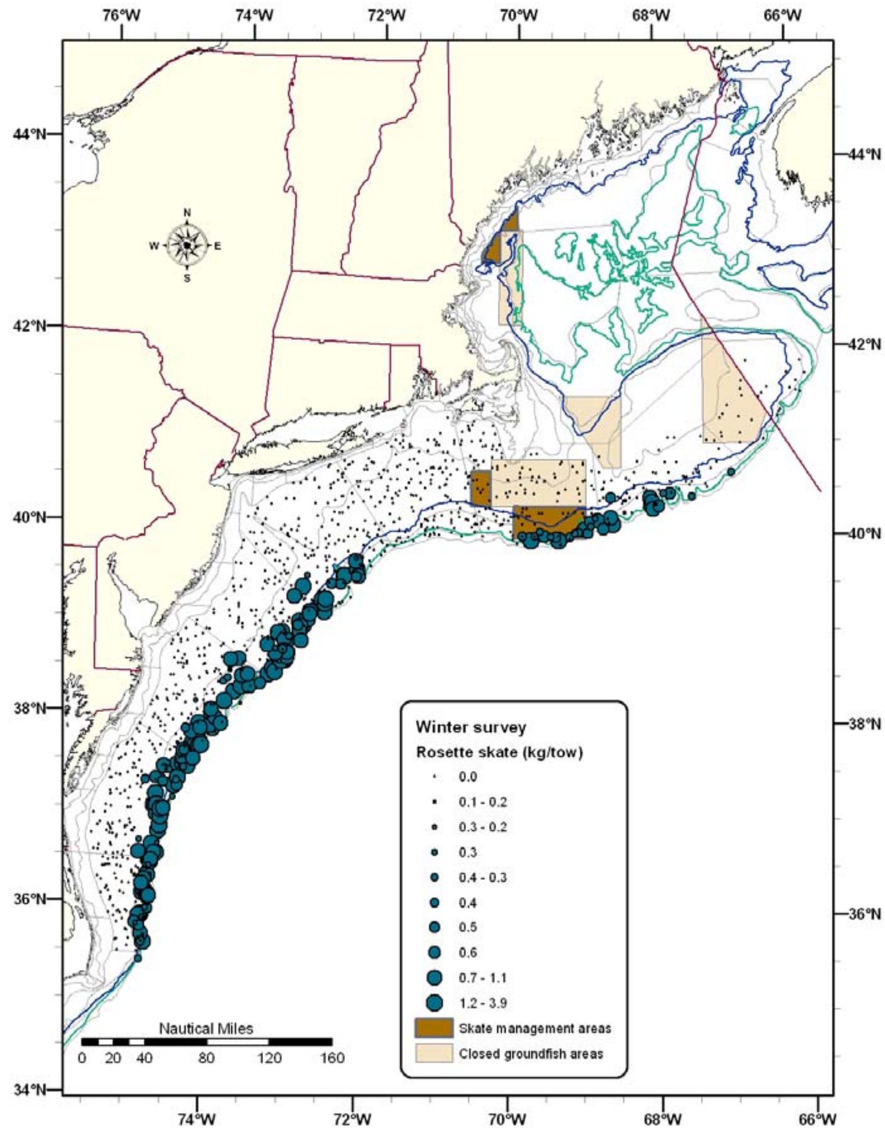
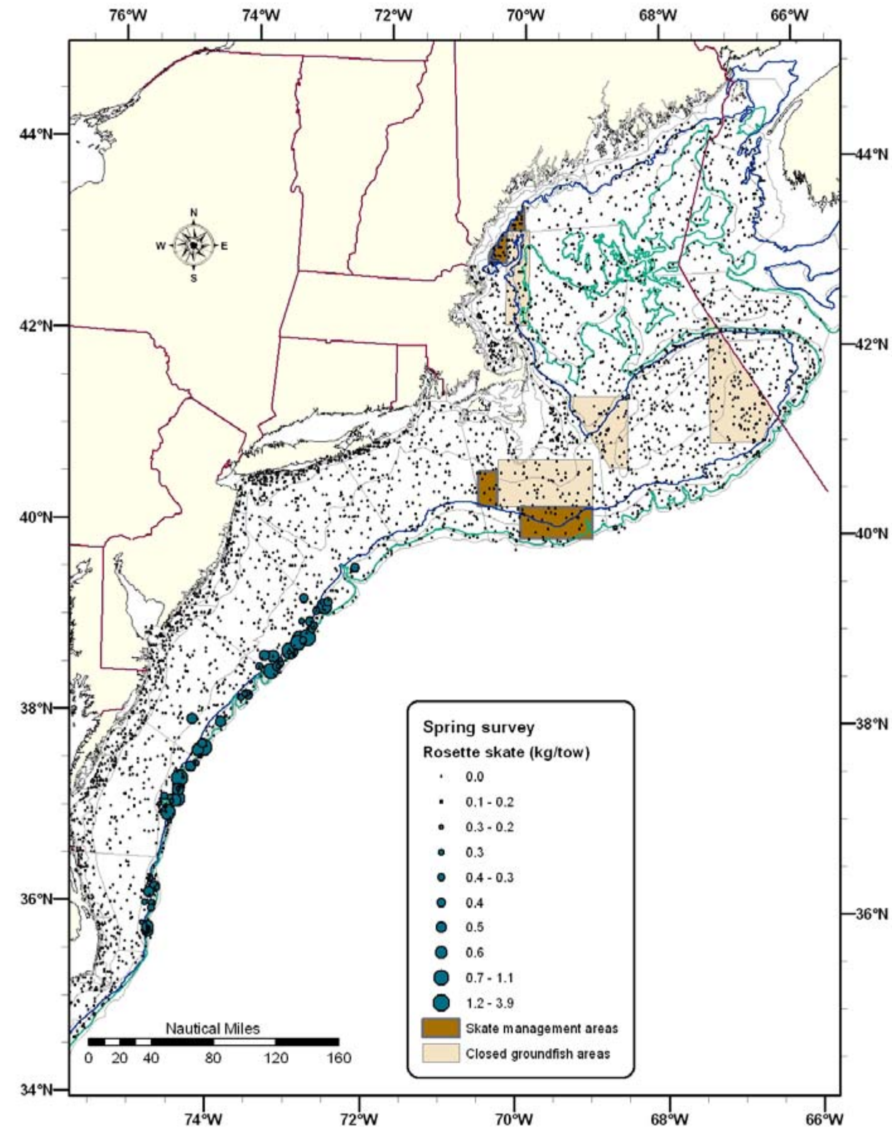
Table 38. Abundance and biomass from NEFSC autumn surveys for rosette skate for the Mid-Atlantic region (offshore strata 61-76). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2005.

	weight/tow			**number/tow**				**Length (cm TL)**						**nonzero**	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	0.033	-0.006	0.073	0.134	-0.015	0.283	0.248	26	30	35	36.5	39	40	7	10
2001	0.121	-0.007	0.249	0.472	-0.016	0.961	0.257	11	34	39	38.6	43	44	10	28
2002	0.052	0.009	0.095	0.347	0.045	0.648	0.15	8	8	30	28	40	42	11	29
2003	0.033	0.016	0.051	0.136	0.071	0.2	0.247	33	33	36	37.4	39	41	7	18
2004	0.048	0.003	0.092	0.231	0.03	0.432	0.206	19	29	35	35.5	37	40	8	29
2005	0.065	0.001	0.129	0.286	-0.004	0.575	0.227	30	30	35	36.4	39	40	7	24

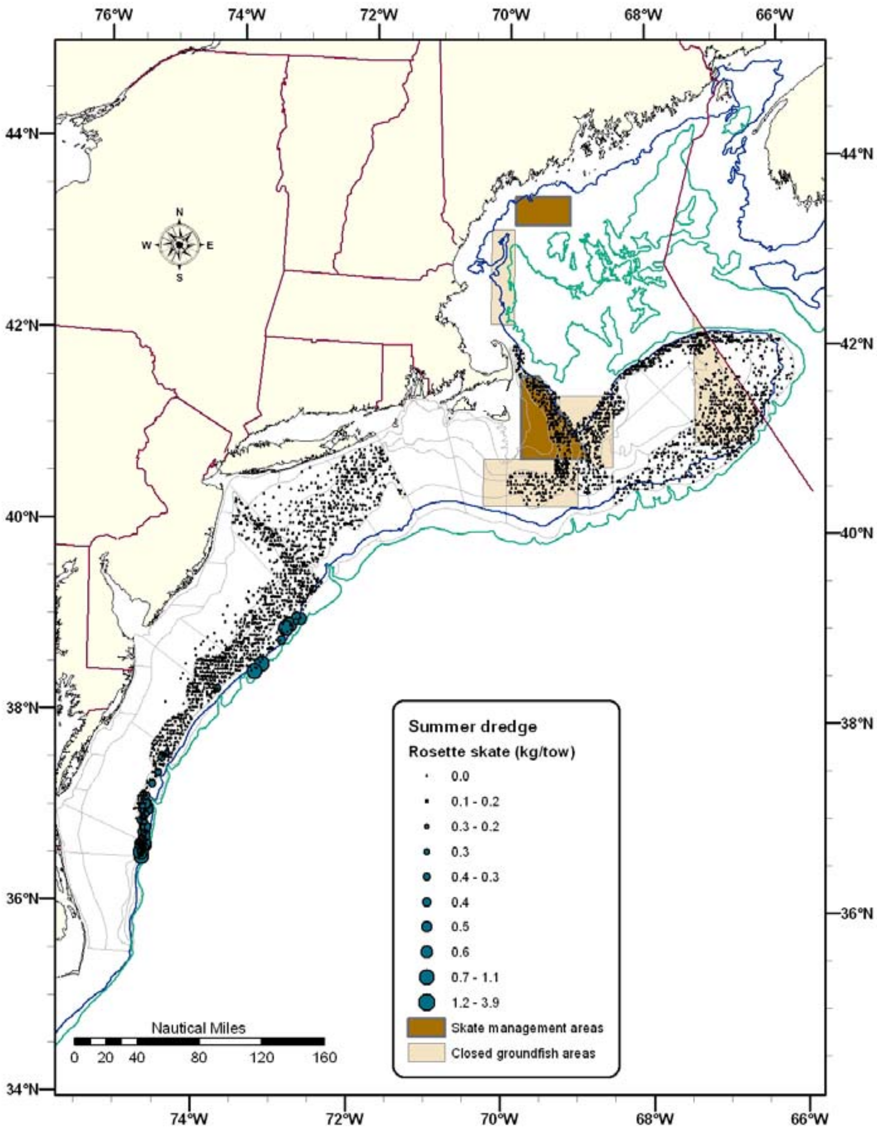
Table 39. Abundance and biomass from NEFSC winter surveys for rosette skate for the Georges Bank to Mid-Atlantic region (offshore strata 1-3,5-7,9-11,13-14,16,61-63,65-67,69-71,73-75). The mean index, 95% confidence intervals, individual fish weight, minimum, mean, and maximum length, 5th, 50th, and 95th percentiles of length, number of nonzero tows, and number of fish caught are presented for 2000-2006. Stratum 16 not sampled in 1993, 2000, 2002-2006. Strata 13 and 14 not sampled in 2003. Stratum 63 not sampled in 1993. Stratum 14 not sampled in 2005.

	weight/tow			**number/tow**				**Length (cm TL)**						**nonzero**	
	mean	lower	upper	mean	lower	upper	ind wt	min	5%	50%	mean	95%	max	tows	no fish
2000	0.344	0.198	0.491	1.357	0.725	1.989	0.254	8	28	37	37.5	43	47	34	740
2001	0.437	0.185	0.69	1.718	0.797	2.64	0.254	9	24	38	37.6	41	46	36	790
2002	0.723	0.14	1.307	2.655	0.603	4.708	0.272	8	29	38	38.3	42	47	34	913
2003	0.67	0.195	1.144	2.774	0.802	4.745	0.242	8	26	37	36.9	41	47	28	1029
2004	0.3	0.171	0.429	1.192	0.653	1.73	0.252	16	31	37	37.8	41	46	29	784
2005	0.189	0.09	0.289	0.716	0.357	1.076	0.264	12	30	38	38.2	43	45	19	281
2006	0.437	0.209	0.665	1.738	0.821	2.654	0.251	8	31	37	37.7	42	45	28	513

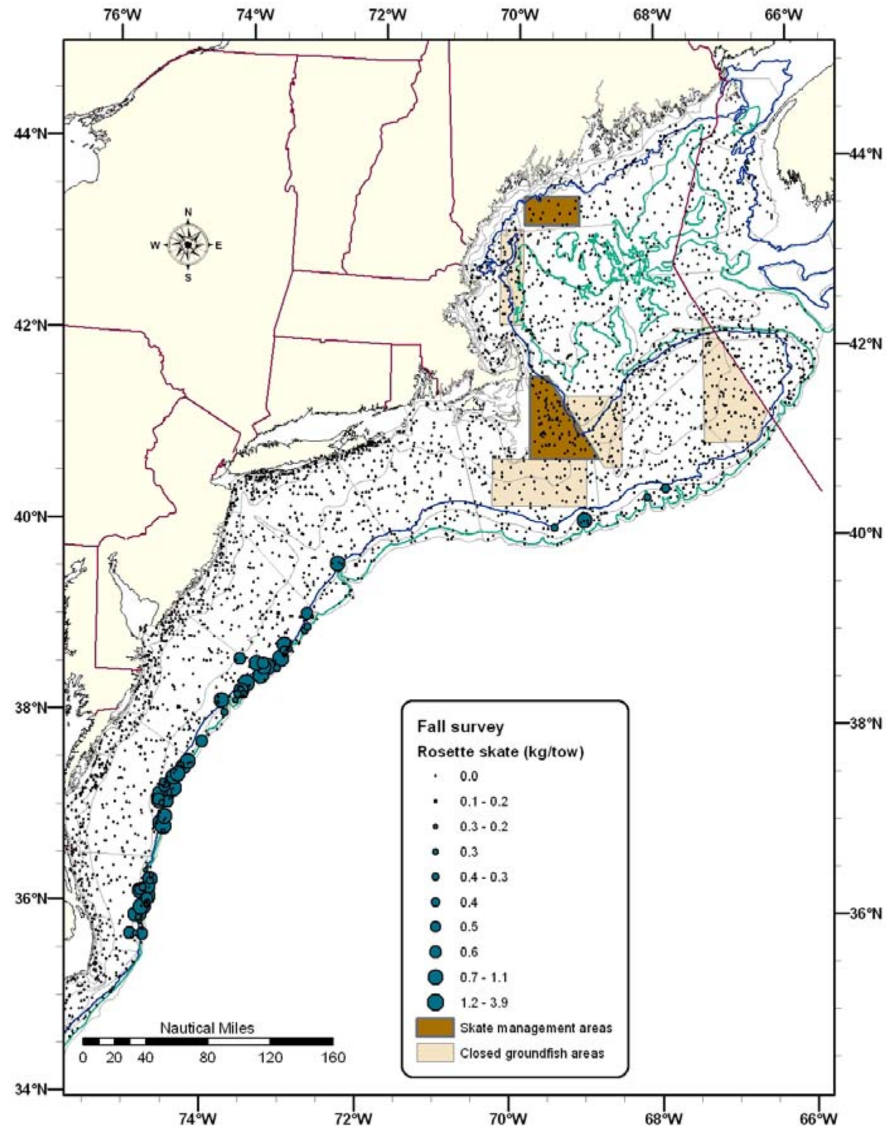
Map 10. Rosette skate biomass distribution in the winter trawl (2000-2007), spring trawl (2000-2008), summer dredge (2000-2007), and autumn trawl (2000-2007) surveys.

Winter (Feb/Mar)	Spring (Apr/May)
	

Summer (Jul/Aug)



Autumn (Sep/Oct)



7.2.4 Life History Characteristics and Biological Reference Points

The Essential Fish Habitat Source Documents prepared by the Northeast Fisheries Science Center (NEFSC) of the National Marine Fisheries Service for each of the seven skate species provide most available biological and habitat information on skates. Any updated information will be provided below. These technical documents are available at http://www.nefsc.noaa.gov/nefsc/habitat/efh/ and contain the following information for each skate species in the northeast complex:

- Life history, including a description of the eggs and reproductive habits
- Average size, maximum size and size at maturity
- Feeding habits
- Predators and species associations
- Geographical distribution for each life history stage
- Habitat characteristics for each life history stage
- Status of the stock (in general terms, based on the Massachusetts inshore and NEFSC trawl surveys)
- A description of research needs for the stock
- Graphical representations of stock abundance from NEFSC trawl survey and Massachusetts inshore trawl survey data
- Graphical representations of percent occurrence of prey from NEFSC trawl survey data

Please refer to the source documents (http://www.nefsc.noaa.gov/nefsc/habitat/efh/) for more detailed information on the above topics. All additional biological information is presented below.

The seven species of the northeast skate complex follow a similar life history strategy but differ in their biological characteristics. This section describes any information made available after the publication of the EFH documents.

7.2.4.1 Winter Skate

Sulikowski et al. (2003) aged winter skate in western Gulf of Maine and determined the oldest age estimated to be 18 and 19 years for females and males, respectively (corresponding length – 94.0 cm and 93.2 cm). Verification of the periodicity of the vertebral bands was determined to be annual with the opaque band being formed in June - July using marginal increment analysis. Von Bertalanffy Growth parameters for male winter skates were calculated to be k = 0.074, L_∞ = 121.8 cm TL, t_o = -1.418; calculated estimates for female winter skates were: k = 0.059, L_∞ = 137.4 cm, t_o = -1.609 (Sulikowski et al. 2003). Growth curves fit to data from this study were found to overestimate maximum total length compared to observed lengths. This may result from a low representation of maximum sized individuals. The maximum reported length is 150 cm TL. Maximum sizes examined in the Gulf of Maine were 93.2 cm total length and 94.0 cm total length for males and females, respectively (Sulikowski et al. 2003).

Winter skates are capable of reproducing year-round but exhibit one peak in the annual cycle (Sulikowski et al. 2004). Sulikowski et al. (2004) examined hormone concentrations in samples obtained from the Gulf of Maine. Mature spermatocysts were observed in males throughout the year; females were capable of reproducing throughout the year. Peak reproductive activity occurs during June – August.

Size at maturity has been shown to vary with latitude. Sulikowski et al. (2003) examined winter skates in the Gulf of Maine and determined that males attained a maximum TL of 121.8cm and 137.4 cm TL for females. Age at maturity in the Gulf of Maine is estimated to be 11 years for males and 11 – 12 years in females (Sulikowski et al. 2005b). Size at maturity is 76cm for females and 73 cm for males (Sulikowski et al. 2005b).

Sosebee (2005) used body morphometry to determine size at maturity to be approximately 65 - 73 cm TL for females and 49 - 60 cm TL for males on samples obtained from the NEFSC trawl survey ranging from Gulf of Maine to Cape Hatteras.

Following its listing as overfished, it was necessary to estimate the required reduction in fishing pressure to rebuild this stock. A Leslie matrix demographic model was used for this purpose. This analysis uses life history parameters (e.g. age-at-maturity, longevity, fecundity) to estimate the exponential growth or decline of the population. These estimates are specific to a particular set of life history parameters and population size. In its simplest form, this model is density independent. It is plausible some of these life history parameters may vary with population size, i.e. they are density dependent; incorporating density dependence is difficult to achieve even in a data rich population. For the purposes of this analysis the population was considered to be in a depleted state with a current growth rate of zero, as estimated from the stable trend in survey data in recent years. Further studies on the fecundity and egg survival of this species would aid in reducing the uncertainty in these input parameters.

For winter skate, the model was constructed using recent estimates of available life history parameters described above. The model was tested to determine feasibility of estimates by comparison of estimated growth rates to known growth rates. NEFSC trawl data was used to estimate the current population growth (or decline) rate. Fishing pressure was then incorporated into the model. For a detailed description of the model construction, please refer to Documents 6 and 7 in Appendix I. Natural mortality was found to range between 0.09 yr^{-1} and 0.17 yr^{-1}. It was not possible to construct age-specific natural mortality rate so this range was assumed to apply to all ages. The base case scenario based solely on available life history parameters resulted in an $r_{predicted}$ of 0.19 yr^{-1}. A sensitivity analysis resulted in a range of $r_{predicted}$ of 0.15 to 0.25 yr^{-1}. Owing to the high level of uncertainty in the input parameters, the model was further tested with a range of scenarios of varying productivities. The size at vulnerability to the NEFSC trawl gear was determined from cumulative size frequency plots. Age at vulnerability was calculated using the size at vulnerability and von Bertalanffy growth parameters. This estimate has a level of uncertainty as the vulnerability of skates to commercial gear may differ to that of the research gear. Examination of the NEFSC trawl survey data provided estimates of population growth and decline throughout the survey. Between 1975 and 1987 the population growth rate was 0.17 yr^{-1} (the maximum observed), while the maximum decline was observed between 1987 and 1993 (-0.14 yr^{-1}). Using the above information the necessary percent reduction in fishing mortality was calculated as 31% for winter skates.

7.2.4.2 Little Skate

Previous age and growth studies conducted on little skate have observed similar size at ages through the northwestern Atlantic (Richards et al. 1963; Johnson, 1979; Waring, 1984; Bigelow and Schroeder, 1953). These studies utilized length frequency plots and rings counted in the vertebral centra to estimate the ages of little skate. For more details on these studies refer to the EFH document (Packer et al. 2003c). Johnson (1979) found a maximum length (L_{max}) of 60 cm (males) and 62 cm (females) cm, A_{max} of 4 years for both sexes, L_{mat} of about 45 cm for both sexes, fecundity of 30 egg cases per year, and maximum age of 8 years. Using Frisk's predictive equations and the NEFSC survey maximum observed length of 62 cm provides estimates of L_{mat} of 50 cm and A_{mat} of 4 years; using Waring's (1984) L_{∞} value of about 53 cm provides an estimate of L_{mat} of 43 cm. This differs to age and size at maturity estimates for the Gulf of Maine and northern Massachusetts waters. Ciccia et al. (in review) found 50% maturity occurs at 9.5 years and 48 cm TL for females and 7.7 years and 46 cm TL for males. Natanson (1993) performed age and growth experiments on captive little skate from Narragansett Bay, Rhode Island that were injected with the antibiotic oxytetracycline. This methodology can be used to validate the ageing protocol for a species. Frisk and Miller (2006) examined vertebral samples of little skate to identify any latitudinal patterns in the northwestern Atlantic. Maximum observed age was 12.5 years. The oldest aged little skate from the mid-Atlantic was 11 years. The oldest individuals from the Gulf of Maine and Southern New England – Georges Bank were 11 years or older. Von Bertalanffy curves were fit for the northwestern Atlantic ($k = 0.19$, $L_\infty = 56.1$ cm TL, $t_o = -1.77$, $p < 0.0001$, $n = 236$) and for individual regions (GOM: $k = 0.18$, $L_\infty = 59.31$ cm TL, $t_o = -1.15$, $p < 0.0001$; SNE-GB: $k = 0.20$, $L_\infty = 54.34$ cm TL, $t_o = -1.22$, $p < 0.0001$; mid-Atlantic: $k = 0.22$, $L_\infty = 53.26$ cm, $t_o = -1.04$, $p < 0.0001$).

Sosebee (2005) used body morphometry to determine size at maturity (male – 39 cm TL; females – 40 – 48 cm TL) on samples obtained from the NEFSC trawl survey ranging from Gulf of Maine to Cape Hatteras. Fecundity was estimated to be 30 eggs per year (Packer et al. 2003 c).

7.2.4.3 Barndoor Skate

Barndoor skates have been reported to reach a maximum size of 152 cm and 20 kb weight (Bigelow & Schroeder, 1953). The maximum observed length in the NEFSC trawl survey was 136 cm total length. In a study conducted in Georges Bank Closed Area II the largest individual observed was 133.5 cm, with total lengths ranging from 20.0 to 133.5 cm. Previous discussions of barndoor skate life history have been limited owing to a lack of appropriate data. To compensate for this, Casey and Myers (1998) used a related species, the common skate (*Dipturus batis*), as a proxy for biological characteristics. This approach is less desirable compared to directed studies on the species in question. Gedamke et al. (2005) examined barndoor skates in the southern section of Georges Bank Closed Area II. Length at 50% maturity was 116.3 cm TL and 107.9 cm TL for females and males, respectively. The oldest age observed was 11 years. Age at maturity was estimated to be 6.5 years and 5.8 years for females and males, respectively. The von Bertalanffy parameters were also determined: $L_\infty = 166.3$ cm TL; $k = 0.1414\ yr^{-1}$; $t_o = -1.2912$ yr. Based on the predictive equations from Frisk *et al*. (2001) and the Northeast Fisheries Science Center (NEFSC) survey maximum observed length of 136 cm TL, L_{mat} is estimated at 102 cm TL and A_{mat} is estimated at 8 years (Northeast Fisheries Science Center 2000). In another study, clasper length measurements on males from Georges Bank show that male sexual maturity occurs at approximately 100 cm TL.

Sosebee (2005) used body morphometry to determine the size of maturity (females: 96 to 105 cm TL; males: 100 cm TL) on samples obtained from the NEFSC trawl survey ranging from Gulf of Maine to Cape Hatteras. Egg production is estimated to range between 69 – 85 eggs/female/year (Parent et al. 2008). As part of a captive breeding program, the egg incubation was determined to range from 342 – 494 days. As part of the same study, successful hatch rate was 73% (Parent et al. 2008). Previous fecundity estimates were 47 eggs per year (Packer et al. 2003a). Hatchlings range in size from 193 mm TL, 128 mm disk width and 32 g body mass.

Historical Canadian survey data (e.g., as presented in Casey and Myers (1998) from St. Pierre Bank to Brown's Bank) suggest that a substantial decline in barndoor skate biomass in the northern part of the species' range had occurred by the time that standardized NEFSC surveys began in U.S. waters in 1963. If the barndoor skate in U.S. waters are a part of the same unit stock as that in Canadian waters, then the high indices in the NEFSC surveys during the early 1960s likely indicate a biomass well below B_{MSY}. The linkage between barndoor skates in U.S. and Canadian waters, however, is unknown. The occurrence of barndoor skate in the autumn survey has been increasing steadily since the 1990s and is approaching levels observed in the 1960s.

7.2.4.4 Thorny Skate

Sulikowski et al (2005a) aged thorny skate in western Gulf of Maine and found oldest age estimated to be 16 years for both females and males (corresponding length – 105 cm and 103 cm). Verification of the periodicity of the vertebral bands was determined to be annual with the opaque band being formed in August or September using marginal increment analysis. However, marginal increment analysis was only suitable for use on juvenile thorny skates (≤ 80 cm TL). Von Bertalanffy Growth parameters for male thorny skates were calculated to be k = 0.11, L_∞ = 127 cm TL, t_o = -0.37; calculated estimates for female thorny skates were: k = 0.13, L_∞ = 120 cm TL, t_o = -0.4 (Sulikowski et al. 2005a). Growth curves fit to data from this study were found to overestimate maximum total length compared to observed lengths. This may result from a low representation of maximum sized individuals. The maximum observed length from the NEFSC trawl survey is 111cm TL. Maximum sizes examined in the Gulf of Maine were 103 cm TL and 105 cm TL for males and females, respectively (Sulikowski et al. 2005a).

Sulikowski et al. (2006) used morphological and hormonal criteria to determine the age and size at sexual maturity in the western Gulf of Maine. For females, 50% maturity occurred at approximately 11 years and 875 mm TL; while for males approximately 10.90 years and 865 mm TL. This species is capable of reproducing year round (Sulikowski et al. 2005a) based on morphological characteristics.

Sosebee (2005) used body morphometry to determine size at maturity to be approximately 36 - 38 cm TL for females and 49 cm TL for males on samples obtained from the NEFSC trawl survey ranging from Gulf of Maine to Cape Hatteras.

Parent et al. (2008) estimated mean annual fecundity to be 40.5 eggs per year based on 2 captive females producing 81 eggs in 1 year. The observed hatching success is 37.5% (Parent et al. 2008).

Following its listing as overfished, it was necessary to estimate the required reduction in fishing pressure to rebuild this stock. A Leslie matrix demographic model was used for this purpose. This analysis uses life history parameters (e.g. age-at-maturity, longevity, fecundity) to estimate the exponential growth or decline of the population. These estimates are specific to a particular set of life history parameters and population size. In its simplest form, this model is density independent. It is plausible some of these life history parameters may vary with population size, i.e. they are density dependent; incorporating density dependence is difficult to achieve even in a data rich population. For the purposes of this analysis the population was considered to be in a depleted state with a current growth rate of zero, as estimated from the stable trend in survey data in recent years. Further studies on the fecundity and egg survival of this species would aid in reducing the uncertainty in these input parameters.

For thorny skate, the model was constructed using recent estimates of available life history parameters described above. The model was tested to determine feasibility of estimates by comparison of estimated growth rates to known growth rates. NEFSC trawl data was used to estimate the current population growth (or decline) rate. Fishing pressure was then incorporated into the model. For a detailed description of the model construction, please refer to Documents 6 and 7 in Appendix I. Natural mortality was found to range between 0.15 yr^{-1} and 0.2 yr^{-1}. It was not possible to construct age-specific natural mortality rate so this range was assumed to apply to all ages. The base case scenario based solely on available life history parameters resulted in an $r_{predicted}$ of 0.14 yr^{-1}. A sensitivity analysis resulted in a range of $r_{predicted}$ of 0.1 to 0.22 yr^{-1}. Owing to the high level of uncertainty in the input parameters, the model was further tested with a range of scenarios of varying productivities. The size at vulnerability to the NEFSC trawl gear was determined from cumulative size frequency plots. Age at vulnerability was calculated using the size at vulnerability and von Bertalanffy growth parameters. This estimate has a level of uncertainty as the vulnerability of skates to commercial gear may differ to that of the research gear. Examination of the NEFSC trawl survey data provided limited information on population growth owing to the lack of obvious trends throughout the time series. Between 1963 and 1994 the population declined at a lower rate of -0.026 yr^{-1}, which increased to -0.23 yr^{-1} between 1993 and 1998 Using the above information the necessary percent reduction in fishing mortality was calculated as 34% for thorny skates.

7.2.4.5 Smooth Skate

Natanson et al. (2007) aged smooth skate from New Hampshire and Massachusetts waters. Maximum ages were estimated to be 14 and 15 years for females and males respectively. Longevity was estimated to be 23 years for females and 24 years for males. Male and females exhibited significantly different growth rates. Accordingly different growth models were required to fit the male and female growth data. Parameters for the von Bertalanffy equation for the males were determined to be k = 0.12, L_∞ = 75.4 cm TL, with L_o required to be set at 11 cm TL (Natanson et al. 2007). Growth models applied to females overestimated the size at birth thus requiring the use of back-calculated data resulting in von Bertalanffy parameters of: k = 0.12, L_∞ = 69.6 cm TL, L_o = 10 TL (Natanson et al. 2007). Sulikowski et al. (2007) determined, in a study conducted in the Gulf of Maine that in their sample mature females ranged in size from 508 to 630 mm TL and for males 550 to 660 mm TL. Based on morphological characteristics in females (ovary weight, shell gland weight, diameter of largest follicles, and pattern of ovarian follicle development) and histological analysis of males (mature spermatocysts in testes) Sulikowski et al. (2007) determined that in the Gulf of Maine smooth skate are capable of reproducing year round. The reproductive cycles of the two sexes are thought to be synchronous (Sulikowski et al. 2007). Kneebone et al. (2007) examined hormonal concentrations of male and female smooth skate in the Gulf of Maine further confirming the ability of this species to reproduce throughout the year. Information is needed on the fecundity and egg survival of this species.

Sosebee (2005) used body morphometry to determine size at maturity to be approximately 33 – 49 cm TL for females and 49 cm TL for males on samples obtained from the NEFSC trawl survey ranging from Gulf of Maine to Cape Hatteras.

Following the methodology used for determining the necessary fishing mortality reduction for winter and thorny skates, construction of a Leslie matrix demographic model was attempted for smooth skate after its recent listing as being overfished. However, some of the required life history parameters are unavailable for smooth skate, e.g. fecundity, first year survival and egg survival. It was necessary to estimate the required reduction in fishing pressure to rebuild this stock. In order to construct a Leslie Matrix for this species, it was necessary to utilize data available for other species in the skate complex (as described in Gedamke 2008; Document 6 in Appendix I). Available data on age-at-maturity, longevity and von Bertalanffy growth parameters were used to estimate natural mortality (0.17 to 0.2 yr^{-1}). It was not possible to construct age-specific natural mortality rate so this range was assumed to apply to all ages. No clear trend is apparent from the NEFSC trawl survey, limiting its use in determining growth rates. The base case scenario based solely on available life history parameters resulted in an $r_{predicted}$ of 0.20 yr^{-1}. A sensitivity analysis resulted in a range of $r_{predicted}$ of 0.12 to 0.35 yr^{-1}. These estimates carry a high level of uncertainty owing to the limited input parameters. Based on examination of the spring survey data, the population was declining until the early 1990s; since 1994 there has been an apparent increase at a rate of 0.12 yr^{-1}. A decline is not apparent in the autumn survey since the 1990s; the population appears to exhibit some stability in the autumn survey during that time period. Existing fishing restrictions may be sufficient to allow this stock to rebuild.

7.2.4.6 Clearnose Skate

Gelsleichter (1998) examined the vertebral centra of clearnose skates that were collected from Chesapeake Bay and the northwest Atlantic Ocean. The oldest male was aged at 5+ years, with the oldest female being 7+ years. This study suggests that clearnose skate experience rapid growth over during a relatively short life span.

Sosebee (2005) used body morphometry to determine size at maturity (females: 59 to 65 cm TL; males: 56 cm TL) on samples obtained from the NEFSC trawl survey ranging from Gulf of Maine to Cape Hatteras. Fecundity was estimated to be 35 eggs/year (Packer et al. 2003b). Information is needed on the fecundity and egg survival of this species.

7.2.4.7 Rosette Skate

Sosebee (2005) used body morphometry to determine size at maturity (males = 33 cm TL; females = 33 – 35 cm TL) on samples obtained from the NEFSC trawl survey ranging from Gulf of Maine to Cape Hatteras. Age and growth data are currently unavailable for rosette skate. Information is needed on the fecundity and egg survival of this species.

7.2.5 Feeding habits

Link and Sosebee (2008) investigated the impact of the consumption by the northeast skate complex on the ecosystem using stomach samples obtained from the NEFSC trawl. Overall the skate complex consumes a small proportion of the biomass contained in the system but they have the potential to have a large impact on some prey species. This impact can be at the same level or even exceed that removed by the fishery for a particular prey species. This study was also described in detail in the SAW 44 documents. The percentage composition of each prey type by maturity stage and species is listed in Table 40. For more complete data regarding the feeding habits and prey composition by species please refer to the SAW 44 documents (http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0703/b.pdf; http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0710/b.pdf).

Table 40. Relative means stomach weight on average for the size class and time period available expressed as a percentage of total stomach content weight throughout the time series.

Species	Winter Skate		Little Skate		Barndoor Skate		Thorny Skate		
	Large >60 cm	Medium 31-60 cm	Large >30 cm	Medium <=30 cm	Large >80 cm	Medium <=80 cm	Small <=30 cm	Medium 31-60 cm	Large >60 cm
Ammodytes spp	27.489	8.781							
Amphipods	1.379	29.183	53.97	25.16	2.059	0	21.181	3.698	0.055
Annelids	13.826	20.415							
Animal Remains	2.805485766	6.41147378	13.5919	9.32877355	6.58838867	1.08627204	17.53218	8.76334299	3.3145161
Ocean Quahog	0.005	0.233							
Bivalves	16.027	6.956	0.214	8.259					
Cancer Crabs	1.061	3.195	0.737	12.502	26.666	8.732			
Cephalopods	3.511	0.534			1.847	0.071	1.53	7.547	8.533
CITARC	0.008	0.018							
Herrings	3.534	0.307			0	18.226	0	0.555	11.02
CRAFAM	0.449	6.048							
Crustaceans	0.496	3.058	5.241	3.826			5.336	9.313	3.462
Decapods	0.013	0.1	0.006	0.429			0.272	0.244	0.06
Other Crabs	1.309	2.381			12.684	15.73	1.36	3.844	3.239
GADFAM	0.042	0.089					0	0.004	0.769
GADMOR	0	0.015							
ISOPOD	1.836	5.614	2.797	2.452			4.133	1.264	0.129
MELAEG	0.076	0							
Silver Hake	1.579	0.333			4.82	3.89	0	0.733	2.726
Mollusk	2.116	0.887	0.121	1.756					
OPHFA2	5.3644	0.205							
Other Fish	12.704	3.326	0.200	3.183	3.756	28.046	1.129	3.479	29.502
PAGFAM	0.116	0.942					0.066	0.128	0.437
Pandalid shrimp	0.616	0.646			16.757	7.726			
Parden	0.51	0							

Species	Winter Skate		Little Skate		Barndoor Skate		Thorny Skate		
PecFa1	0.509	0.27							
PenFam	0.032	0.009							
SCOFam	1.361	0							
Red hake	1.11	0.043			0.347	0			
Polychaetes			7.226	13.91	0.484	0	35.677	42.381	16.941
Crangon Spp			11.593	7.644	4.769	0.062			
CUMACE			1.378	0.124					
DECCRA			1.865	10.807					
EUPFam			1.058	0.617					
Gulf Stream Fi					0.526	0.141			
Sculpins					0.144	6.002			
Misc Crustaceans				16.78	0.56				
Other Decapods					0.488	0			
Other Shrimp					0.181	0.141			
Other Gadids					0	0.4			
Haddock					1.104	0.891			
4-Spot Flounder					0	8.298			
CANFAM							0.041	0.603	2.682
COTFAM							0	0.409	1.249
DECSHR							0.114	3.550	1.162
Euphausiids							9.963	7.915	3.923
MYXFAM							0	0.371	5.434
PANFAM							1.634	4.691	3.847
Eelpouts							0.03	0.505	1.515
MERBIL									
Mysida									
SERFA2									
SOLFAM									
Total Prey	93.183	96.182	98.011	89.097	98.515	98.298	94.777	95.752	91.042

Species	Smooth Skate		Clearnose Skate		Rosette Skate	
	Large >30 cm	Medium <=30 cm	Large <=60 cm	Medium >60 cm	Large >30 cm	Medium <=30 cm
Ammodytes spp			0.378	1.242		
Amphipods	14.009	1.087			24.843	6.922
Annelids	0.978	2.702	3.056	0.299		
Animal Remains	23.201013	8.94110746	2.507139471	0.29680721	22.005541	20.5159093
Ocean Quahog						
Bivalves			2.775	3.401		
Cancer Crabs	0	1.521	23.979	17.282	2.462	5.674
Cephalopods			7.72	10.537	7.159	3.927
CITARC						
Herrings						
CRAFAM						
Crustaceans					0	2.832
Decapods			0.505	0	0	0.380
Other Crabs	0.37	2.726	28.317	11.9		
GADFAM	8.165	0.132				
GADMOR						
ISOPOD					1.34	3.304
MELAEG						
Silver Hake						
Mollusk						
OPHFA2			9.249	5.826	0	3.819
Other Fish	0	6.14	11.917	47.717	1.839	2.477
PAGFAM						
Pandalid shrimp	2.169	28.885			0	4.269
Parden						
PecFa1						

Species	Smooth Skate		Clearnose Skate		Rosette Skate	
PenFam						
SCOFam						
Red hake						
Polychaetes					17.558	13.088
Crangon Spp	1.024	3.636			8.091	9.487
CUMACE						
DECCRA					1.341	18.036
EUPFam					3.179	4.435
Gulf Stream Fi						
Sculpins						
Misc Crustaceans	11.382	11.539	8.108	0.873		
Other Decapods	3.489	2.908				
Other Shrimp						
Other Gadids						
Haddock						
4-Spot Flounder						
CANFAM						
COTFAM						
DECSHR	1.109	4.958				
Euphausiids	30.913	18.012				
MYXFAM						
PANFAM						
Eelpouts						
MERBIL	0	6.668				
Mysida	3.193	0.144			10.184	0.836
SERFA2			1.488	0.271		
SOLFAM			0	0.358		
Total Prey	98.823	94.893	85.048	92.529	98.352	97.79

7.2.5.1 Winter Skate

Winter skates were divided into three size groups: small (<30 cm TL), medium (31-60 cm TL), and large (>=60 cm TL). Owing to the difficulties in distinguishing between little and small (immature) winter skates, the small size category was included in the analysis of immature little skates. The amount of food consumed was related to the size of the skate. Medium sized skates consumed approximately 2 kg per year of prey items, while large skates consumed approximately 9 kg per year. The total consumptive demand for this species is estimated to range between 20,000 and 180,000 mt per year. Winter skates are benthivorous and their piscivorous nature was clearly shown by the large portion of the diet formed by forage fishes. Overall, the diet of winter skates was dominated by forage fish, squid and benthic macrofauna. Up to 80,000 mt of a particular prey item can be removed by this skate in any given year.

7.2.5.2 Little Skate

Little skates were divided into two size groups: small (<=30 cm TL) and large (>30 cm TL). Owing to the difficulties in distinguishing between little and small (immature) winter skates, the small size category for winter skate was included in the analysis of small little skates. The amount of food consumed was related to the size of the skate. Small skates consumed approximately 500 g per year of prey items, while large skates consumed approximately 2.5 kg per year. The total consumptive demand for this species is estimated to range between 100,000 and 350,000 mt per year, with total consumption dominated by large skates. Little skates are benthivorous which was reflected by the large portion of the diet that benthic macrofauna (polychaetes and amphipods) and benthic megafauna (crabs and bivalves) comprised. Overall, the diet of little skates was dominated by benthic invertebrates. Up to 8,000 mt of a particular prey item can be removed by this skate in any given year.

7.2.5.3 Barndoor Skate

Barndoor skates were divided into two size groups: immature (<60 cm TL) mature (>100 cm TL). The amount of food consumed was related to the size of the skate. Immature skates consumed approximately 5 kg per year of prey items, while mature skates consumed approximately 10 to 20 kg per year. The total consumptive demand for this species is estimated to range between 4,000 and 16,000 mt per year, with total consumption dominated by mature skates. Barndoor skates are benthivorous and their piscivorous nature was clearly shown by the large portion of the diet formed by forage fishes. Overall, the diet of barndoor skates was dominated by herrings Pandalid shrimps and *Cancer* crabs. Up to 8,000 mt of a particular prey item can be removed by this skate in any given year.

7.2.5.4 Thorny Skate

Thorny skates were divided into three size groups: small (<=30 cm TL), medium (31-60 cm TL), and large (>60 cm TL). The amount of food consumed was related to the size of the skate. Small sized skates consumed approximately 500 g per year of prey items, while medium and large skates consumed approximately 1.5 kg and 12 kg per year, respectively. The total consumptive demand for this species is estimated to range between 10,000 and 40,000 mt per year. Thorny skates are benthivorous and their piscivorous nature was clearly shown by the large portion of the diet formed by forage fishes. Overall, the diet of thorny skates was dominated by herrings, squid, polychaetes, silver hake and other fish. Up to 80,000 mt of a particular prey item can be removed by this skate in any given year.

7.2.5.5 Smooth Skate

Smooth skates were divided into two size groups: small (<=30 cm TL) and large (>30 cm TL). The amount of food consumed was related to the size of the skate. Small skates consumed approximately 0.5 - 1 kg per year of prey items, while large skates consumed approximately 2 - 3 kg per year. The total consumptive demand for this species is estimated to range between 1,000 and 5,000 mt per year, with total consumption dominated by mature skates. Smooth skates are benthivorous which was reflected by the large portion of the diet that benthic megafauna (pandalids and euphausiids) comprised. Overall, the diet of smooth skates was dominated by pandalid shrimp and euphausiids. Up to 2,000 mt of a particular prey item can be removed by this skate in any given year, but values are typically on the order of 500 to 1,000 mt.

7.2.5.6 Clearnose Skate

Clearnose skates were divided into two size groups: small (<=60 cm TL) and large (>60 cm TL). The amount of food consumed was related to the size of the skate. Small skates consumed approximately 1 - 2 kg per year of prey items, while large skates consumed approximately 5 kg per year. The total consumptive demand for this species is estimated to range between 2,000 and 18,000 mt per year, with total consumption dominated by large skates. Clearnose skates are benthivorous which was reflected by the large portion of the diet that benthic megafauna (crabs and miscellaneous crustaceans) comprised. Overall, the diet of clearnose skates was dominated by other crabs, *Cancer* crabs and squids. Up to 8,000 – 10,000 mt of a particular prey item can be removed by this skate in any given year, but values are typically on the order of 2,000 to 4,000 mt.

7.2.5.7 Rosette Skate

Rosette skates were divided into two size groups: small (<=30 cm TL) and large (>30 cm TL). The amount of food consumed was related to the size of the skate. Small skates consumed approximately 200 g per year of prey items, while large skates consumed approximately 800 g per year. The total consumptive demand for this species is estimated to range between 50 and 500 mt per year, with total consumption dominated by large skates. Rosette skates are benthivorous which was reflected by the large portion of the diet that benthic macrofauna (amphipods and polychaetes) and benthic megafauna (crabs and shrimps) comprised. Overall, the diet of rosette skates was dominated by benthic macrofauna and to a lesser extent pandalid shrimps, squids and *Cancer* crabs. Up to 70 mt of a particular prey item can be removed by this skate in any given year, but more typically 10 – 30 mt.

7.2.6 Evaluation of Fishing Mortality and Stock Abundance

The length-based mortality estimators of Beverton and Holt (1956) and Hoenig (1987) were considered for the estimation of fishing mortality rates for winter, little, barndoor, thorny and clearnose skates from length frequency distribution sampled by the NEFSC spring and autumn. At the time of the 44th Stock Assessment Workshop (NEFSC 2007), age and growth data were only available for the 5 species listed above. Recently, age and growth estimates have become available for smooth skates (Natanson et al. 2007) but age information remains unavailable for rosette skates.

SARC 30 (NEFSC 2000) concluded that the Hoenig (1987) estimates are more reliable, and those are the fishing mortality rates (F) referenced below. Estimates were calculated for five year moving groups, or windows of years to smooth the variation in the mortality estimates caused by variations in recruitment over time. Natural mortality for all species was assumed to be equal to the k parameter in the von

Bertalanffy equation based on Frisk et al. (2001) which suggests that the M/k ratio for skates is about 1.0. Various values for L' were used to determine the effect of that parameter.

Gedamke et al. (2007; Document 6 in Appendix I) describe the use of Leslie matrices and life tables in evaluating an elasmobranch species ability to withstand fishing pressure. Demographic analysis such as this, tracks the change over time of the number of individuals in each specified class. In an age-based analysis, the data on age-at-maturity, longevity, fecundity and survivorship are required. These data are not always readily available for the skate species. However, as shown in Gedamke et al. (2007) this method can be used in conjunction with the NEFSC survey data to "solve" for the missing parameter, as exampled by barndoor skate. The Leslie Matrix was used to calculate an $r_{conditional}$ of 0.41/year for barndoor skate in the absence of fishing pressure. This methodology was applied to the skate species from the northeast skate complex currently listed as overfished.

The following subsections describe estimates of mortality for winter, little, barndoor, thorny and clearnose skates. At the time of analysis, no age and growth parameters were available for smooth and rosette skates, so no mortality estimates have been made.

7.2.6.1 Winter Skate

The latest assessment report (SAW 44; NEFSC 2007) described the patterns in mortality estimates for winter skate finding that they are consistent across alternative values of L' in both surveys with high values found in the mid-1970s dropping to low values in the 1980s (NEFSC, 2007). Increases occurred with the onset of the directed fishery through the mid-1990s followed by a decline. There is a lag associated with the moving window estimator, so any increase or decrease will be delayed. The values for F from the autumn survey where L' is 50 cm are 0.17 in the early part of the time series, drop to a low of 0.02 in 1985, increase to 0.2 in 1997 and have declined to 0.11 in recent years.

For winter skate, the SAW concluded that there are insufficient data on species specific historical landings to determine F or propose F_{MSY} or proxy reference points. New techniques of estimating fishing mortality were rejected by the SAW. The SAW approved the continued use of the 75th percentile value of the NEFSC autumn biomass indices for the Gulf of Maine (GOM) to Mid Atlantic (MA) offshore region during 1967-1998 as a proxy for the B_{MSY} for winter skate (6.46 kg/tow), and one-half of that value as the threshold biomass reference point for winter skate (3.23 kg/tow).

Benoit (2006) estimated the acute discard mortality rate of winter skate on Canadian research vessels. Mortality was determined from visible respiratory movements, i.e., spiracle movement. After 1-2 hours out of water, 50% of individuals no longer showed respiratory movements. Acute discard mortality for this species was estimated to be at least 50%. This estimate is based solely on time on deck and may vary accordingly with sorting time. This study did not address long-term mortality; effects of injuries sustained in the net remain unknown.

For winter skate, the 2005-2007 NEFSC autumn survey biomass index average of 2.93 kg/tow is less than the biomass threshold reference point of 3.23 kg/tow and thus species remains overfished. The 2005 – 2007 average index is less than the 2004 – 2006 index by 4%, but overfishing is not occurring because the percent decline in the consecutive three year moving averages does not exceed the maximum threshold which according to the FMP defines when overfishing is occurring.

7.2.6.2 Little Skate

The latest assessment report (SAW 44; NEFSC 2007) described the patterns in mortality estimates for little skate finding that they are less consistent across alternative values of L' and surveys. The lower values of L' indicate that the force of mortality being exerted at these sizes is almost entirely natural mortality. The trend in mortality estimates for L' = 45 cm TL suggests an increases over the time series at relatively high values between 0.2 and 0.4.

The use of length-based yield per recruit reference points for little skate in the northeast region is considered to be unreliable by the SAW, due to the uncertainty of cohort slicing for age groups. A threshold F reference is therefore proposed for little skate based on the estimate of the natural mortality rate (M). The SARC approved the continued use of the 75th percentile value of the NEFSC spring survey biomass indices for the GOM-MA inshore and offshore regions during 1982-1999 as a proxy for B_{MSY} for little skate (6.54 kg/tow), and one-half of that value as the threshold biomass reference point for little skate (3.27 kg/tow).

For little skate, the 2005-2007 NEFSC spring survey biomass index average of 3.67 kg/tow is greater than the biomass threshold reference point of 3.27 kg/tow. Therefore, little skate is not overfished. The 2005 – 2007 average index is less than the 2004 – 2006 index by 20%, but overfishing is not occurring, because the percent decline does not exceed the maximum threshold which according to the FMP defines when overfishing is occurring.

7.2.6.3 Barndoor Skate

The latest assessment report (SAW 44; NEFSC 2007) described the patterns in mortality estimates for barndoor skate finding that they are very consistent across alternative values of L' and seasons. The trend is low F until 1975 when estimates become more imprecise because of few sampled fish. Estimates then decline to low values through 2006. The time lag in this estimate of fishing mortality is evident in the delay in the increase in F in the early part of the time series.

For barndoor skate, the SAW concluded that there are insufficient data on species specific historical landings to determine F or propose F_{MSY} or proxy reference points. New techniques of estimating fishing mortality were rejected by the SAW. The SAW approved the continued use of the mean value of the NEFSC autumn survey biomass indices for the GOM-SNE offshore region during 1963-1966 as a proxy for B_{MSY} for barndoor skate (1.62 kg/tow), and one-half of that value as the threshold biomass reference point for barndoor skate (0.81 kg/tow).

For barndoor skate, the 2005-2007 NEFSC autumn survey biomass index average of 1.00 kg/tow is greater than the biomass threshold reference point of 0.81 kg/tow. Therefore, barndoor skate is not overfished. The 2005 – 2007 average index is less than the 2004 – 2006 index by 14%, but overfishing is not occurring, because the percent decline does not exceed the maximum threshold which according to the FMP defines when overfishing is occurring.

7.2.6.4 Thorny Skate

Fishing mortality patterns, as described in the latest assessment report (SAW 44; NEFSC 2007), for thorny skate are also consistent across seasons and alternative values of L' (NEFSC, 2007). There has been a general increase in F estimates over the entire time series. For L' = 50 cm TL, the values in the early part of the time series were less than 0.1, increased to 0.15 in the 1980s and have since increased to around 0.2 in recent years.

For thorny skate, the SAW concluded that there are insufficient data on species specific historical landings to determine F rates or propose F_{MSY} or proxy reference points. New techniques of estimating fishing mortality were rejected by the SARC. The SAW approved the continued use of the 75th percentile value of the NEFSC autumn biomass indices for the GOM-SNE offshore region during 1963-1998 as a proxy for the B_{MSY} for thorny skate (4.41 kg/tow), and one-half of that value as the threshold biomass reference point for thorny skate (2.20 kg/tow).

For thorny skate, the 2005-2007 NEFSC autumn survey biomass index average of 0.42 kg/tow is less than the biomass threshold reference point of 2.20 kg/tow. Therefore, thorny skate is overfished. The 2005 – 2007 index is lower than the 2004 – 2006 index by 24%, therefore overfishing is occurring.

7.2.6.5 Smooth Skate

At time of SAW 44 (NEFSC 2007), age and growth data were unavailable to determine fishing mortality rates. There are insufficient data on species specific historical landings to determine fishing mortality rates or propose F_{MSY} reference points. New techniques of estimating F were rejected by the SARC. The SAW approved the continued use of the 75th percentile value of the NEFSC autumn biomass indices for the GOM-SNE offshore region during 1963-1998 as a proxy for the B_{MSY} for smooth skate (0.31 kg/tow), and one-half of that value as the threshold biomass reference point for smooth skate (0.16 kg/tow).

For smooth skate, the 2005 – 2007 NEFSC autumn survey biomass index average of 0.14 kg/tow is less than the biomass threshold reference point of 0.16 kg/tow. Unlike its previous status, smooth skate is now overfished. The 2005-2007 index is less than the 2004 – 2006 index by 22%, so overfishing is not occurring because the percent decline does not exceed the maximum threshold which according to the FMP defines when overfishing is occurring.

7.2.6.6 Clearnose Skate

Fishing mortality patterns, as described by SAW 44 (NEFSC 2007), for clearnose skate are less consistent between surveys and alternative values of L'. However, there has been a general decreasing trend in F estimates over the time series. The values for L' = 50 cm TL have ranged from 0.3 in the early part of the time series and slowly deceased to 0.2 in recent years.

The SAW concluded that there are insufficient data on species specific historical landings for clearnose skate to determine fishing mortality rates or propose F_{MSY} reference points. New techniques of estimating F were rejected by the SARC review panel. The SAW approved the continued use of the mean value of the NEFSC autumn survey biomass indices for the GOM-SNE offshore region during 1975-1998 as a proxy for the B_{MSY} for clearnose skate (0.56 kg/tow), and one-half of that value as the threshold biomass reference point for clearnose skate (0.28 kg/tow).

For clearnose skate, the 2005-2007 NEFSC autumn survey biomass index average of 0.64 kg/tow is greater than the B_{MSY} proxy and the threshold reference points of 0.56 kg/tow and 0.28 kg/tow. Clearnose skate is not overfished. The 2003 – 2005 average of 0.63 kg/tow was less than 30% below the 2002-2004 average of 0.75 kg/tow, therefore overfishing is not occurring for clearnose skate, because this percent decline does not exceed the maximum threshold which according to the FMP defines when overfishing is occurring.

7.2.6.7 Rosette Skate

Frisk's (1999) predictive equations and the NEFSC survey L_{max} of 57 cm provide estimates of L_{mat} of 46 cm and A_{mat} of four years. There are insufficient data on the age and growth of rosette skate to determine F or propose F_{MSY} reference points. The SAW report (NEFSC 2007) approved the continued use of the 75th percentile value of the NEFSC autumn survey biomass indices for the Mid-Atlantic offshore region during 1967-1998 as a proxy for B_{MSY} for rosette skate (0.029 kg/tow), and one-half of that value as the threshold biomass reference point for rosette skate (0.015 kg/tow).

For rosette skate, there are insufficient data on age and growth to determine F. The 2005 – 2007 NEFSC autumn survey biomass index average of 0.06 kg/tow is above the B_{MSY} proxy and threshold reference points of 0.029 kg/tow and 0.015 kg/tow. Rosette skate is not overfished. The 2005-2007 index is above the 2004 – 2006 index, and therefore overfishing is not occurring, because the percent decline does not exceed the maximum threshold which according to the FMP defines when overfishing is occurring.

7.2.6.8 SARC Comments

NEFSC survey data were the primary source of information used to derive indices of biomass for the skate species and reference points. The trend of indices of winter skate abundance and biomass from the NEFSC autumn surveys has varied throughout the time serious, with a peak occurring in the mid 1980s. Current NEFSC indices of winter skate abundance are below the time series mean, and are about 20% of the peak observed during the mid 1980s. Indices of little skate abundance and biomass from the NEFSC spring survey have also varied, with increases beginning in the 1980s, reaching a peak in 1999. This peak has been followed by a steady decline. After a long period of absence from the survey, the presence of barndoor skates in the survey has been steadily increasing since 1990. NEFSC autumn survey indices for thorny skate have declined continuously over the last 40 years, reaching a historically low value in 2005 is less than10% of the peak observed in the 1970s. Indices of smooth skate abundance and biomass from the NEFSC autumn survey have not shown an increase since the observed peak in the late 1970s. Recently smooth skate was listed as being overfished. NEFSC spring and autumn survey indices for clearnose skate increased from the mid-1980s through 2000 and have since declined to about average values. Recent indices of rosette skate abundance and biomass from the NEFSC surveys have increased approaching the peak values of the late 1970s.

Assessment data for the northeast skate complex is considered to be poor . Difficulties with species identification have hindered the collection of high quality species specific catch data. This in turn has reduced the number of appropriate models available for the stock assessment of these species. The SARC proposed alternative model-based fishing mortality estimates and new biological reference points. The proposed biological reference points were based on stock-recruit or yield-per-recruit analysis. These were not accepted by the review panel due to a lack of species-specific catch data. Further study is required to determine the reliability of these proposed models to ensure their suitability.

The SARC discussed two methods for estimating fishing mortality rates; models developed by Hoenig (1987) and Gedamke and Hoenig (2006). There was concern about whether the assumptions of both methods were met sufficiently. It was suggested that the reliability of the two methods be tested using simulation methods.

The use of observer data to disaggregate historical landings and discard data was discussed. The observer data contain some errors related to species identification that complicates the disaggregation of historical catch and discards into individual species.

7.2.7 Marine Mammals and Protected Species

The following protected species are found in the environment utilized by the skate fishery. A number of them are listed under the Endangered Species Act of 1973 (ESA) as "endangered" or "threatened", while others are identified as protected under the Marine Mammal Protection Act of 1972 (MMPA). Actions taken to minimize the interaction of the fishery with protected species are described in Section 4.1.1 of Skate Amendment 3. Monthly reports of observed incidental takes are available on the NEFSC website at http://www.nefsc.noaa.gov/femad/fishsamp/fsb/.

Cetaceans	***Status***
Northern right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Blue whale (*Balaenoptera musculus*)	Endangered
Sei whale (*Balaenoptera borealis*)	Endangered
Sperm whale (*Physeter macrocephalus*)	Endangered
Minke whale (*Balaenoptera acutorostrata*)	Protected
Pilot whale (*Globicephala* spp.)	Protected
Long-finned pilot whale (*Globicephala melas*)	Protected
Short-finned pilot whale (*Globicephala macrorhynchus*)	Protected
Spotted dolphin (*Stenella frontalis*)	Protected
Risso's dolphin (*Grampus griseus*)	Protected
White-sided dolphin (*Lagenorhynchus acutus*)	Protected
Common dolphin (*Delphinus delphis*)	Protected
Bottlenose dolphin: coastal stock (*Tursiops truncatus*)	Protected
Bottlenose dolphin: offshore stock (*Tursiops truncatus*)	Protected
Harbor porpoise (*Phocoena phocoena*)	Protected
Seals	
Harbor seal (*Phoca vitulina*)	Protected
Gray seal (*Halichoerus grypus*)	Protected
Harp seal (*Phoca groenlandica*)	Protected
Hooded seal (*Crystophora cristata*)	Protected
Sea Turtles	
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*)	Endangered*
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Fish	
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered
Atlantic salmon (*Salmo salar*)	Endangered

**Green turtles in U.S. waters are listed as threatened except for the Florida breeding population which is listed as endangered.*

Although salmon belonging to the Gulf of Maine distinct population segment (DPS) of Atlantic salmon occur within the general geographical area covered by the Northeast Multispecies FMP, they are unlikely to occur in the area where the fishery is prosecuted given their numbers and distribution. Therefore, the DPS is not likely to be affected by the skate fishery.

It is expected that all of the remaining species identified have the potential to be affected by the operation of the skate fishery. However, given differences in abundance, distribution and migratory patterns, it is likely that any effects that may occur, as well as the magnitude of effects when they do occur, will vary among the species. Summary information is provided here that describes the general distribution of cetaceans, pinnipeds, and sea turtles within the management area for the Skate FMP as well as the known interactions of gear used in the skate fishery with these protected species. Additional background information on the range-wide status of marine mammal and sea turtle species that occur in the area can be found in a number of published documents. These include sea turtle status reviews and biological reports (NMFS and USFWS 2007; Hirth 1997; USFWS 1997; Marine Turtle Expert Working Group (TEWG) 1998 & 2000), recovery plans for Endangered Species Act-listed sea turtles and marine mammals (NMFS 1991; NMFS and USFWS 1991a; NMFS and USFWS 1991b; NMFS and USFWS 1992; NMFS 1998; USFWS and NMFS 1992; NMFS 2005), the marine mammal stock assessment reports (*e.g.*, Waring *et al*. 2006,2007 and 2008), and other publications (*e.g.*, Clapham *et al.* 1999; Perry *et al.* 1999; Wynne and Schwartz 1999; Best *et al.* 2001; Perrin *et al*. 2002). Additionally, the Center for Biological Diversity and the Turtle Island Restoration Network has recently filed a petition to reclassify loggerhead turtles in the North Pacific Ocean as a distinct population segment (DPS) with endangered status and designate critical habitat under the ESA (72 *Federal Register* 64585; November 16, 2007). While this petition is geared toward the North Pacific, the possibility exists that it could affect status in other areas. NMFS has found that the petition presents substantial scientific information that the petition action may be warranted, and has published a notice and request for comments, available at: http://www.nmfs.noaa.gov/pr/pdfs/fr/fr72-64585.pdf.

7.2.7.1 Sea Turtles

Loggerhead, leatherback, Kemp's ridley, and green sea turtles occur seasonally in southern New England and Mid-Atlantic continental shelf waters north of Cape Hatteras. In general, turtles move up the coast from southern wintering areas as water temperatures warm in the spring (James *et al*. 2005; Morreale and Standora 2005; Braun-McNeill and Epperly 2004; Morreale and Standora 1998; Musick and Limpus 1997; Shoop and Kenney 1992; Keinath *et al.* 1987). The trend is reversed in the fall as water temperatures cool. By December, turtles have passed Cape Hatteras, returning to more southern waters for the winter (James *et al*. 2005; Morreale and Standora 2005; Braun-McNeill and Epperly 2004; Morreale and Standora 1998; Musick and Limpus 1997; Shoop and Kenney 1992; Keinath *et al.* 1987). Hard-shelled species are typically observed as far north as Cape Cod whereas the more cold-tolerant leatherbacks are observed in more northern Gulf of Maine waters in the summer and fall (Shoop and Kenney 1992; STSSN database).

Sea turtles are known to be captured in gillnet and trawl gear; gear types that are used in the skate fishery. According to the monthly reports on the NEFSC website for March 2006 – February 2008, one loggerhead turtle was taken in observed groundfish trips by a bottom trawl, and none were observed in sink gillnets.

7.2.7.2 Large Cetaceans (Baleen Whales and Sperm Whale)

The western North Atlantic baleen whale species (Northern right, humpback, fin, sei, and minke) follow a general annual pattern of migration from high latitude summer foraging grounds, including the Gulf of Maine and Georges Bank, and low latitude winter calving grounds (Perry *et al.* 1999; Kenney 2002). However, this is an oversimplification of species movements, and the complete winter distribution of most species is unclear (Perry et al. 1999; Waring et al. *2008*). Studies of some of the large baleen whales (right, humpback, and fin) have demonstrated the presence of each species in higher latitude waters even in the winter (Swingle *et al*. 1993; Wiley *et al*. 1995; Perry *et al*. 1999; Brown *et al*. 2002).

In comparison to the baleen whales, sperm whale distribution occurs more on the continental shelf edge, over the continental slope, and into mid-ocean regions (Waring *et al*. 2005). However, sperm whales distribution in U.S. EEZ waters also occurs in a distinct seasonal cycle (Waring *et al*. *2008*). Typically, sperm whale distribution is concentrated east-northeast of Cape Hatteras in winter and shifts northward in spring when whales are found throughout the Mid-Atlantic Bight (Waring *et al*. 2005). Distribution extends further northward to areas north of Georges Bank and the Northeast Channel region in summer and then south of New England in fall, back to the Mid-Atlantic Bight (Waring *et al.* 1999).

Right whales and sei whales feed on copepods (Horwood 2002; Kenney 2002). The groundfish fishery will not affect the availability of copepods for foraging right and sei whales because copepods are very small organisms that will pass through skate fishing gear rather than being captured in it. Blue whales feed on euphausiids (krill) (Sears 2002) which, likewise, are too small to be captured in skate fishing gear. Humpback whales and fin whales also feed on krill as well as small schooling fish (e.g., sand lance, herring, mackerel) (Aguilar 2002; Clapham 2002). Fish species caught in skate gear are species that live in benthic habitat (on or very near the bottom) such as flounders versus schooling fish such as herring and mackerel that occur within the water column. Sperm whales feed on larger organisms that inhabit the deeper ocean regions (Whitehead 2002). The skate fishery does not operate in these deep water areas.

The skate fishery does not operate in low latitude waters where calving and nursing occurs for these large cetacean species (Aguilar 2002; Clapham 2002; Horwood 2002; Kenney 2002; Sears 2002; Whitehead 2002).

Gillnet gear is known to pose a risk of entanglement causing injury and death to large cetaceans. Right whale, humpback whale, and minke whale entanglements in gillnet gear have been documented (Johnson *et al*. 2005; Waring *et al*. *2008*). However, it is often not possible to attribute the gear to a specific fishery. For the period March 2006 – December 2008, five incidents of whale takes were observed on trips targeting groundfish, all of which were taken in bottom trawl trips. Of those five takes, four were of whales that were in various states of decomposition, while one pilot whale was deemed "fresh". In July 2008, a humback whale was observed alive and entangled in gillnet gear used to target cod. Also, a fresh dead minke whale was observed in bottom trawl gear used to target winter flounder.

7.2.7.3 Small Cetaceans (Dolphins, Harbor Porpoise and Pilot Whale)

Numerous small cetacean species (dolphins, pilot whales, harbor porpoise) occur within the area from Cape Hatteras through the Gulf of Maine. Seasonal abundance and distribution of each species in Mid-Atlantic, Georges Bank, and/or Gulf of Maine waters varies with respect to life history characteristics. Some species primarily occupy continental shelf waters (e.g., white sided dolphins, harbor porpoise), while others are found primarily in continental shelf edge and slope waters (e.g., Risso's dolphin), and still others occupy all three habitats (e.g., common dolphin, spotted dolphins). Information on the western North Atlantic stocks of each species is summarized in Waring *et al*. (*2008*). Small cetaceans are known be captured in gillnet and trawl gear, although the rate of bycatch of harbor porpoise in trawl gear may be low. In recent data, there were six observed (fresh dead) takes of harbor porpoise in NE bottom trawl gear from 2003-2006.

With respect to harbor porpoise specifically, the most recent Stock Assessment Reports show that the estimated number of harbor porpoise takes is increasing, moving closer to the Potential Biological

Removal level calculated for this species rather than declining toward the long-term Zero Mortality Rate Goal (ZMRG), which is 10 percent of PBR (approximately 75 animals). The most recent stock assessment report states that the average annual estimated harbor porpoise mortality and serious injury in the Northeast sink gillnet fishery during 1994-1998, before the Harbor Porpoise Take Reduction Plan (HPTRP), was 1,163, and from 2000 to 2005 was 480 (Waring *et al.*, 2008). The assessment also states that the total annual estimated average human-caused mortality is 734 harbor porpoises per year, including 77 from Canadian fisheries and 5 from unknown fisheries using strandings data. This is an increase from 575 in the previous assessment. The Harbor Porpoise Take Reduction Team is currently developing options to reduce takes.

7.2.7.4 Pinnipeds

Of the four species of seals expected to occur in the area, harbor seals have the most extensive distribution with sightings occurring as far south as 30° N (Katona *et al.* 1993). Grey seals are the second most common seal species in U.S. EEZ waters, occurring primarily in New England (Katona *et al.* 1993; Waring *et al. 2008*). Pupping colonies for both species are also present in New England, although the majority of pupping occurs in Canada. Harp and hooded seals are less commonly observed in U.S. EEZ waters. Both species form aggregations for pupping and breeding off of eastern Canada in the late winter/early spring, and then travel to more northern latitudes for molting and summer feeding (Waring *et al. 2008*). However, individuals of both species are also known to travel south into U.S. EEZ waters and sightings as well as strandings of each species have been recorded for both New England and Mid-Atlantic waters (Waring *et al. 2008*). All four species of seals are known to be captured in gillnet and/or trawl gear (Waring *et al. 2008*).

7.3 Physical Environment

The Northeast U.S. Shelf Ecosystem (Map 11) has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream (Sherman *et al.* 1996). The continental slope includes the area east of the shelf, out to a depth of 2000 m. Four distinct sub-regions comprise the NOAA Fisheries Northeast Region: the Gulf of Maine, Georges Bank, the Mid-Atlantic Bight, and the continental slope. Occasionally another sub-region, Southern New England, is described; however, we incorporated discussions of any distinctive features of this area into the sections describing Georges Bank and the Mid-Atlantic Bight.

The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern edge. It is characterized by highly productive, well-mixed waters and strong currents. The Mid-Atlantic Bight is comprised of the sandy, relatively flat, gently sloping continental shelf from southern New England to Cape Hatteras, NC. The continental slope begins at the continental shelf break and continues eastward with increasing depth until it becomes the continental rise. It is fairly homogenous, with exceptions at the shelf break, some of the canyons, the Hudson Shelf Valley, and in areas of glacially rafted hard bottom.

Pertinent physical and biological characteristics of each of these sub-regions are described in this section, along with a short description of the physical features of coastal environments. Inshore, offshore, and continental slope lobster habitats are described in Section 3.2.6. Information on the affected physical and biological environments included in this amendment was extracted from Stevenson et al. (2004). The primary source references used by Stevenson et al. are not cited in the text of Section 3.1. They are:

Backus 1987; Schmitz *et al*. 1987; Tucholke 1987; Wiebe *et al*. 1987; Cook 1988; Reid and Steimle 1988; Stumpf and Biggs 1988; Abernathy 1989; Townsend 1992; Mountain 1994; Beardsley *et al*. 1996; Brooks 1996; Sherman *et al*. 1996; Dorsey 1998; Kelley 1998; NEFMC 1998; Steimle *et al*. 1999. References used to describe the biological features of the affected environment and to describe lobster habitats are cited in the text.

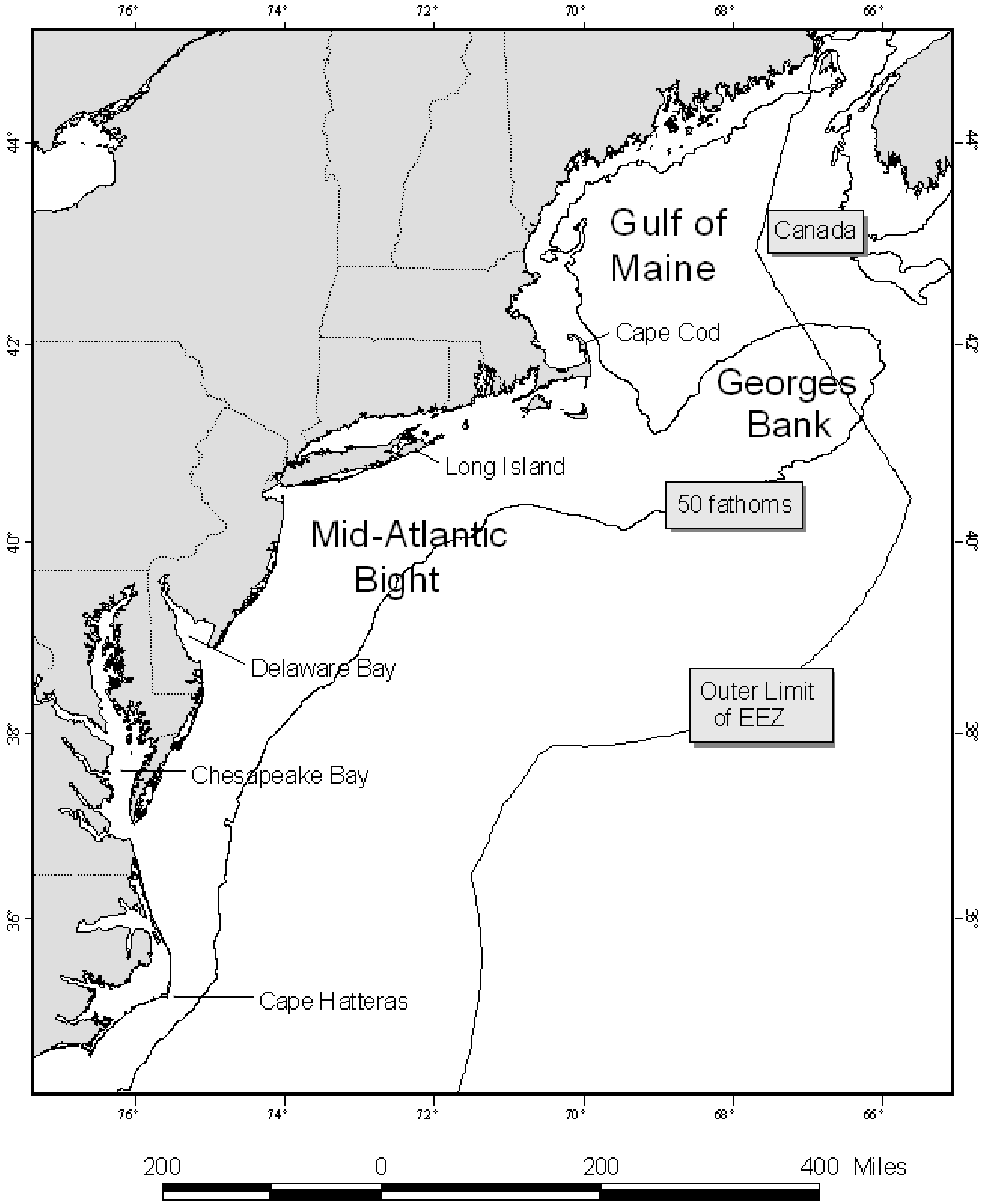
7.3.1 Gulf of Maine

7.3.1.1 Physical Environment

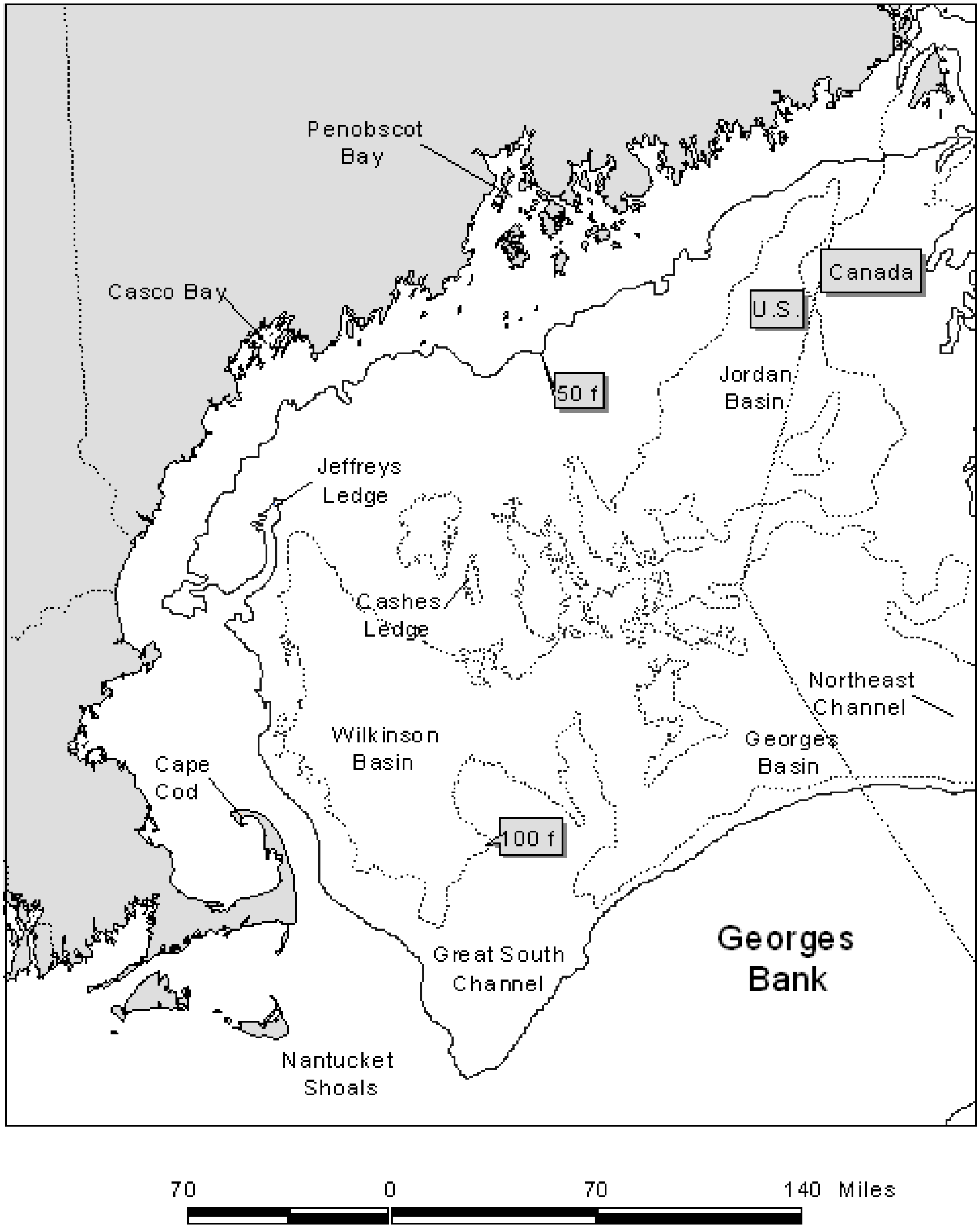
Although not obvious in appearance, the Gulf of Maine (GOM) is actually an enclosed coastal sea, bounded on the east by Browns Bank, on the north by the Nova Scotian (Scotian) Shelf, on the west by the New England states, and on the south by Cape Cod and Georges Bank (Map 12). The GOM was glacially derived, and is characterized by a system of deep basins, moraines and rocky protrusions with limited access to the open ocean. This geomorphology influences complex oceanographic processes that result in a rich biological community.

The GOM is topographically unlike any other part of the continental border along the U.S. Atlantic coast. The GOM's geologic features, when coupled with the vertical variation in water properties, result in a great diversity of habitat types. It contains twenty-one distinct basins separated by ridges, banks, and swells. The three largest basins are Wilkinson, Georges, and Jordan (Map 12). Depths in the basins exceed 250 m, with a maximum depth of 350 m in Georges Basin, just north of Georges Bank. The Northeast Channel between Georges Bank and Browns Bank leads into Georges Basin, and is one of the primary avenues for exchange of water between the GOM and the North Atlantic Ocean.

High points within the Gulf include irregular ridges, such as Cashes Ledge, which peaks at 9 m below the surface, as well as lower flat topped banks and gentle swells. Some of these rises are remnants of the sedimentary shelf that was left after most of it was removed by the glaciers. Others are glacial moraines and a few, like Cashes Ledge, are outcroppings of bedrock. Very fine sediment particles created and eroded by the glaciers have collected in thick deposits over much of the GOM, particularly in its deep basins (Map 12). These mud deposits blanket and obscure the irregularities of the underlying bedrock, forming topographically smooth terrains. Some shallower basins are covered with mud as well, including some in coastal waters. In the rises between the basins, other materials are usually at the surface. Unsorted glacial till covers some morainal areas, as on Sewell Ridge to the north of Georges Basin and on Truxton Swell to the south of Jordan Basin. Sand predominates on some high areas and gravel, sometimes with boulders, predominates on others.



Map 11. Northeast U.S Shelf Ecosystem.



Map 12. Gulf of Maine.

Coastal sediments exhibit a high degree of small-scale variability. Bedrock is the predominant substrate along the western edge of the GOM north of Cape Cod in a narrow band out to a depth of about 60 m. Rocky areas become less common with increasing depth, but some rock outcrops poke through the mud covering the deeper sea floor. Mud is the second most common substrate on the inner continental shelf. Mud predominates in coastal valleys and basins that often abruptly border rocky substrates. Many of these basins extend without interruption into deeper water. Gravel, often mixed with shell, is common adjacent to bedrock outcrops and in fractures in the rock. Large expanses of gravel are not common, but do occur near reworked glacial moraines and in areas where the seabed has been scoured by bottom currents. Gravel is most abundant at depths of 20 - 40 m, except in eastern Maine where a gravel-covered plain exists to depths of at least 100 m. Bottom currents are stronger in eastern Maine where the mean tidal range exceeds 5 m. Sandy areas are relatively rare along the inner shelf of the western GOM, but are more common south of Casco Bay, especially offshore of sandy beaches.

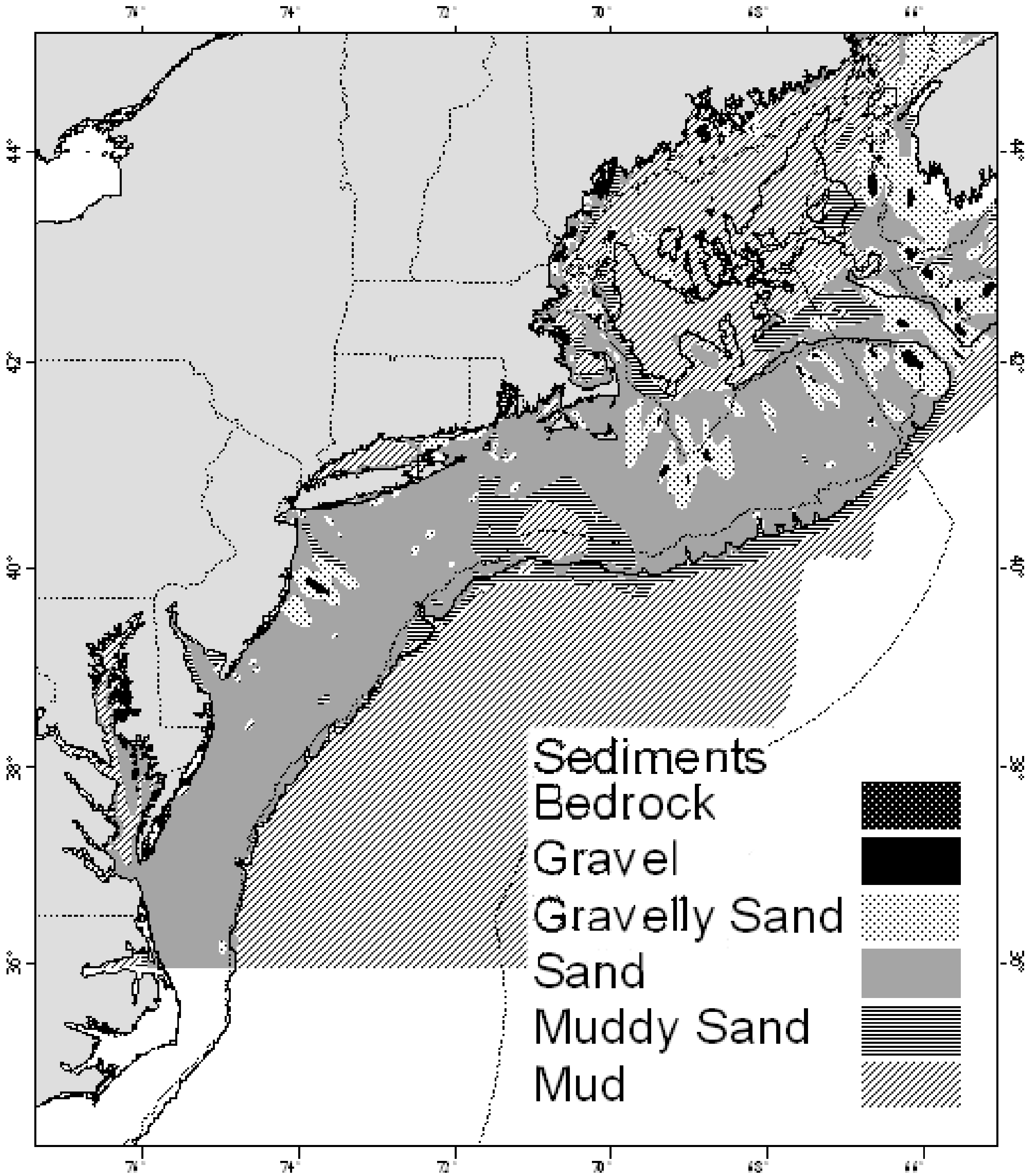
An intense seasonal cycle of winter cooling and turnover, springtime freshwater runoff, and summer warming influences oceanographic and biologic processes in the GOM. The Gulf has a general counterclockwise nontidal surface current that flows around its coastal margin (Map 14). It is primarily driven by fresh, cold Scotian Shelf water that enters over the Scotian Shelf and through the Northeast Channel, and freshwater river runoff, which is particularly important in the spring. Dense relatively warm and saline slope water entering through the bottom of the Northeast Channel from the continental slope also influences gyre formation. Counterclockwise gyres generally form in Jordan, Wilkinson, and Georges Basins and the Northeast Channel as well. These surface gyres are more pronounced in spring and summer; with winter, they weaken and become more influenced by the wind.

Stratification of surface waters during spring and summer seals off a mid-depth layer of water that preserves winter salinity and temperatures. This cold layer of water is called “Maine intermediate water” (MIW) and is located between more saline Maine bottom water and the warmer, stratified Maine surface water. The stratified surface layer is most pronounced in the deep portions of the western GOM. Tidal mixing of shallow areas prevents thermal stratification and results in thermal fronts between the stratified areas and cooler mixed areas. Typically, mixed areas include Georges Bank, the southwest Scotian Shelf, eastern Maine coastal waters, and the narrow coastal band surrounding the remainder of the Gulf.

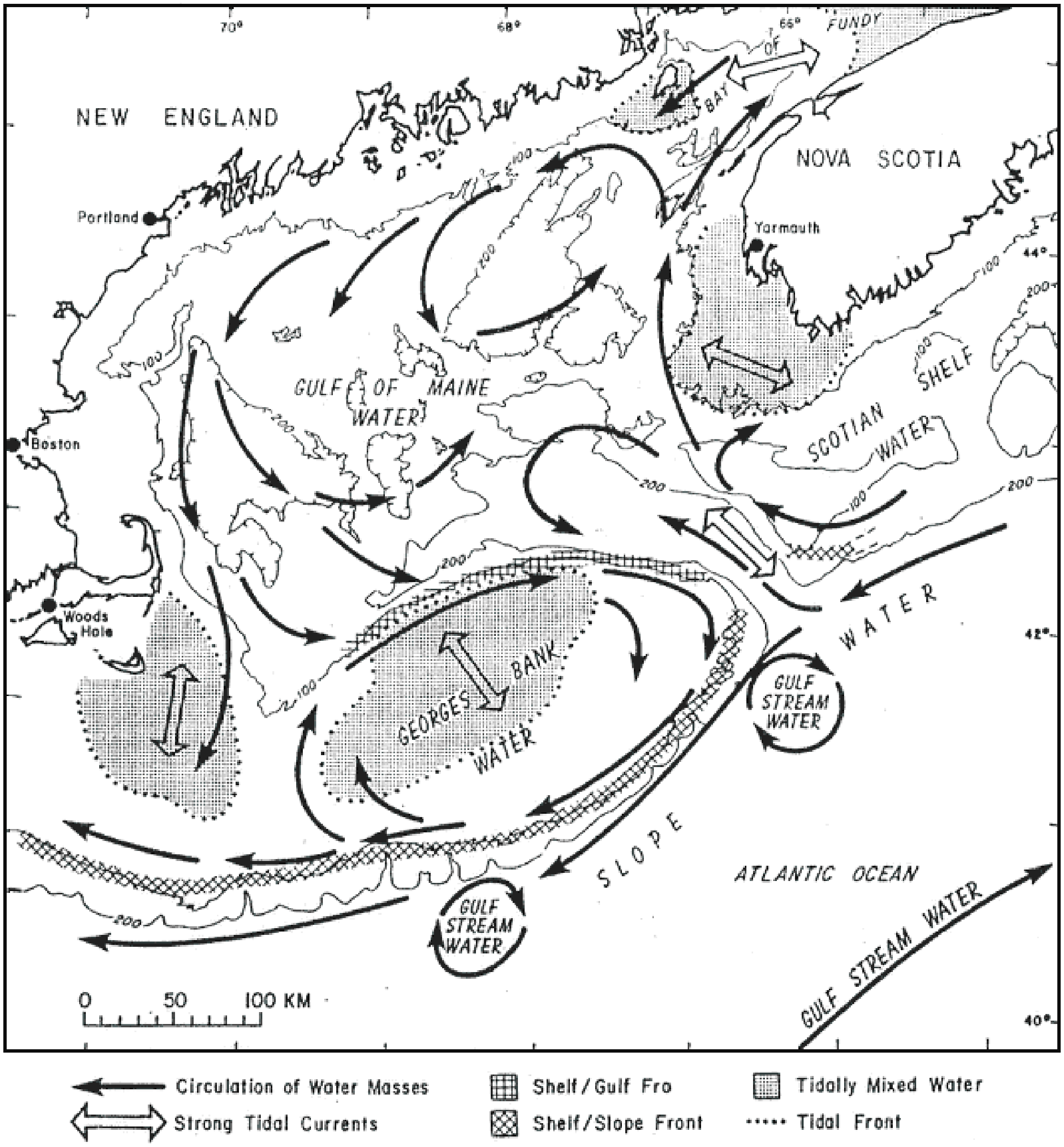
The Northeast Channel provides an exit for cold MIW and outgoing surface water while it allows warmer more saline slope water to move in along the bottom and spill into the deeper basins. The influx of water occurs in pulses, and appears to be seasonal, with lower flow in late winter and a maximum in early summer.

GOM circulation and water properties can vary significantly from year to year. Notable episodic events include shelf-slope interactions such as the entrainment of shelf water by Gulf Stream rings (see the “Gulf Stream and Associated Features” section, below), and strong winds that can create currents as high as 1.1 m/s over Georges Bank. Warm core Gulf Stream rings can also influence upwelling and nutrient exchange on the Scotian shelf, and affect the water masses entering the GOM. Annual and seasonal inflow variations also affect water circulation.

Internal waves are episodic and can greatly affect the biological properties of certain habitats. Internal waves can shift water layers vertically, so that habitats normally surrounded by cold MIW are temporarily bathed in warm, organic rich surface water. On Cashes Ledge, it is thought that deeper nutrient rich water is driven into the photic zone, providing for increased productivity. Localized areas of upwelling interaction occur in numerous places throughout the Gulf.



Map 13. Northeast region sediments, modified from Poppe *et al*. (1989a and b).



Map 14. Water mass circulation patterns in the Georges Bank - Gulf of Maine region.

7.3.1.2 Benthic Invertebrates

Based on 303 benthic grab samples collected in the GOM during 1956-1965, Theroux and Wigley (1998) reported that, in terms of numbers, the most common groups of benthic invertebrates in the GOM were annelid worms (35%), bivalve mollusks (33%), and amphipod crustaceans (14%). Biomass was dominated by bivalves (24%), sea cucumbers (22%), sand dollars (18%), annelids (12%), and sea anemones (9%). Watling (1998) used numerical classification techniques to separate benthic invertebrate samples into seven bottom assemblages. These assemblages are identified in Table 1 and their distribution is indicated in Map 15. This classification system considers predominant taxa, substrate types, and seawater properties.

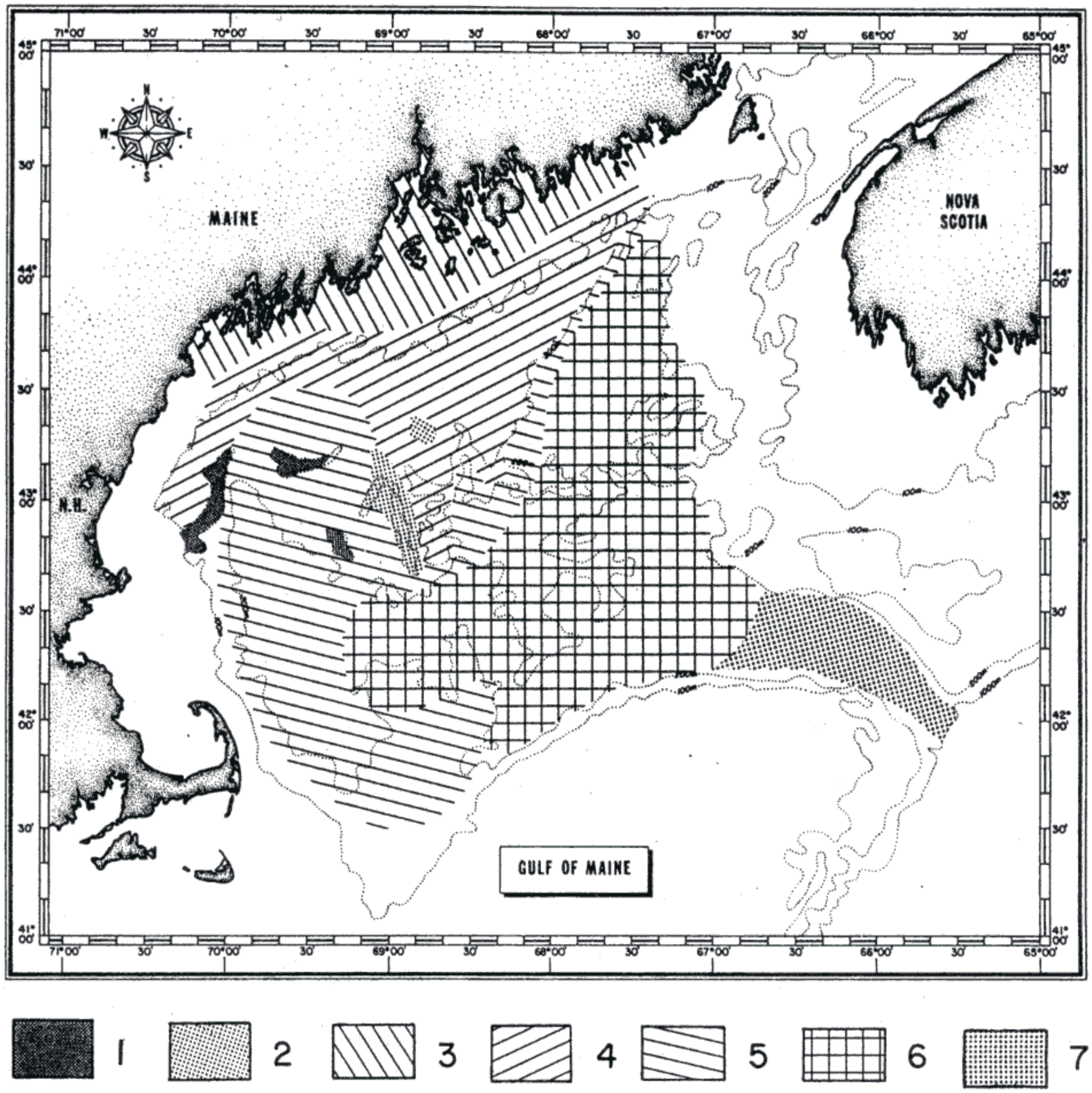
7.3.1.3 Demersal Fish

Demersal fish assemblages for the GOM and Georges Bank were part of broad scale geographic investigations conducted by Gabriel (1992) and Mahon *et al.* (1998). Both these studies and a more limited study by Overholtz and Tyler (1985) found assemblages that were consistent over space and time in this region. In her analysis, Gabriel (1992) found that the most persistent feature over time in assemblage structure from Nova Scotia to Cape Hatteras was the boundary separating assemblages between the GOM and Georges Bank, which occurred at approximately the 100 m isobath on northern Georges Bank. Overholtz and Tyler (1985) identified five assemblages for this region. The Gulf of Maine-deep assemblage included a number of species found in other assemblages, with the exception of American plaice and witch flounder, which was unique to this assemblage. Gabriel's approach did not allow species to co-occur in assemblages, and classified these two species as unique to the deepwater Gulf of Maine-Georges Bank assemblage. Results of these two studies are compared in Table 42.

Table 41. Gulf of Maine benthic assemblages as identified by Watling (1998).

Benthic Assemblage	**Benthic Community Description**
1	Comprises all sandy offshore banks, most prominently Jeffreys Ledge, Fippennies Ledge, and Platts Bank; depth on top of banks about 70 m; substrate usually coarse sand with some gravel; fauna characteristically sand dwellers with an abundant interstitial component.
2	Comprises the rocky offshore ledges, such as Cashes Ledge, Sigsbee Ridge and Three Dory Ridge; substrate either rock ridge outcrop or very large boulders, often with a covering of very fine sediment; fauna predominantly sponges, tunicates, bryozoans, hydroids, and other hard bottom dwellers; overlying water usually cold Gulf of Maine Intermediate Water.
3	Probably extends all along the coast of the Gulf of Maine in water depths less than 60 m; bottom waters warm in summer and cold in winter; fauna rich and diverse, primarily polychaetes and crustaceans, probably consists of several (sub-) assemblages due to heterogeneity of substrate and water conditions near shore and at mouths of bays.
4	Extends over the soft bottom at depths of 60 - 140 m, well within the cold Gulf of Maine Intermediate Water; bottom sediments primarily fine muds; fauna dominated by polychaetes, shrimp, and cerianthid anemones.
5	A mixed assemblage comprising elements from the cold water fauna as well as a few deeper water species with broader temperature tolerances; overlying water often a mixture of Intermediate Water and Bottom Water, but generally colder than 7°C most of the year; fauna sparse, diversity low, dominated by a few polychaetes, with brittle stars, sea pens, shrimp, and cerianthids also present.
6	Comprises the fauna of the deep basins; bottom sediments generally very fine muds, but may have a gravel component in the offshore morainal regions; overlying water usually 7 - 8°C, with little variation; fauna shows some bathyal affinities but densities are not high, dominated by brittle stars and sea pens, and sporadically by a tube-making amphipod.
7	The true upper slope fauna that extends into the Northeast Channel; water temperatures are always above 8°C and salinities are at least 35 ppt; sediments may be either fine muds or a mixture of mud and gravel.

Geographical distribution of assemblages is shown in Map 15.



Map 15. Distribution of the seven major benthic assemblages in the Gulf of Maine. Distribution determined from both soft bottom quantitative sampling and qualitative hard bottom sampling. The assemblages are characterized as follows: 1. Sandy offshore banks; 2. Rocky offshore ledges; 3. Shallow (< 50 m) temperate bottoms with mixed substrate; 4. Boreal muddy bottom, overlain by Maine Intermediate Water, 50 - 160 m (approximate); 5. Cold deep water, species with broad tolerances, muddy bottom; 6. Deep basin warm water, muddy bottom; 7. Upper slope water, mixed sediment. Source: Watling (1998).

Table 42. Comparison of demersal fish assemblages of Georges Bank and the Gulf of Maine.

Overholtz and Tyler (1985)		**Gabriel (1992)**	
Assemblage	**Species**	**Species**	**Assemblage**
Slope and Canyon	offshore hake blackbelly rosefish Gulf stream flounder fourspot flounder, goosefish, silver hake, white hake, red hake	offshore hake blackbelly rosefish Gulf stream flounder fawn cusk-eel, longfin hake, armored sea robin	Deepwater
Intermediate	silver hake red hake goosefish Atlantic cod, haddock, ocean pout, yellowtail flounder, winter skate, little skate, sea raven, longhorn sculpin	silver hake red hake goosefish northern shortfin squid, spiny dogfish, cusk	Combination of Deepwater Gulf of Maine/Georges Bank and Gulf of Maine-Georges Bank Transition
Shallow	Atlantic cod haddock pollock silver hake white hake red hake goosefish ocean pout	Atlantic cod haddock pollock	Gulf of Maine-Georges Bank Transition Zone (*see below also*)
	yellowtail flounder windowpane winter flounder winter skate little skate longhorn sculpin summer flounder sea raven, sand lance	yellowtail flounder windowpane winter flounder winter skate little skate longhorn sculpin	Shallow Water Georges Bank-Southern New England
Gulf of Maine-Deep	white hake American plaice witch flounder thorny skate silver hake, Atlantic cod, haddock, cusk, Atlantic wolffish	white hake American plaice witch flounder thorny skate redfish	Deepwater Gulf of Maine-Georges Bank
Northeast Peak	Atlantic cod haddock pollock ocean pout, winter flounder, white hake, thorny skate, longhorn sculpin	Atlantic cod haddock pollock	Gulf of Maine-Georges Bank Transition Zone (*see above also*)

7.3.2 Georges Bank

7.3.2.1 Physical Environment

Georges Bank is a shallow (3 - 150 m depth), elongate (161 km wide by 322 km long) extension of the continental shelf that was formed by the Wisconsinian glacial episode. It is characterized by a steep slope on its northern edge and a broad, flat, gently sloping southern flank. The Great South Channel lies to the west. Natural processes continue to erode and rework the sediments on Georges Bank. It is anticipated that erosion and reworking of sediments will reduce the amount of sand available to the sand sheets, and cause an overall coarsening of the bottom sediments (Valentine *et al.* 1993).

Glacial retreat during the late Pleistocene deposited the bottom sediments currently observed on the eastern section of Georges Bank, and the sediments have been continuously reworked and redistributed by the action of rising sea level, and by tidal, storm and other currents. The strong, erosive currents affect the character of the biological community. Bottom topography on eastern Georges Bank is characterized by linear ridges in the western shoal areas; a relatively smooth, gently dipping sea floor on the deeper, easternmost part; a highly energetic peak in the north with sand ridges up to 30 m high and extensive gravel pavement; and steeper and smoother topography incised by submarine canyons on the southeastern margin (see the “Continental Slope” section, below, for more on canyons). The interaction of several environmental factors, including availability and type of sediment, current speed and direction, and bottom topography, has formed seven sedimentary provinces on eastern Georges Bank (Valentine and Lough 1991), which are described in Table 43 and depicted in Map 16. The gravel-sand mixture is usually a transition zone between coarse gravel and finer sediments.

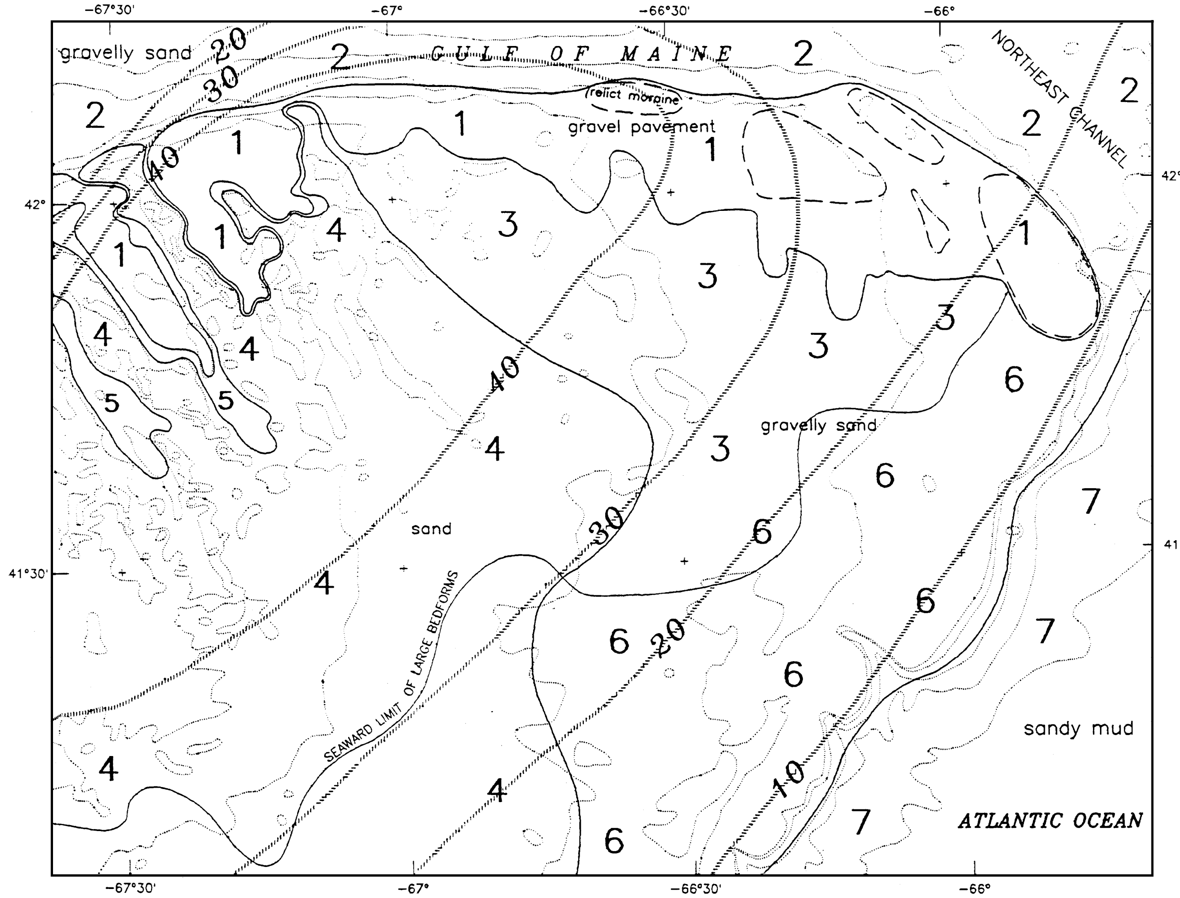
The central region of the Bank is shallow, and the bottom is characterized by shoals and troughs, with sand dunes superimposed upon them. The two most prominent elevations on the ridge and trough area are Cultivator and Georges Shoals. This shoal and trough area is a region of strong currents, with average flood and ebb tidal currents greater than 4 km/h, and as high as 7 km/h. The dunes migrate at variable rates, and the ridges may also move. In an area that lies between the central part and Northeast Peak, Almeida *et al.* (2000) identified high-energy areas as between 35 - 65 m deep, where sand is transported on a daily basis by tidal currents, and a low-energy area at depths > 65 m that is affected only by storm currents.

The area west of the Great South Channel, known as Nantucket Shoals (Map 12), is similar in nature to the central region of the Bank. Currents in these areas are strongest where water depth is shallower than 50 m. This type of travelling dune and swale morphology is also found in the Mid-Atlantic Bight, and further described in that section of the document. The Great South Channel separates the main part of Georges Bank from Nantucket Shoals. Sediments in this region include gravel pavement and mounds, some scattered boulders, sand with storm generated ripples, and scattered shell and mussel beds. Tidal and storm currents range from moderate to strong, depending upon location and storm activity (Valentine, pers. comm.).

Table 43. Sedimentary provinces and associated benthic landscapes of Georges Bank.

Sedimentary Province	Depth (m)	Description	Benthic Assemblage
Northern Edge / Northeast Peak (1)	40 - 200	Dominated by gravel with portions of sand, common boulder areas, and tightly packed pebbles. Representative epifauna (bryozoa, hydrozoa, anemones, and calcareous worm tubes) are abundant in areas of boulders. Strong tidal and storm currents.	Northeast Peak
Northern Slope and Northeast Channel (2)	200 - 240	Variable sediment type (gravel, gravel-sand, and sand) scattered bedforms. This is a transition zone between the northern edge and southern slope. Strong tidal and storm currents.	Northeast Peak
North /Central Shelf (3)	60 - 120	Highly variable sediment type (ranging from gravel to sand) with rippled sand, large bedforms, and patchy gravel lag deposits. Minimal epifauna on gravel due to sand movement. Representative epifauna in sand areas includes amphipods, sand dollars, and burrowing anemones.	Central Georges
Central and Southwestern Shelf - shoal ridges (4)	10 - 80	Dominated by sand (fine and medium grain) with large sand ridges, dunes, waves, and ripples. Small bedforms in southern part. Minimal epifauna on gravel due to sand movement. Representative epifauna in sand areas includes amphipods, sand dollars, and burrowing anemones.	Central Georges
Central and Southwestern Shelf - shoal troughs (5)	40 - 60	Gravel (including gravel lag) and gravel-sand between large sand ridges. Patchy large bedforms. Strong currents. (Few samples – submersible observation noted presence of gravel lag, rippled gravel-sand, and large bedforms.) Minimal epifauna on gravel due to sand movement. Representative epifauna in sand areas includes amphipods, sand dollars, and burrowing anemones.	Central Georges
Southeastern Shelf (6)	80 - 200	Rippled gravel-sand (medium and fine grained sand) with patchy large bedforms and gravel lag. Weaker currents; ripples are formed by intermittent storm currents. Representative epifauna includes sponges attached to shell fragments and amphipods.	Southern Georges
Southeastern Slope (7)	400 - 2000	Dominated by silt and clay with portions of sand (medium and fine) with rippled sand on shallow slope and smooth silt-sand deeper.	none

Sediment provinces as defined by Valentine *et al*. (1993) and Valentine and Lough (1991), with additional comments by Valentine (pers. comm.) and benthic assemblages assigned by Theroux and Grosslein (1987). See text for further discussion on benthic assemblages.



Map 16. Sedimentary provinces of eastern Georges Bank.
Based on criteria of sea floor morphology, texture, sediment movement and bedforms, and mean tidal bottom current speed (cm/s). Relict moraines (bouldery seafloor) are enclosed by dashed lines. See Table 43 for descriptions of provinces. Source: Valentine and Lough (1991).

Oceanographic frontal systems separate water masses of the GOM and Georges Bank from oceanic waters south of the Bank. These water masses differ in temperature, salinity, nutrient concentration, and planktonic communities, which influence productivity and may influence fish abundance and distribution. Currents on Georges Bank include a weak, persistent clockwise gyre around the Bank, a strong semidiurnal tidal flow predominantly northwest and southeast, and very strong, intermittent storm induced currents, which all can occur simultaneously (Map 14). Tidal currents over the shallow top of Georges Bank can be very strong, and keep the waters over the Bank well mixed vertically. This results in a tidal front that separates the cool waters of the well mixed shallows of the central Bank from the warmer, seasonally stratified shelf waters on the seaward and shoreward sides of the Bank. The clockwise gyre is instrumental in distribution of plankton, including fish eggs and larvae.

7.3.2.2 Invertebrates

Amphipod crustaceans (49%) and annelid worms (28%) numerically dominated the contents of 211 samples collected on Georges Bank during 1956-1965 (Theroux and Wigley 1998). Biomass was dominated by sand dollars (50%) and bivalves (33%). Theroux and Grosslein (1987) utilized the same database to identify four macrobenthic invertebrate assemblages. They noted that the boundaries between assemblages were not well defined because there is considerable intergrading between adjacent assemblages. Their assemblages are associated with those identified by Valentine and Lough (1991) in Table 43.

The Western Basin assemblage is found in the upper Great South Channel region at the northwestern corner of the Bank, in comparatively deepwater (150 - 200 m) with relatively slow currents and fine bottom sediments of silt, clay and muddy sand. Fauna are comprised mainly of small burrowing detritivores and deposit feeders, and carnivorous scavengers. Valentine and Lough (1991) did not identify a comparable assemblage; however, this assemblage is geographically located adjacent to Assemblage 5 as described by Watling (1998) (Table 40, Map 15).

The Northeast Peak assemblage is found along the Northern Edge and Northeast Peak, which varies in depth and current strength and includes coarse sediments, consisting mainly of gravel and coarse sand with interspersed boulders, cobbles, and pebbles. Fauna tend to be sessile (coelenterates, brachiopods, barnacles, and tubiferous annelids) or free-living (brittle stars, crustaceans, and polychaetes), with a characteristic absence of burrowing forms.

The Central Georges Bank assemblage occupies the greatest area, including the central and northern portions of the Bank in depths less than 100 m. Medium grained shifting sands dominate this dynamic area of strong currents. Organisms tend to be small to moderately large with burrowing or motile habits.

The Southern Georges Bank assemblage is found on the southern and southwestern flanks at depths from 80 - 200 m, where fine grained sands and moderate currents predominate. Many southern species exist here at the northern limits of their range.

7.3.2.3 Demersal Fish

Along with high levels of primary productivity, Georges Bank has been historically characterized by high levels of fish production. Several studies have attempted to identify demersal fish assemblages over large spatial scales. Overholtz and Tyler (1985) found five depth related groundfish assemblages for Georges Bank and the GOM that were persistent temporally and spatially. Depth and salinity were identified as major physical influences explaining assemblage structure. Gabriel (1992) identified six assemblages, which are compared with the results of Overholtz and Tyler (1985) in Table 2. Mahon *et al.* (1998) found similar results.

7.3.3 Mid-Atlantic Bight

7.3.3.1 Physical Environment

The Mid-Atlantic Bight includes the shelf and slope waters from Georges Bank south to Cape Hatteras, and east to the Gulf Stream (Map 11). Like the rest of the continental shelf, the topography of the Mid-Atlantic Bight was shaped largely by sea level fluctuations caused by past ice ages. The shelf's basic morphology and sediments derive from the retreat of the last ice sheet, and the subsequent rise in sea level. Since that time, currents and waves have modified this basic structure.

Shelf and slope waters of the Mid-Atlantic Bight have a slow southwestward flow that is occasionally interrupted by warm core rings or meanders from the Gulf Stream. On average, shelf water moves parallel to bathymetry isobars at speeds of 5 - 10 cm/s at the surface and 2 cm/s or less at the bottom. Storm events can cause much more energetic variations in flow. Tidal currents on the inner shelf have a higher flow rate of 20 cm/s that increases to 100 cm/s near inlets.

Slope water tends to be warmer than shelf water because of its proximity to the Gulf Stream, and tends to be more saline. The abrupt gradient where these two water masses meet is called the shelf-slope front. This front is usually located at the edge of the shelf and touches bottom at about 75 - 100 m depth of water, and then slopes up to the east toward the surface. It reaches surface waters approximately 25 - 55 km further offshore. The position of the front is highly variable, and can be influenced by many physical factors. Vertical structure of temperature and salinity within the front can develop complex patterns because of the interleaving of shelf and slope waters; *e.g.*, cold shelf waters can protrude offshore, or warmer slope water can intrude up onto the shelf.

The seasonal effects of warming and cooling increase in shallower, nearshore waters. Stratification of the water column occurs over the shelf and the top layer of slope water during the spring-summer and is usually established by early June. Fall mixing results in homogenous shelf and upper slope waters by October in most years. A permanent thermocline exists in slope waters from 200 - 600 m deep. Temperatures decrease at the rate of about 0.02ºC per meter and remain relatively constant except for occasional incursions of Gulf stream eddies or meanders. Below 600 m, temperature declines, and usually averages about 2.2ºC at 4000 m. A warm, mixed layer approximately 40 m thick resides above the permanent thermocline.

The “cold pool” is an annual phenomenon particularly important to the Mid-Atlantic Bight. It stretches from the Gulf of Maine along the outer edge of Georges Bank and then southwest to Cape Hatteras. It becomes identifiable with the onset of thermal stratification in the spring and lasts into early fall until normal seasonal mixing occurs. It usually exists along the bottom between the 40 and 100 m isobaths and extends up into the water column for about 35 m, to the bottom of the seasonal thermocline. The cold pool usually represents about 30% of the volume of shelf water. Minimum temperatures for the cold pool occur in early spring and summer, and range from 1.1 - 4.7ºC.

The shelf slopes gently from shore out to between 100 and 200 km offshore where it transforms to the slope (100 - 200 m water depth) at the shelf break. In both the Mid-Atlantic and on Georges Bank, numerous canyons incise the slope, and some cut up onto the shelf itself (see the “Continental Slope” section, below). The primary morphological features of the shelf include shelf valleys and channels, shoal massifs, scarps, and sand ridges and swales (Map 17 and Map 18).

Most of these structures are relic except for some sand ridges and smaller sand-formed features. Shelf valleys and slope canyons were formed by rivers of glacier outwash that deposited sediments on the outer shelf edge as they entered the ocean. Most valleys cut about 10 m into the shelf, with the exception of the Hudson Shelf Valley that is about 35 m deep. The valleys were partially filled as the glacier melted and retreated across the shelf. The glacier also left behind a lengthy scarp near the shelf break from Chesapeake Bay north to the eastern end of Long Island (Map 17 and Map 18). Shoal retreat massifs were produced by extensive deposition at a cape or estuary mouth. Massifs were also formed as estuaries retreated across the shelf.

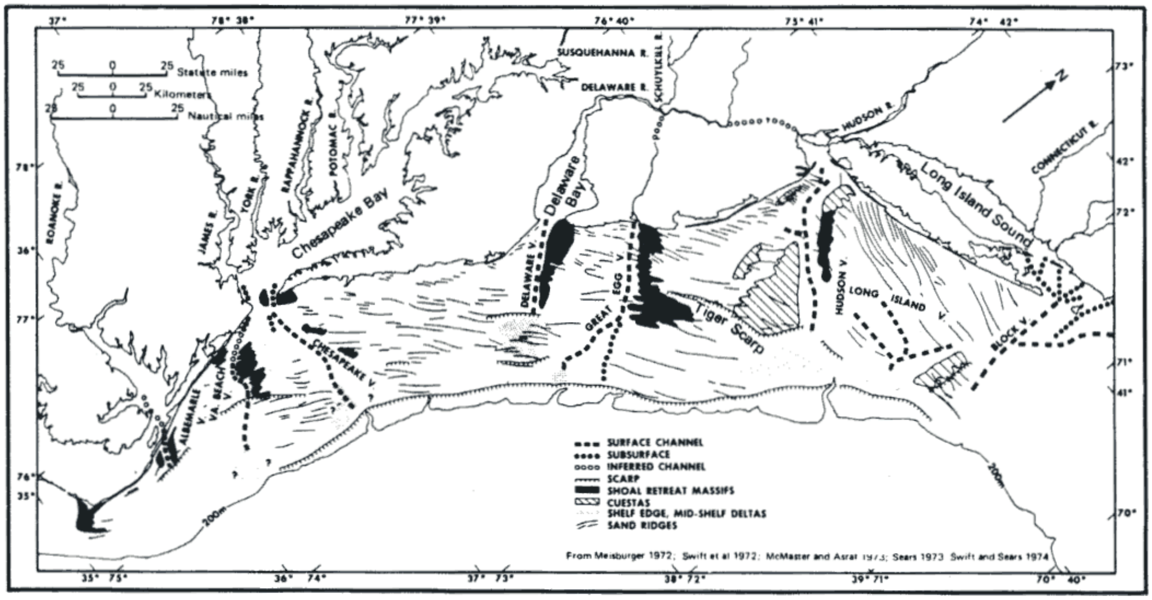
The sediment type covering most of the shelf in the Mid-Atlantic Bight is sand, with some relatively small, localized areas of sand-shell and sand-gravel. On the slope, silty sand, silt, and clay predominate.

Some sand ridges (Map 17) are more modern in origin than the shelf's glaciated morphology. Their formation is not well understood; however, they appear to develop from the sediments that erode from the shore face. They maintain their shape, so it is assumed that they are in equilibrium with modern current and storm regimes. They are usually grouped, with heights of about 10 m, lengths of 10 - 50 km and spacing of 2 km. Ridges are usually oriented at a slight angle towards shore, running in length from northeast to southwest. The seaward face usually has the steepest slope. Sand ridges are often covered with smaller similar forms such as sand waves, megaripples, and ripples. Swales occur between sand ridges. Since ridges are higher than the adjacent swales, they are exposed to more energy from water currents, and experience more sediment mobility than swales. Ridges tend to contain less fine sand, silt and clay while relatively sheltered swales contain more of the finer particles. Swales have greater benthic macrofaunal density, species richness and biomass, due in part to the increased abundance of detrital food and the physically less rigorous conditions.

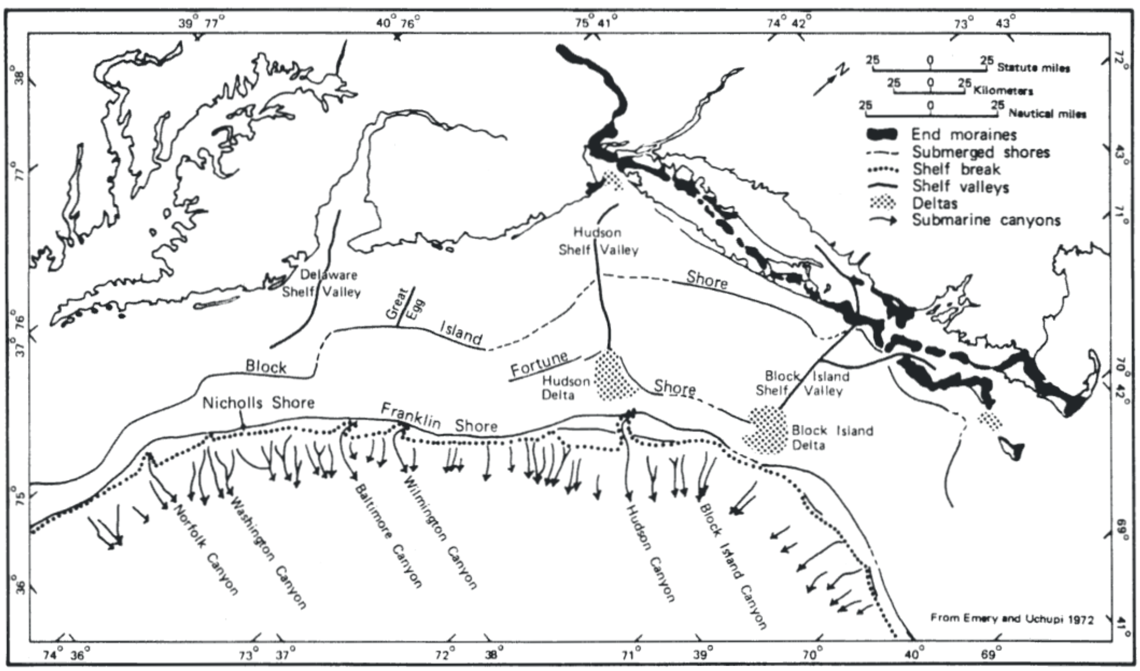
Sand waves are usually found in patches of 5 - 10 with heights of about 2 m, lengths of 50 - 100 m and 1 - 2 km between patches. Sand waves are primarily found on the inner shelf, and often observed on sides of sand ridges. They may remain intact over several seasons. Megaripples occur on sand waves or separately on the inner or central shelf. During the winter storm season, they may cover as much as 15% of the inner shelf. They tend to form in large patches and usually have lengths of 3 - 5 m with heights of 0.5 - 1 m. Megaripples tend to survive for less than a season. They can form during a storm and reshape the upper 50 - 100 cm of the sediments within a few hours. Ripples are also found everywhere on the shelf, and appear or disappear within hours or days, depending upon storms and currents. Ripples usually have lengths of about 1 - 150 cm and heights of a few centimeters.

Sediments are uniformly distributed over the shelf in this region (see Map 13). A sheet of sand and gravel varying in thickness from 0 - 10 m covers most of the shelf. The mean bottom flow from the constant southwesterly current is not fast enough to move sand, so sediment transport must be episodic. Net sediment movement is in the same southwesterly direction as the current. The sands are mostly medium to coarse grains, with finer sand in the Hudson Shelf Valley and on the outer shelf. Mud is rare over most of the shelf, but is common in the Hudson Shelf Valley. Occasionally relic estuarine mud deposits are re-exposed in the swales between sand ridges. Fine sediment content increases rapidly at the shelf break, which is sometimes called the "mud line," and sediments are 70 - 100% fines on the slope.

The northern portion of the Mid-Atlantic Bight is sometimes referred to as southern New England. Most of this area was discussed under Georges Bank; however, one other formation of this region deserves note. The mud patch is located just southwest of Nantucket Shoals and southeast of Long Island and Rhode Island (Map 13). Tidal currents in this area slow significantly, which allows silts and clays to settle out. The mud is mixed with sand, and is occasionally re-suspended by large storms. This habitat is an anomaly of the outer continental shelf.



Map 17. Mid-Atlantic Bight submarine morphology.
Source: Stumpf and Biggs (1988).



Map 18. Major features of the mid-Atlantic and southern New England continental shelf.
Source: Stumpf and Biggs (1988).

Artificial reefs are another significant Mid-Atlantic habitat, formed much more recently on the geologic time scale than other regional habitat types. These localized areas of hard structure have been formed by shipwrecks, lost cargoes, disposed solid materials, shoreline jetties and groins, submerged pipelines, cables, and other materials (Steimle and Zetlin 2000). While some of materials have been deposited specifically for use as fish habitat, most have an alternative primary purpose; however, they have all become an integral part of the coastal and shelf ecosystem. It is expected that the increase in these materials has had an impact on living marine resources and fisheries, but these effects are not well known. In general, reefs are important for attachment sites, shelter, and food for many species, and fish predators such as tunas may be attracted by prey aggregations, or may be behaviorally attracted to the reef structure. The overview by Steimle and Zetlin (2000) used NOAA hydrographic surveys to plot rocks, wrecks, obstructions, and artificial reefs, which together were considered a fairly complete list of non-biogenic reef habitat in the Mid-Atlantic estuarine and coastal areas (Map 19).

7.3.3.2 Invertebrates

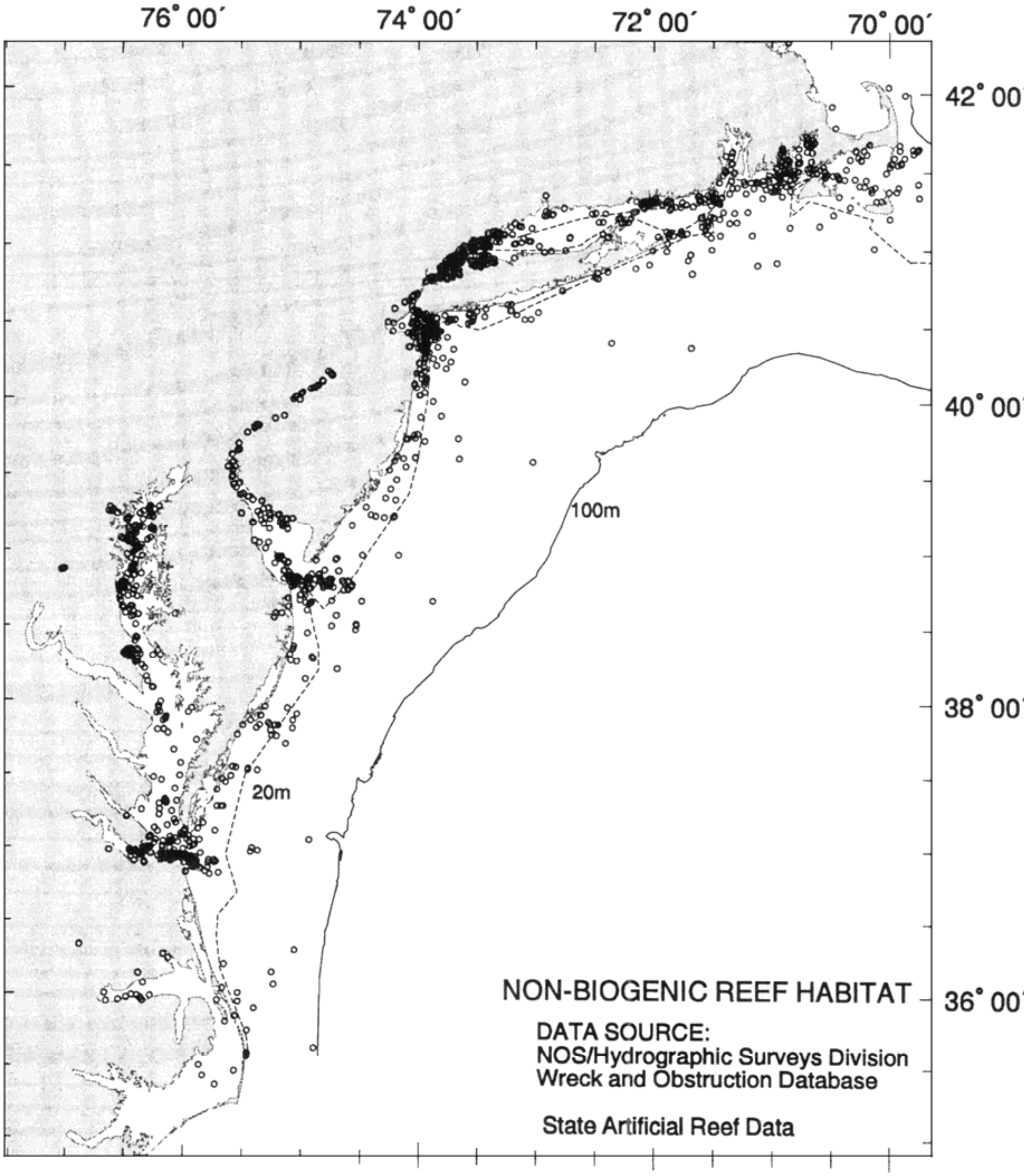
Wigley and Theroux (1981) reported on the faunal composition of 563 bottom grab samples collected in the Mid-Atlantic Bight during 1956-1965. Amphipod crustaceans and bivalve mollusks accounted for most of the individuals (41% and 22%, respectively), whereas mollusks dominated the biomass (70%). Three broad faunal zones related to water depth and sediment type were identified by Pratt (1973). The "sand fauna" zone was defined for sandy sediments (1% or less silt) that are at least occasionally disturbed by waves, from shore out to 50 m (Map 20). The "silty sand fauna" zone occurred immediately offshore from the sand fauna zone, in stable sands containing a small amount of silt and organic material. Silts and clays become predominant at the shelf break and line the Hudson Shelf Valley, and support the "silt-clay fauna."

Building on Pratt's work, the Mid-Atlantic shelf was further divided by Boesch (1979) into seven bathymetric/morphologic subdivisions based on faunal assemblages (Table 44). Sediments in the region studied (Hudson Shelf Valley south to Chesapeake Bay) were dominated by sand with little finer materials. Ridges and swales are important morphological features in this area. Sediments are coarser on the ridges, and the swales have greater benthic macrofaunal density, species richness, and biomass. Faunal species composition differed between these features, and Boesch (1979) incorporated this variation in his subdivisions. Much overlap of species distributions was found between depth zones, so the faunal assemblages represented more of a continuum than distinct zones.

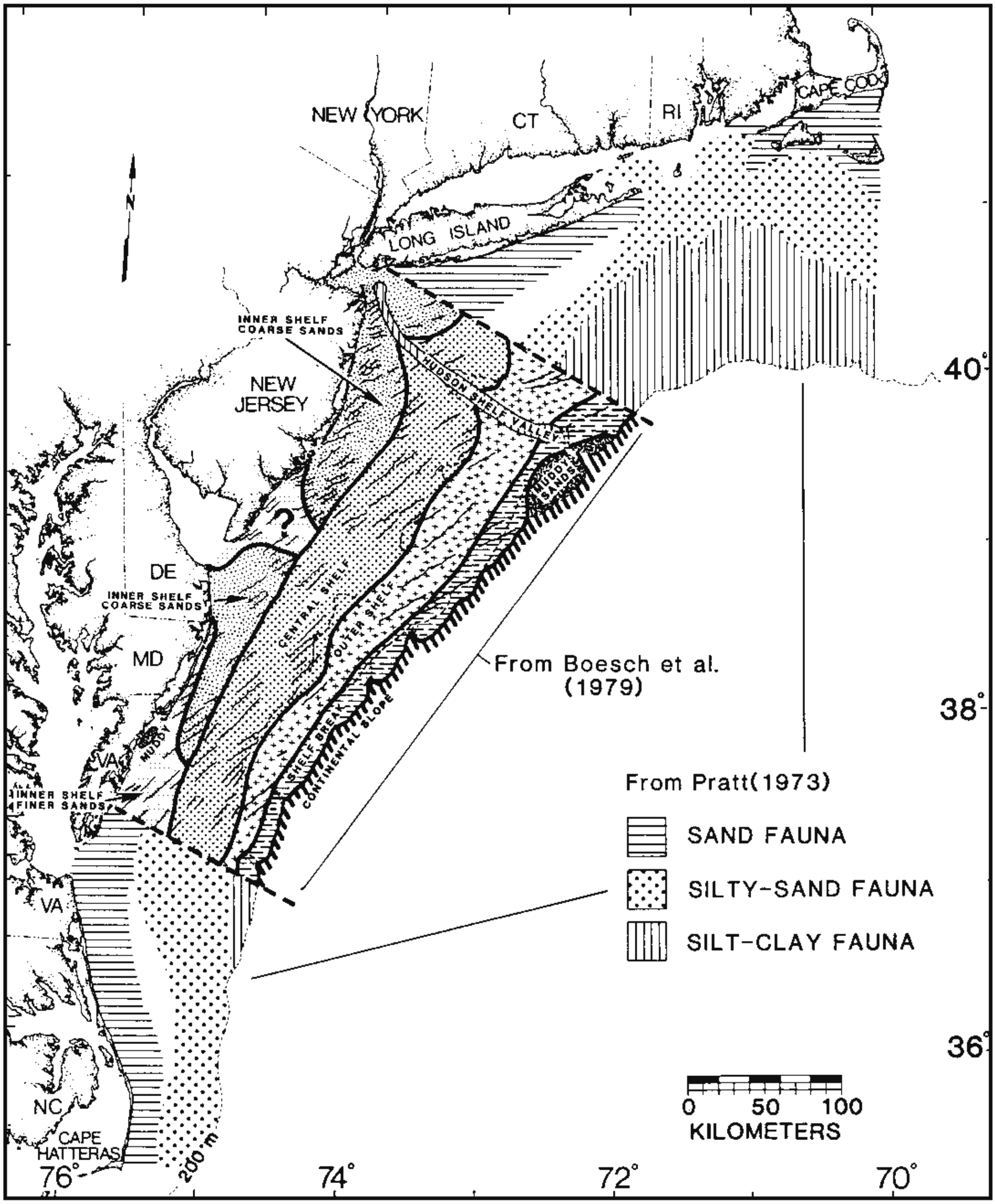
7.3.3.3 Demersal Fish

Demersal fish assemblages were described at a broad geographic scale for the continental shelf and slope from Cape Chidley, Labrador to Cape Hatteras, North Carolina (Mahon *et al.* 1998) and from Nova Scotia to Cape Hatteras (Gabriel 1992). Factors influencing species distribution included latitude and depth. Results of these studies were similar to an earlier study confined to the Mid-Atlantic Bight continental shelf (Colvocoresses and Musick 1984). In this study, there were clear variations in species abundances, yet they demonstrated consistent patterns of community composition and distribution among demersal fishes of the Mid-Atlantic shelf. This is especially true for five strongly recurring species associations that varied slightly by season (Table 44). The boundaries between fish assemblages generally followed isotherms and isobaths. The assemblages were largely similar between the spring and fall collections, with the most notable change being a northward and shoreward shift in the temperate group in the spring.

Steimle and Zetlin (2000) described representative epibenthic/epibiotic, motile epibenthic, and fish species associated with sparsely scattered reef habitats that consist mainly of manmade structures (Table 46)



Map 19. Summary of all reef habitats (except biogenic, such as mussel or oyster beds) in the Mid-Atlantic Bight.
Source: Steimle and Zetlin (2000).



Map 20. Schematic representation of major macrofaunal zones on the mid-Atlantic shelf. Approximate location of ridge fields indicated. Source: Reid and Steimle (1988).

Table 44. Mid-Atlantic habitat types.

Habitat Type [after Boesch (1979)]	Description		
	Depth (m)	**Characterization [Pratt (1973) faunal zone]**	**Characteristic Benthic Macrofauna**
Inner shelf	0 - 30	characterized by coarse sands with finer sands off MD and VA (sand zone)	Polychaetes: *Polygordius, Goniadella, Spiophanes*
Central shelf	30 - 50	(sand zone)	Polychaetes: *Spiophanes, Goniadella* Amphipod: *Pseudunciola*
Central and inner shelf swales	0 - 50	occurs in swales between sand ridges (sand zone)	*Polychaetes: Spiophanes, Lumbrineris, Polygordius*
Outer shelf	50 - 100	(silty sand zone)	Amphipods: *Ampelisca vadorum, Erichthonius* Polychaetes: *Spiophanes*
Outer shelf swales	50 - 100	occurs in swales between sand ridges (silty sand zone)	Amphipods: *Ampelisca agassizi, Unciola, Erichthonius*
Shelf break	100 - 200	(silt-clay zone)	not given
Continental slope	> 200	(none)	not given

As described by Pratt (1973) and Boesch (1979) with characteristic macrofauna as identified in Boesch (1979).

Table 45. Major recurrent demersal finfish assemblages of the Mid-Atlantic Bight during spring and fall.

Season	Species Assemblage				
	Boreal	**Warm temperate**	**Inner shelf**	**Outer shelf**	Slope
Spring	Atlantic cod little skate sea raven goosefish winter flounder longhorn sculpin ocean pout silver hake red hake white hake spiny dogfish	black sea bass summer flounder butterfish scup spotted hake northern searobin	windowpane	fourspot flounder	shortnose greeneye offshore hake blackbelly rosefish white hake
Fall	white hake silver hake red hake goosefish longhorn sculpin winter flounder yellowtail flounder witch flounder little skate spiny dogfish	black sea bass summer flounder butterfish scup spotted hake northern searobin smooth dogfish	windowpane	fourspot flounder fawn cusk eel gulf stream flounder	shortnose greeneye offshore hake blackbelly rosefish white hake witch flounder

As determined by Colvocoresses and Musick (1984).

Table 46. Mid-Atlantic reef types, location, and representative flora and fauna.

Location (Type)	Representative Flora and Fauna		
	Epibenthic/Epibiotic	**Motile Epibenthic Invertebrates**	**Fish**
Estuarine (oyster reefs, blue mussel beds, other hard surfaces, semi-hard clay and *Spartina* peat reefs)	Oyster, barnacles, ribbed mussel, blue mussel, algae, sponges, tube worms, anemones, hydroids, bryozoans, slipper shell, jingle shell, northern stone coral, sea whips, tunicates, caprellid amphipods, wood borers	Xanthid crabs, blue crab, rock crabs, spider crab, juvenile American lobsters, sea stars	Gobies, spot, striped bass, black sea bass, white perch, toadfish, scup, drum, croaker, spot, sheepshead porgy, pinfish, juvenile and adult tautog, pinfish, northern puffer, cunner, sculpins, juvenile and adult Atlantic cod, rock gunnel, conger eel, American eel, red hake, ocean pout, white hake, juvenile pollock
Coastal (exposed rock/soft marl, harder rock, wrecks and artificial reefs, kelp, other materials)	Boring mollusks (piddocks), red algae, sponges, anemones, hydroids, northern stone coral, soft coral, sea whips, barnacles, blue mussel, horse mussel, bryozoans, skeleton and tubiculous amphipods, polychaetes, jingle shell, sea stars	American lobster, Jonah crab, rock crabs, spider crab, sea stars, urchins, squid egg clusters	Black sea bass, pinfish, scup, cunner, red hake, gray triggerfish, black grouper, smooth dogfish, summer flounder, scad, bluefish, amberjack, Atlantic cod, tautog, ocean pout, conger eel, sea raven, rock gunnel, radiated shanny
Shelf (rocks and boulders, wrecks and artificial reefs, other solid substrates)	Boring mollusks (piddocks) red algae, sponges, anemones, hydroids, stone coral, soft coral, sea whips, barnacles, blue mussels, horse mussels, bryozoans, amphipods, polychaetes	American lobster, Jonah crabs, rock crabs, spider crabs, sea stars, urchins, squid egg clusters (with addition of some deepwater taxa at shelf edge)	Black sea bass, scup, tautog, cunner, gag, sheepshead, porgy, round herring, sardines, amberjack, spadefish, gray triggerfish, mackerels, small tunas, spottail pinfish, tautog, Atlantic cod, ocean pout, red hake, conger eel, cunner, sea raven, rock gunnel, pollock, white hake
Outer shelf (reefs and clay burrows including “pueblo village community”)			Tilefish, white hake, conger eel

As described in Steimle and Zetlin (2000).

7.3.4 Continental Slope

7.3.4.1 Physical Environment

The continental slope extends from the continental shelf break, at depths between 60 - 200 m, eastward to a depth of 2000 m. The width of the slope varies from 10 - 50 km, with an average gradient of 3 - 6°; however, local gradients can be nearly vertical. The base of the slope is defined by a marked decrease in seafloor gradient where the continental rise begins.

The morphology of the present continental slope appears largely to be a result of sedimentary processes that occurred during the Pleistocene, including, 1) slope upbuilding and progradation by deltaic sedimentation principally during sea-level low stands; 2) canyon cutting by sediment mass movements during and following sea-level low stands; and 3) sediment slumping.

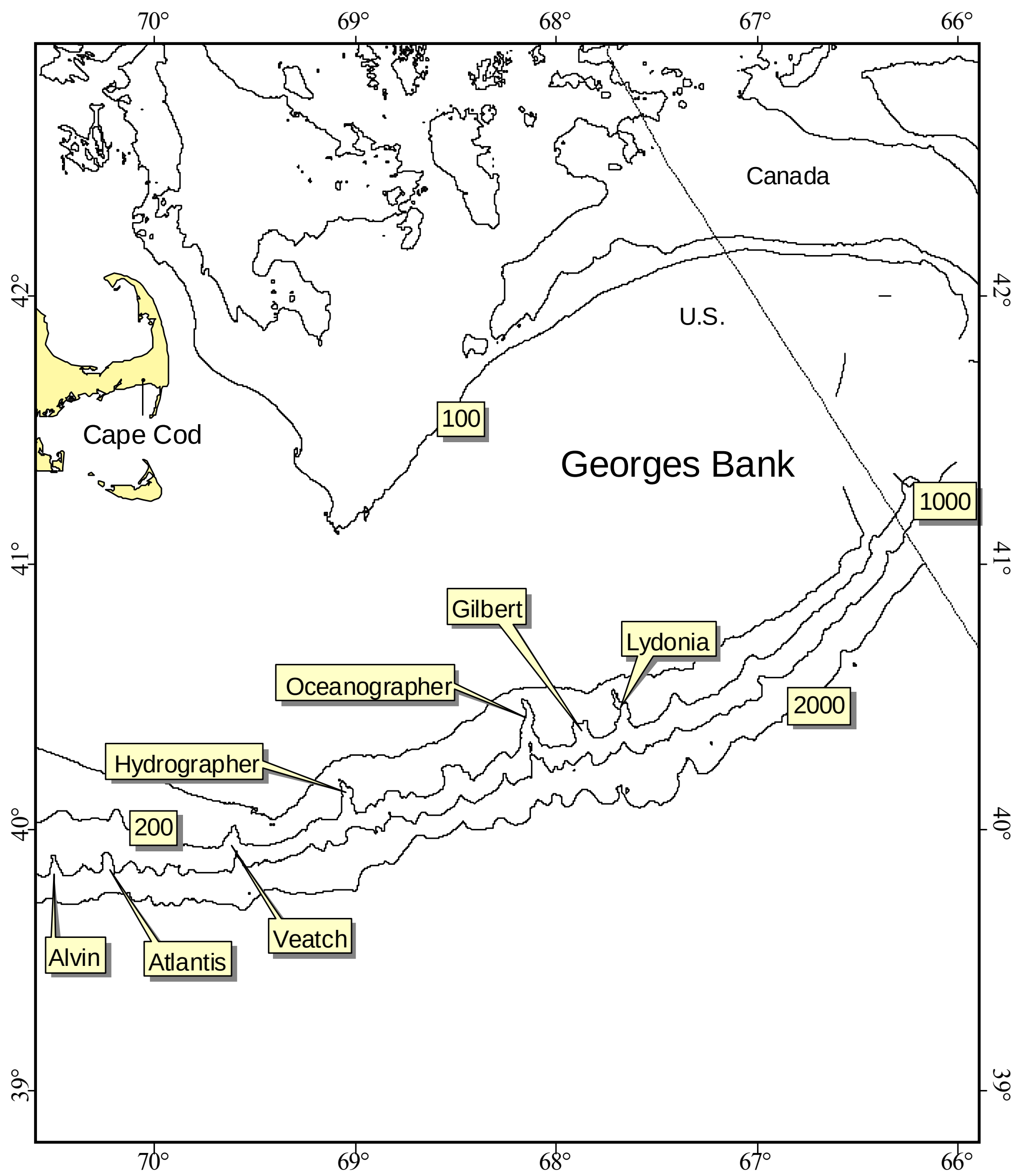
The slope is cut by at least 70 large canyons between Georges Bank and Cape Hatteras (Map 21 and Map 22) and numerous smaller canyons and gullies, many of which may feed into the larger canyon systems. The New England Seamount Chain including Bear, Mytilus, and Balanus Seamounts occurs on the slope southwest of Georges Bank. A smaller chain (Caryn, Knauss, etc.) occurs in the vicinity in deeper water.

A "mud line" occurs on the slope at a depth of 250 - 300 m, below which fine silt and clay-size particles predominate (Map 13). Localized coarse sediments and rock outcrops are found in and near canyon walls, and occasional boulders occur on the slope because of glacial rafting. Sand pockets may also be formed because of downslope movements.

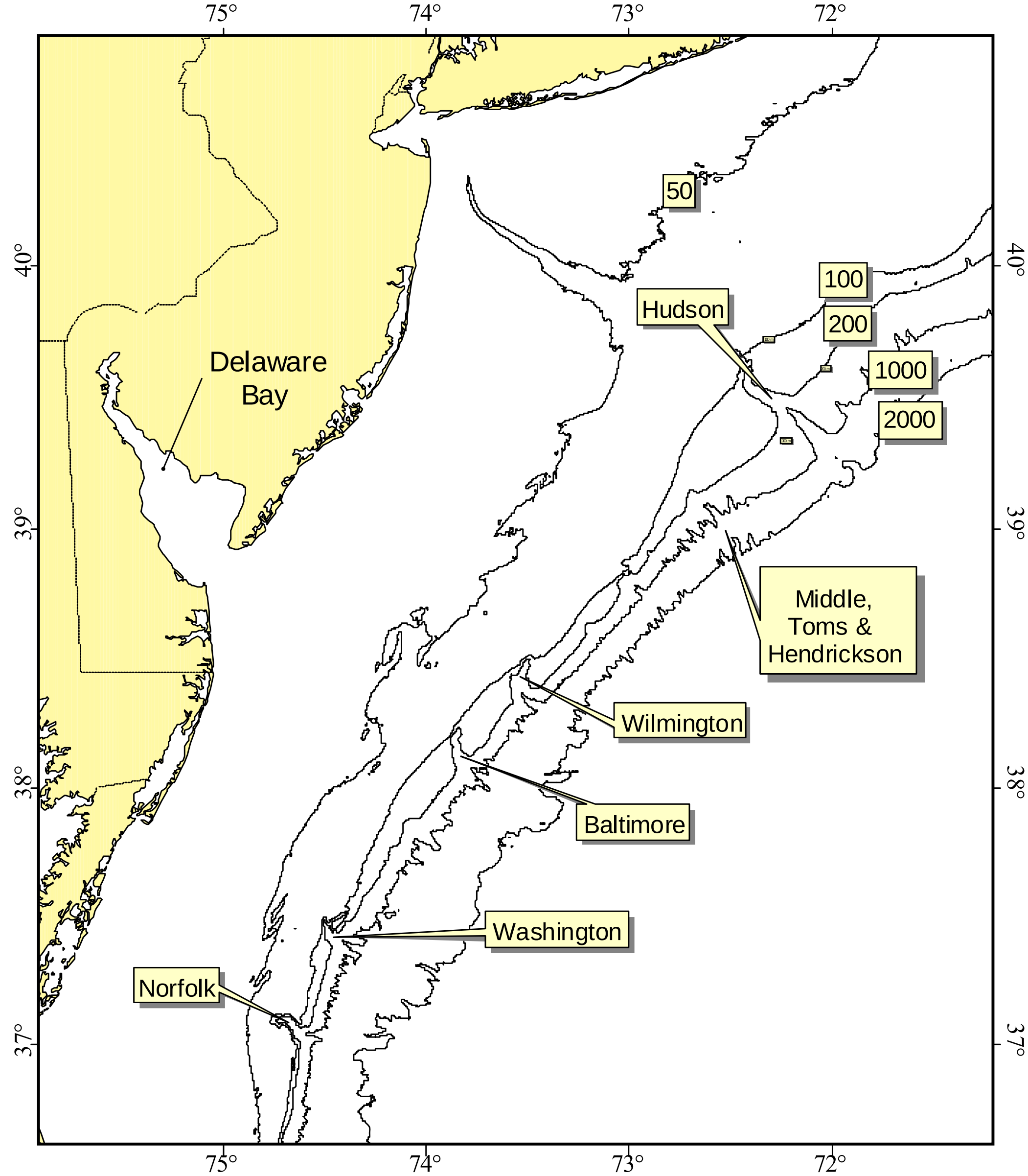
Gravity induced downslope movement is the dominant sedimentary process on the slope, and includes slumps, slides, debris flows, and turbidity currents, in order from thick cohesive movement to relatively nonviscous flow. Slumps may involve localized, short, down-slope movements by blocks of sediment. However, turbidity currents can transport sediments thousands of kilometers.

Submarine canyons are not spaced evenly along the slope, but tend to decrease in areas of increasing slope gradient. Canyons are typically "v" shaped in cross section and often have steep walls and outcroppings of bedrock and clay. The canyons are continuous from the canyon heads to the base of the continental slope. Some canyons end at the base of the slope, but others continue as channels onto the continental rise. Larger and more deeply incised canyons are generally significantly older than smaller ones, and there is evidence that some older canyons have experienced several episodes of filling and re-excavation. Many, if not all, submarine canyons may first form by mass-wasting processes on the continental slope, although there is evidence that some canyons were formed because of fluvial drainage (*e.g.*, Hudson Canyon).

Canyons can alter the physical processes in the surrounding slope waters. Fluctuations in the velocities of the surface and internal tides can be large near the heads of the canyons, leading to enhanced mixing and sediment transport in the area. Shepard *et al.* (1979) concluded that the strong turbidity currents initiated in study canyons were responsible for enough sediment erosion



Map 21. Principal submarine canyons on southern flank of Georges Bank. Depths in meters.



Map 22. Principal submarine canyons in Mid-Atlantic Bight. Depths in meters.

and transport to maintain and modify those canyons. Since surface and internal tides are ubiquitous over the continental shelf and slope, it can be anticipated that these fluctuations are important for sedimentation processes in other canyons as well. In Lydonia Canyon, Butman *et al.* (1982) found that the dominant source of low frequency current variability was related to passage of warm core Gulf Stream rings rather than the atmospheric events that predominate on the shelf.

The water masses of the Atlantic continental slope and rise are essentially the same as those of the North American Basin [defined in Wright and Worthington (1970)]. Worthington (1976) divided the water column of the slope into three vertical layers: deepwater (colder than 4°C), the thermocline (4 - 17°C), and surface water (warmer than 17°C). In the North American Basin, deepwater accounts for two-thirds of all the water, the thermocline for about one-quarter, and surface water the remainder. In the slope water north of Cape Hatteras, the only warm water occurs in the Gulf Stream and in seasonally influenced summer waters.

The principal cold water mass in the region is the North Atlantic Deep Water. North Atlantic Deep Water is comprised of a mixture of five sources: Antarctic Bottom Water, Labrador Sea Water, Mediterranean Water, Denmark Strait Overflow Water, and Iceland-Scotland Overflow Water. The thermocline represents a straightforward water mass compared with either the deepwater or the surface water. Nearly 90% of all thermocline water comes from the water mass called the Western North Atlantic Water. This water mass is slightly less saline northeast of Cape Hatteras due to the influx of southward flowing Labrador Coastal Water. Seasonal variability in slope waters penetrates only the upper 200 m of the water column.

In the winter months, cold temperatures and storm activity create a well mixed layer down to about 100 - 150 m, but summer warming creates a seasonal thermocline overlain by a surface layer of low density water. The seasonal thermocline, in combination with reduced storm activity in the summer, inhibits vertical mixing and reduces the upward transfer of nutrients into the photic zone.

Two currents found on the slope, the Gulf Stream and Western Boundary Undercurrent, together represent one of the strongest low frequency horizontal flow systems in the world. Both currents have an important influence on slope waters. Warm and cold core rings that spin off the Gulf Stream are a persistent and ubiquitous feature of the northwest Atlantic Ocean (see the “Gulf Stream” section). The Western Boundary Undercurrent flows to the southwest along the lower slope and continental rise in a stream about 50 km wide. The boundary current is associated with the spread of North Atlantic Deep Water, and it forms part of the generally westward flow found in slope water. North of Cape Hatteras it crosses under the Gulf Stream in a manner not yet completely understood.

Shelf and slope waters of the northeast region are intermittently affected by the Gulf Stream. The Gulf Stream begins in the Gulf of Mexico and flows northeastward at an approximate rate of 1 m/s (2 knots), transporting warm waters north along the eastern coast of the United States, and then east towards the British Isles. Conditions and flow of the Gulf Stream are highly variable on time scales ranging from days to seasons. Intrusions from the Gulf Stream constitute the principal source of variability in slope waters off the northeastern shelf.

The location of the Gulf Stream’s shoreward, western boundary is variable because of meanders and eddies. Gulf Stream eddies are formed when extended meanders enclose a parcel of seawater and pinch off. These eddies can be cyclonic, meaning they rotate counterclockwise and have a cold core formed by enclosed slope water (cold core ring), or anticyclonic, meaning they rotate clockwise and have a warm core of Sargasso Sea water (warm core ring). The rings are shaped like a funnel, wider at the top and narrower at the bottom, and can have depths of over 2000 m. They range in size from approximately 150 - 230 km in diameter. There are 35% more rings and meanders near Georges Bank than in the Mid-

Atlantic region. A net transfer of water on and off the shelf may result from the interaction of rings and shelf waters. These warm or cold core rings maintain their identity for several months until they are reabsorbed by the Gulf Stream. The rings and the Gulf Stream itself have a great influence over oceanographic conditions all along the continental shelf.

7.3.4.2 Invertebrates

Polychaete annelids represent the most important slope faunal group in terms of numbers of individuals and species (Wiebe *et al.* 1987). Ophiuroids (brittle stars) are considered to be among the most abundant slope organisms, but this group is comprised of relatively few species. The taxonomic group with the highest species diversity is the peracarid crustaceans (which includes amphipods, cumaceans, and isopods). Some species of the slope are widely distributed, while others appear to be restricted to particular ocean basins. The ophiuroids and bivalves appear to have the broadest distributions, while the peracarid crustaceans appear to be highly restricted because they brood their young, and lack a planktonic stage of development. In general, gastropods do not appear to be very abundant; however, past studies are inconclusive since they have not collected enough individuals for large-scale community and population studies.

In general, slope inhabiting benthic organisms are strongly zoned by depth and/or water temperature, although these patterns are modified by the presence of topography, including canyons, channels, and current zonations (Hecker 1990). Moreover, at depths of less than 800 m, the fauna is extremely variable and the relationships between faunal distribution and substrate, depth, and geography are less obvious (Wiebe *et al.* 1987). Fauna occupying hard surface sediments are not as dense as in comparable shallow water habitats (Wiebe *et al.* 1987), but there is an increase in species diversity from the shelf to the intermediate depths of the slope. Diversity then declines again in the deeper waters of the continental rise and plain. Hecker (1990) identified four megafaunal zones on the slope of Georges Bank and southern New England (Table 47).

One group of organisms of interest because of the additional structure they can provide for habitat and their potential long life span are the Alcyonarian soft corals. Soft corals can be bush or treelike in shape; species found in this form attach to hard substrates such as rock outcrops or gravel. These species can range in size from a few millimeters to several meters, and the trunk diameter of large specimens can exceed 10 cm. Other Alcyonarians found in this region include sea pens and sea pansies (Order Pennatulacea), which are found in a wider range of substrate types.

As opposed to most slope environments, canyons may develop a lush epifauna. Hecker *et al.* (1983) found faunal differences between the canyons and slope environments. Hecker and Blechschmidt (1979) suggested that faunal differences were due at least in part to increased environmental heterogeneity in the canyons, including greater substrate variability and nutrient enrichment. Hecker *et al.* (1983) found highly patchy faunal assemblages in the canyons, and also found additional faunal groups located in the canyons, particularly on hard substrates, that do not appear to occur in other slope environments. Canyons are also thought to serve as nursery areas for a number of species (Cooper *et al.* 1987; Hecker 2001). The canyon habitats in Table 48 were classified by Cooper *et al.* (1987).

7.3.4.3 Demersal Fish

Most finfish identified as slope inhabitants on a broad spatial scale (Colvocoresses and Musick 1984; Overholtz and Tyler 1985; Gabriel 1992) (Table 43) are associated with canyon features as well (Cooper *et al.* 1987) (Table 48). Finfish identified by broad studies that were not included in Cooper *et al.* (1987) include offshore hake, fawn cusk-eel, longfin hake, witch flounder, and armored searobin. Canyon species (Cooper *et al.* 1987) that were not discussed in the broad scale studies include squirrel hake, conger eel, and tilefish. Cusk and ocean pout were identified by Cooper *et al.* (1987) as canyon species, but classified in other habitats by the broad scale studies.

Table 47. Faunal zones of the continental slope of Georges Bank and Southern New England.

Zone	Approximate Depth (m)	Gradient	Current	Fauna
Upper Slope	300 - 700	Low	Strong	Dense filter feeders; Scleratinians (*Dasmosmilia lymani, Flabellum alabastrum*), quill worm (*Hyalinoecia*)
Upper Middle Slope	500 - 1300	High	Moderate	Sparse scavengers; red crab (*Geryon quinqueidens*), long-nosed eel (*Synaphobranchus*), common grenadier (*Nezumia*). Alcyonarians (*Acanella arbuscula*, *Eunephthya florida*) in areas of hard substrate
Lower Middle Slope/Transition	1200 - 1700	High	Moderate	Sparse suspension feeders; cerianthids, sea pens (*Distichoptilum gracile*)
Lower Slope	> 1600	Low	Strong	Dense suspension and deposit feeders; ophiurid (*Ophiomusium lymani*), cerianthids, sea pens

From Hecker (1990)

Table 48. Habitat types for the canyons of Georges Bank, including characteristic fauna.

Habitat Type	Geologic Description	Canyon Locations	Most Commonly Observed Fauna
I	Sand or semiconsolidated silt substrate (claylike consistency) with less than 5% overlay of gravel. Relatively featureless except for conical sediment mounds.	Walls and axis	Cerianthid, pandalid shrimp, white colonial anemone, Jonah crab, starfishes, portunid crab, greeneye, brittle stars, mosaic worm, red hake, fourspot flounder, shellless hermit crab, silver hake, gulf stream flounder
II	Sand or semiconsolidated silt substrate (claylike consistency) with more than 5% overlay of gravel. Relatively featureless.	Walls	Cerianthids, galatheid crab, squirrel hake, white colonial anemone, Jonah crab, silver hake, sea stars, ocean pout, brittle stars, shellless hermit crab, greeneye
III	Sand or semiconsolidated silt (claylike consistency) overlain by siltstone outcrops and talus up to boulder size. Featured bottom with erosion by animals and scouring.	Walls	White colonial anemone, pandalid shrimp, cleaner shrimp, rock anemone, white hake, sea stars, ocean pout, conger eel, brittle stars, Jonah crab, lobster, blackbelly rosefish, galatheid crab, mosaic worm, tilefish
IV	Consolidated silt substrate, heavily burrowed/excavated. Slope generally more than 5º and less than 50º. Termed "pueblo village" habitat.	Walls	Sea stars, blackbelly rosefish, Jonah crab, lobster, white hake, cusk, ocean pout, cleaner shrimp, conger eel, tilefish, galatheid crab, shellless hermit crab
V	Sand dune substrate.	Axis	Sea stars, white hake, Jonah crab, goosefish

From Cooper *et al.* (1987).
Faunal characterization is for depths < 230 m only.

7.4 Essential Fish Habitat

The environment that could potentially be affected by the proposed action has been identified as EFH for benthic life stages of species that are managed under the NE Multispecies; Atlantic Sea Scallop; Monkfish; Deep-Sea Red Crab; Northeast Skate Complex; Atlantic Herring; Summer Flounder, Scup, and Black Sea Bass; Tilefish; Squid, Atlantic Mackerel, and Butterfish; Atlantic Surfclam and Ocean Quahog Fishery Management Plans. EFH for the species managed under these FMPs includes a wide variety of benthic habitats in state and federal waters throughout the Northeast U.S. Shelf Ecosystem. EFH descriptions of the geographic range, depth, and bottom types for all the benthic life stages of the species managed under these FMPs are summarized in the following table.

Table 49. EFH descriptions for all benthic life stages of federally-managed species in the U.S. Northeast Shelf Ecosystem. Species with EFH vulnerable to bottom tending gear are shaded (see Stevenson et al. 2004).

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
American plaice	juvenile	GOME and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass. Bay to Cape Cod Bay, MA	45 - 150	Bottom habitats with fine grained sediments or a substrate of sand or gravel
American plaice	adult	GOME and estuaries from Passamaquoddy Bay to Saco Bay, ME and from Mass. Bay to Cape Cod Bay, MA	45 - 175	Bottom habitats with fine grained sediments or a substrate of sand or gravel
Atlantic cod	juvenile	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	25 - 75	Bottom habitats with a substrate of cobble or gravel
Atlantic cod	adult	GOME, GB, eastern portion of continental shelf off southern NE and following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, Boston Harbor, Cape Cod Bay, Buzzards Bay	10 - 150	Bottom habitats with a substrate of rocks, pebbles, or gravel
Atlantic halibut	juvenile	GOME, GB	20 - 60	Bottom habitats with a substrate of sand, gravel, or clay
Atlantic halibut	adult	GOME, GB	100 - 700	Bottom habitats with a substrate of sand, gravel, or clay
Atlantic herring	eggs	GOME, GB and following estuaries: Englishman/Machias Bay, Casco Bay, and Cape Cod Bay	20 – 80	Bottom habitats attached to gravel, sand, cobble or shell fragments, also on macrophytes
Atlantic sea scallop	juvenile	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Great Bay, Mass Bay, and Cape Cod Bay	18 - 110	Bottom habitats with a substrate of cobble, shells, and silt

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
Atlantic sea scallop	adult	GOME, GB, southern NE and middle Atlantic south to Virginia-North Carolina border and following estuaries: Passamaquoddy Bay to Sheepscot R.; Casco Bay, Great Bay, Mass Bay, and Cape Cod Bay	18 - 110	Bottom habitats with a substrate of cobble, shells, coarse/gravelly sand, and sand
Haddock	juvenile	GB, GOME, middle Atlantic south to Delaware Bay	35 - 100	Bottom habitats with a substrate of pebble and gravel
Haddock	adult	GB and eastern side of Nantucket Shoals, throughout GOME, *additional area of Nantucket Shoals, and Great South Channel	40 - 150	Bottom habitats with a substrate of broken ground, pebbles, smooth hard sand, and smooth areas between rocky patches
Monkfish	juvenile	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, all areas of GOME	25 - 200	Bottom habitats with substrates of a sandshell mix, algae covered rocks, hard sand, pebbly gravel, or mud
Monkfish	adult	Outer continental shelf in the middle Atlantic, mid-shelf off southern NE, outer perimeter of GB, all areas of GOME	25 - 200	Bottom habitats with substrates of a sandshell mix, algae covered rocks, hard sand, pebbly gravel, or mud
Ocean pout	eggs	GOME, GB, southern NE, and middle Atlantic south to Delaware Bay, and the following estuaries: Passamaquoddy Bay to Saco Bay, Massachusetts and Cape Cod Bay	<50	Bottom habitats, generally in hard bottom sheltered nests, holes, or crevices
Ocean pout	juvenile	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, and Cape Cod Bay	< 50	Bottom habitats in close proximity to hard bottom nesting areas
Ocean pout	adult	GOME, GB, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Saco Bay; Mass. Bay, Boston Harbor, and Cape Cod Bay	< 80	Bottom habitats, often smooth bottom near rocks or algae
Offshore hake	juvenile	Outer continental shelf of GB and southern NE south to Cape Hatteras, NC	170 - 350	Bottom habitats
Offshore hake	adult	Outer continental shelf of GB and southern NE south to Cape Hatteras, NC	150 - 380	Bottom habitats
Pollock	juvenile	GOME, GB, and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay to Waquoit Bay; Long Island Sound, Great South Bay	0 – 250	Bottom habitats with aquatic vegetation or a substrate of sand, mud, or rocks

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
Pollock	adult	GOME, GB, southern NE, and middle Atlantic south to New Jersey and the following estuaries: Passamaquoddy Bay, Damariscotta R., Mass Bay, Cape Cod Bay, Long Island Sound	15 – 365	Hard bottom habitats including artificial reefs
Red hake	juvenile	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay, Mass. Bay to Cape Cod Bay; Buzzards Bay to Conn. R.; Hudson R./ Raritan Bay, and Chesapeake Bay	< 100	Bottom habitats with substrate of shell fragments, including areas with an abundance of live scallops
Red hake	adult	GOME, GB, continental shelf off southern NE, and middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Saco Bay; Great Bay, Mass. Bay to Cape Cod Bay; Buzzards Bay to Conn. R.; Hudson R./ Raritan Bay, Delaware Bay, and Chesapeake Bay	10 - 130	Bottom habitats in depressions with a substrate of sand and mud
Redfish	juvenile	GOME, southern edge of GB	25 - 400	Bottom habitats with a substrate of silt, mud, or hard bottom
Redfish	adult	GOME, southern edge of GB	50 - 350	Bottom habitats with a substrate of silt, mud, or hard bottom
White hake	adult	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Passamaquoddy Bay to Great Bay; Mass. Bay to Cape Cod Bay	5 - 325	Bottom habitats with substrate of mud or fine grained sand
Silver hake	juvenile	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, Mass. Bay to Cape Cod Bay	20 – 270	Bottom habitats of all substrate types
Silver hake	adult	GOME, GB, continental shelf off southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Casco Bay, Mass. Bay to Cape Cod Bay	30 – 325	Bottom habitats of all substrate types
Windowpane flounder	juvenile	GOME, GB, southern NE, middle Atlantic south to Cape Hatteras and the following estuaries: Passamaquoddy Bay to Great Bay; Mass. Bay to Chesapeake Bay	1 - 100	Bottom habitats with substrate of mud or fine grained sand

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
Windowpane flounder	adult	GOME, GB, southern NE, middle Atlantic south to Virginia - NC border and the following estuaries: Passamaquoddy Bay to Great Bay; Mass. Bay to Chesapeake Bay	1 - 75	Bottom habitats with substrate of mud or fine grained sand
Winter flounder	eggs	GB, inshore areas of GOME, southern NE, and middle Atlantic south to Delaware Bay	<5	Bottom habitats with a substrate of sand, muddy sand, mud, and gravel
Winter flounder	juvenile	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	0.1 – 10 (1 - 50, age 1+)	Bottom habitats with a substrate of mud or fine grained sand
Winter flounder	adult	GB, inshore areas of GOME, southern NE, middle Atlantic south to Delaware Bay and the following estuaries: Passamaquoddy Bay to Chincoteague Bay	1 - 100	Bottom habitats including estuaries with substrates of mud, sand, grave
Witch flounder	juvenile	GOME, outer continental shelf from GB south to Cape Hatteras	50 - 450 to 1500	Bottom habitats with fine grained substrate
Witch flounder	adult	GOME, outer continental shelf from GB south to Chesapeake Bay	25 - 300	Bottom habitats with fine grained substrate
Yellowtail flounder	juvenile	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Sheepscot R., Casco Bay, Mass. Bay to Cape Cod Bay	20 - 50	Bottom habitats with substrate of sand or sand and mud
Yellowtail flounder	adult	GB, GOME, southern NE continental shelf south to Delaware Bay and the following estuaries: Sheepscot R., Casco Bay, Mass. Bay to Cape Cod Bay	20 - 50	Bottom habitats with substrate of sand or sand and mud
Red crab	juvenile	Southern flank of GB and south the Cape Hatteras, NC	700 - 1800	Bottom habitats of continental slope with a substrate of silts, clays, and all silt-clay-sand composites
Red crab	adult	Southern flank of GB and south the Cape Hatteras, NC	200 - 1300	Bottom habitats of continental slope with a substrate of silts, clays, and all silt-clay-sand composites
Black sea bass	juvenile	Demersal waters over continental shelf from GOME to Cape Hatteras, NC, also includes estuaries from Buzzards Bay to Long Island Sound; Gardiners Bay, Barnegat Bay to Chesapeake Bay; Tangier/ Pocomoke Sound, and James River	1 - 38	Rough bottom, shellfish and eelgrass beds, manmade structures in sandy-shelly areas, offshore clam beds, and shell patches may be used during wintering

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
Black sea bass	adult	Demersal waters over continental shelf from GOME to Cape Hatteras, NC, also includes estuaries: Buzzards Bay, Narragansett Bay, Gardiners Bay, Great South Bay, Barnegat Bay to Chesapeake Bay; Tangier/ Pocomoke Sound, and James River	20 - 50	Structured habitats (natural and manmade), sand and shell substrates preferred
Ocean quahog	juvenile	Eastern edge of GB and GOME throughout the Atlantic EEZ	8 - 245	Throughout substrate to a depth of 3 ft within federal waters, occurs progressively further offshore between Cape Cod and Cape Hatteras
Ocean quahog	adult	Eastern edge of GB and GOME throughout the Atlantic EEZ	8 - 245	Throughout substrate to a depth of 3 ft within federal waters, occurs progressively further offshore between Cape Cod and Cape Hatteras
Atlantic surfclam	juvenile	Eastern edge of GB and the GOME throughout Atlantic EEZ	0 - 60, low density beyond 38	Throughout substrate to a depth of 3 ft within federal waters, burrow in medium to coarse sand and gravel substrates, also found in silty to fine sand, but not in mud
Atlantic surfclam	adult	Eastern edge of GB and the GOME throughout Atlantic EEZ	0 - 60, low density beyond 38	Throughout substrate to a depth of 3 ft within federal waters
Scup	juvenile	Continental shelf from GOME to Cape Hatteras, NC includes the following estuaries: Mass. Bay, Cape Cod Bay to Long Island Sound; Gardiners Bay to Delaware Inland Bays; and Chesapeake Bay	(0 - 38)	Demersal waters north of Cape Hatteras and inshore on various sands, mud, mussel, and eelgrass bed type substrates
Scup	adult	Continental shelf from GOME to Cape Hatteras, NC includes the following estuaries: Cape Cod Bay to Long Island Sound; Gardiners Bay to Hudson R./ Raritan Bay; Delaware Bay and Inland Bays; and Chesapeake Bay	(2 -185)	Demersal waters north of Cape Hatteras and inshore estuaries (various substrate types)
Summer flounder	juvenile	Over continental shelf from GOME to Cape Hatteras, NC; south of Cape Hatteras to Florida; also includes estuaries from Waquoit Bay to James R.; Albemarle Sound to Indian R.	0.5 – 5 in estuary	Demersal waters, on muddy substrate but prefer mostly sand; found in the lower estuaries in flats, channels, salt marsh creeks, and eelgrass beds

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
Summer flounder	adult	Over continental shelf from GOME to Cape Hatteras, NC; south of Cape Hatteras to Florida; also includes estuaries from Buzzards Bay, Narragansett Bay, Conn. R. to James R.; Albemarle Sound to Broad R.; St. Johns R., and Indian R.	0 - 25	Demersal waters and estuaries
Tilefish	juvenile	US/Canadian boundary to VA/NC boundary (shelf break, submarine canyon walls, and flanks: GB to Cape Hatteras)	76 - 365	Rough bottom, small burrows, and sheltered areas; substrate rocky, stiff clay, human debris
Tilefish	adult	US/Canadian boundary to VA/NC boundary (shelf break, submarine canyon walls, and flanks: GB to Cape Hatteras)	76 - 365	Rough bottom, small burrows, and sheltered areas; substrate rocky, stiff clay, human debris
Longfin squid	eggs	GB, southern NE and middle Atlantic to mouth of Chesapeake Bay	<50	Egg masses attached to rocks, boulders and vegetation on sand or mud bottom
Golden crab	juvenile	Chesapeake Bay to the south through the Florida Straight (and into the Gulf of Mexico)	290 - 570	Continental slope in flat areas of foraminifera ooze, on distinct mounds of dead coral, ripple habitat, dunes, black pebble habitat, low outcrop, and soft bioturbated habitat
Golden crab	adult	Chesapeake Bay to the south through the Florida Straight (and into the Gulf of Mexico)	290 - 570	Continental slope in flat areas of foraminifera ooze, on distinct mounds of dead coral, ripple habitat, dunes, black pebble habitat, low outcrop, and soft bioturbated habitat
Barndoor skate	juvenile	Eastern GOME, GB, Southern NE, Mid-Atlantic Bight to Hudson Canyon	l0 - 750, mostly < 150	Bottom habitats with mud, gravel, and sand substrates
Barndoor skate	adult	Eastern GOME, GB, Southern NE, Mid-Atlantic Bight to Hudson Canyon	l0 - 750, mostly < 150	Bottom habitats with mud, gravel, and sand substrates
Clearnose skate	juvenile	GOME, along shelf to Cape Hatteras, NC; includes the estuaries from Hudson River/Raritan Bay south to the Chesapeake Bay mainstem	0 – 500, mostly < 111	Bottom habitats with substrate of soft bottom along continental shelf and rocky or gravelly bottom
Clearnose skate	adult	GOME, along shelf to Cape Hatteras, NC; includes the estuaries from Hudson River/Raritan Bay south to the Chesapeake Bay mainstem	0 – 500, mostly < 111	Bottom habitats with substrate of soft bottom along continental shelf and rocky or gravelly bottom

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
Little skate	juvenile	GB through Mid-Atlantic Bight to Cape Hatteras, NC; includes the estuaries from Buzzards Bay south to the Chesapeake Bay mainstem	0 - 137, mostly 73 - 91	Bottom habitats with sandy or gravelly substrate or mud
Little skate	adult	GB through Mid-Atlantic Bight to Cape Hatteras, NC; includes the estuaries from Buzzards Bay south to the Chesapeake Bay mainstem	0 - 137, mostly 73 - 91	Bottom habitats with sandy or gravelly substrate or mud
Rosette skate	juvenile	Nantucket shoals and southern edge of GB to Cape Hatteras, NC	33 - 530, mostly 74 - 274	Bottom habitats with soft substrate, including sand/mud bottoms, mud with echinoid and ophiuroid fragments, and shell and pteropod ooze
Rosette skate	adult	Nantucket shoals and southern edge of GB to Cape Hatteras, NC	33 - 530, mostly 74 - 274	Bottom habitats with soft substrate, including sand/mud bottoms, mud with echinoid and ophiuroid fragments, and shell and pteropod ooze
Smooth skate	juvenile	Offshore banks of GOME	31 – 874, mostly 110 - 457	Bottom habitats with a substrate of soft mud (silt and clay), sand, broken shells, gravel and pebbles
Smooth skate	adult	Offshore banks of GOME	31 – 874, mostly 110 - 457	Bottom habitats with a substrate of soft mud (silt and clay), sand, broken shells, gravel and pebbles
Thorny skate	juvenile	GOME and GB	18 - 2000, mostly 111 - 366	Bottom habitats with a substrate of sand, gravel, broken shell, pebbles, and soft mud
Thorny skate	adult	GOME and GB	18 - 2000, mostly 111 - 366	Bottom habitats with a substrate of sand, gravel, broken shell, pebbles, and soft mud
Winter skate	juvenile	Cape Cod Bay, GB, southern NE shelf through Mid-Atlantic Bight to North Carolina; includes the estuaries from Buzzards Bay south to the Chesapeake Bay mainstem	0 - 371, mostly < 111	Bottom habitats with substrate of sand and gravel or mud
Winter skate	adult	Cape Cod Bay, GB southern NE shelf through Mid-Atlantic Bight to North Carolina; includes the estuaries from Buzzards Bay south to the Chesapeake Bay mainstem	0 - 371, mostly < 111	Bottom habitats with substrate of sand and gravel or mud

Species	Life Stage	Geographic Area of EFH	Depth (meters)	EFH Description
White hake	juvenile	GOME, southern edge of GB, southern NE to middle Atlantic and the following estuaries: Passamaquoddy Bay to Great Bay; Mass. Bay to Cape Cod Bay	5 - 225	Pelagic stage - pelagic waters; demersal stage - bottom habitat with seagrass beds or substrate of mud or fine grained sand

7.4.1 Habitat Effects of Fishing

Amendment 13 (NEFMC 2003) describes the general effects of bottom trawls and dredges on benthic marine habitats. The primary source document used for this analysis was an advisory report prepared for the International Council for the Exploration of the Seas (ICES 2000) that identified a number of possible effects of beam trawls and bottom otter trawls on benthic habitats. This report is based on scientific findings summarized in Lindeboom and de Groot (1998), which were peer-reviewed by an ICES working group. The focus of the report is the Irish Sea and North Sea, but it also includes assessments of effects in other areas. Two general conclusions were: 1) low-energy environments are more affected by bottom trawling; and 2) bottom trawling can affect the potential for habitat recovery (*i.e.*, after trawling ceases, benthic communities and habitats may not always return to their original pre-impacted state). Regarding direct habitat effects, the report also concluded that:

- Loss or dispersal of physical features such as peat banks or boulder reefs (<u>changes are always permanent</u> and lead to an overall change in habitat diversity, which can in turn lead to the local loss of species and species assemblages dependant on such features);

- Loss of structure-forming organisms such as bryozoans, tube-dwelling polychaetes, hydroids, seapens, sponges, mussel beds, and oyster beds (<u>changes may be permanent</u> and can lead to an overall change in habitat diversity which can in turn lead to the local loss of species and species assemblages dependant on such biogenic features);

- Reduction in complexity caused by redistributing and mixing of surface sediments and the degradation of habitat and biogenic features, leading to a decease in the physical patchiness of the sea floor (<u>changes are not likely to be permanent</u>);

- Alteration of the detailed physical features of the sea floor by reshaping seabed features such as sand ripples and damaging burrows and associated structures which provide important habitats for smaller animals and can be used by fish to reduce their energy requirements (<u>changes are not likely to be permanent</u>).

A more recent evaluation of the habitat effects of trawling and dredging was prepared by the Committee on Ecosystem Effects of Fishing for the National Research Council's Ocean Studies Board (NRC 2002). Trawl gear evaluated by the Committee included bottom otter trawls and beam trawls. Dredge gear included hydraulic clam dredges, non-hydraulic oyster, conch, and crab dredges, and scallop dredges with and without teeth. This report identified four general conclusions regarding the types of habitat modifications caused by trawls and dredges.

- Trawling and dredging reduce habitat complexity
- Repeated trawling and dredging result in discernable changes in benthic communities
- Bottom trawling reduces the productivity of benthic habitats
- Fauna that live in low natural disturbance regimes are generally more vulnerable to fishing gear disturbance

An additional source of information that relates specifically to the Northeast region is the report of a "Workshop on the Effects of Fishing Gear on Marine Habitats off the Northeastern U.S." sponsored by the New England and Mid-Atlantic Fishery Management Councils in October 2001 (NEFSC 2002). A panel of invited fishing industry members and experts in the fields of benthic ecology, fishery ecology, geology, and fishing gear technology was convened for the purpose of assisting the New England Fishery Management Council (NEFMC), the Mid-Atlantic Fishery Management Council (MAFMC) and NMFS with: 1) evaluating the existing scientific research on the effects of fishing gear on benthic habitats; 2) determining the degree of impact from various gear types on benthic habitats in the Northeast; 3) specifying the type of evidence that is available to support the conclusions made about the degree of impact.; 4) ranking the relative importance of gear impacts on various habitat types; and 5) providing recommendations on measures to minimize those adverse impacts. The panel was provided with a summary of available research studies that summarized information relating to the effects of bottom otter trawls, New Bedford style scallop dredges, and hydraulic clam dredges. Relying on this information plus professional judgment, the panel identified the effects, and the degree of impact, of these three gears plus bottom gillnets, pots, and longlines on mud, sand, and gravel/rock bottom habitats.

Additional information is provided in this report on the recovery times for each type of impact for all three gears in mud, sand, and gravel habitats ("gravel" includes other hard-bottom habitats). This information made it possible to rank these three substrates in terms of their vulnerability to the effects of bottom trawling and dredging, although other factors such as frequency of disturbance from fishing and from natural events are also important. In general, impacts were determined to be greater in gravel/rock habitats with attached epifauna. Impacts on biological structure were ranked higher than impacts on physical structure and otter trawls and scallop dredges were ranked much higher than hydraulic dredges or stationary gears. Effects of trawls on major physical features in mud (deep-water clay-bottom habitats) and gravel bottom were described as permanent, and impacts to biological and physical structure were given recovery times of months to years in mud and gravel. Impacts of trawling on physical structure in sand were of shorter duration (days to months) given the exposure of most continental shelf sand habitats to strong bottom currents and/or frequent storms. For scallop dredges in gravel, recovery from impacts to biological structure was estimated to take several years and, for impacts to physical structure, months to years. In sand, biological structure was estimated to recover within months to years and physical structure within days to months.

The contents of a second expert panel report, produced by the Pew Charitable Trusts and entitled "Shifting Gears: Addressing the Collateral Impacts of Fishing Methods in U.S. Waters" (Morgan and Chuenpagdee 2003), was also summarized in Amendment 13. This group evaluated the habitat effects of ten different commercial fishing gears used in U.S. waters. The report concluded that bottom trawls and dredges have very high habitat impacts, bottom gillnets and pots and traps have low to medium impacts, and bottom longlines have low impacts. As in the ICES and NRC reports, individual types of trawls and dredges were not evaluated. The impacts of bottom gill nets, traps, and longlines were limited to warm or shallow-water environments with rooted aquatic vegetation or "live bottom" environments (*e.g.*, coral reefs).

Results of a review of 44 gear effect studies published through the summer of 2002 that were relevant (same gears and habitats) to the NE region of the U.S. (see Stevenson et al. 2004) are also summarized in Amendment 13. Based on these studies, positive and negative effects of bottom otter trawls, New Bedford-style scallop dredges, and hydraulic clam dredges are summarized by substrate type in Amendment 13, along with recovery times (when known). Whenever possible, only statistically significant results were reported. In general, these studies confirm the previous determinations of potential adverse impacts of trawls and dredges found in the ICES (2000), NRC (2002), NEFSC (2002), and Morgan and Chuenpagdee (2003) reports. The results of these 44 studies are summarized below for each gear/habitat type combination. Studies of the effects of multiple gear types are not included. Physical and biological effects for each gear-substrate category are summarized in separate paragraphs. When necessary, biological effects are summarized separately for single disturbance and repeated disturbance experimental studies, and for non-experimental studies. For more detailed information, including the identification of each study, see Stevenson et al. (2004). An up-dated summary of gear effects research studies that are relevant to the NE region will be included in the revised gear effects section of the NEFMC Omnibus EFH Amendment 2 (Phase 2), which is currently being developed.

7.4.2 Otter Trawls – Mud

Results of 11 studies are summarized, five done in North America, four in Europe, and one in Australia. One was performed in an inter-tidal habitat, one in very deep water (250 m), and the rest in a depth range of 14-90 meters. Seven of them were experimental studies, three were observational, and one was both. Two examined physical effects, six of them assessed biological effects, and three studies examined physical and biological effects. One study evaluated geochemical sediment effects. In this habitat type, biological evaluations focused on infauna: all nine biological assessments examined infaunal organisms and four of them also included epifauna. Habitat recovery was monitored on five occasions. Two studies evaluated the long-term effects of commercial trawling, one by comparing benthic samples from a fishing ground with samples collected near a shipwreck, while another evaluated changes in macrofaunal abundance during periods of low, moderate, and high fishing effort during a 27-year time period. Four of the experimental studies were done in closed or previously un-trawled areas and three in commercially fished areas. One study examined the effects of a single tow and six involved multiple tows, five restricted trawling to a single event (*e.g.*, one day) and two examined the cumulative effects of continuous disturbance.

7.4.2.1 Physical Effects

Trawl doors produce furrows up to 10 cm deep and berms 10-20 cm high on mud bottom. Evidence from four studies indicates that there is a large variation in the duration of these features (2-18 months). There is also evidence that repeated tows increase bottom roughness, fine surface sediments are re-suspended and dispersed, and rollers compress sediment. A single pass of a trawl did not cause sediments to be turned over, but single and multiple tows smoothed surface features.

7.4.2.2 Biological Effects

Single disturbance experimental studies
Two single-event studies were conducted in commercially trawled areas. Experimental trawling in intertidal mud habitat in the Bay of Fundy (Canada) disrupted diatom mats and reduced the abundance of nematodes in trawl door furrows, but recovery was complete after 1-3 months. There were no effects on infaunal polychaetes. In a sub-tidal mud habitat (30-40 m deep), benthic infauna were not affected. In two assessments performed in areas that had not been affected by mobile bottom gear for many years, effects were more severe. In both cases, total infaunal abundance and the abundance of individual polychaete and bivalve species declined immediately after trawling. In one of these studies, there were also immediate and significant reductions in the number of species and species diversity. Positive effects included reduced porosity, increased food value, and increased chlorophyll production in surface sediments. Most of these effects lasted less than 3.5 months. In the other, two tows removed 28% of the epifauna on mud and sand substrate and epifauna in all trawled quadrats showed signs of damage. These results were not reported separately for mud bottom.

Repeated disturbance experimental studies
Two studies of the effects of repeated trawling were conducted in areas that had been closed to fishing for six years and >25 years. In one, multiple tows were made weekly for a year and, in the other, monthly for 16 months. In one case, 61% of the benthic species sampled tended to be negatively affected, but significant reductions were only noted for brittlestars. In the other, repeated trawling had no significant effect on the numbers of infaunal individuals or biomass. In this study, the number of infaunal species increased by the end of the disturbance period. Some species (*e.g.*, polychaetes) increased in abundance, while others (*e.g.*, bivalves) decreased. Community structure was altered after five months of trawling and did not fully recover until 18 months after trawling ended.

Observational studies
An analysis of benthic sample data collected from a fishing ground over a 27-year period of high, medium, and low levels of fishing effort showed an increased abundance of organisms belonging to taxa that were expected to increase at higher disturbance levels, whereas those that were expected to decrease did not change in abundance. Results of another study indicated that a trawling ground had fewer benthic organisms and fewer species than an un-exploited site near a shipwreck. Trawling in deep water apparently dislodged infaunal polychaetes, causing them to be suspended in near-bottom water.

7.4.3 Otter Trawls – Sand

Results of 14 studies are summarized. Six studies were conducted in North America (three in a single long-term experiment on the Grand Banks), four in Australia, and four in Europe. Ten are experimental studies. Eight of them were done in depths less than 60 m, one at 80 m, and four in depths greater than 100 m. Three studies examined the physical effects of trawling, ten were limited to biological effects, and one examined both. Five of the biological studies were restricted to epifauna, one only examined infauna, and five included epifauna and infauna. The only experiment that was designed to monitor recovery was the one on the Grand Banks, although surveys conducted in Australia documented changes in the abundance of benthic organisms five years after closed areas were established. Two studies compared benthic communities in trawled areas of sandy substrate with undisturbed areas near a shipwreck. Six studies were performed in commercially exploited areas, five in closed areas, two compared closed and open areas, and one was done in a test tank. All the experimental studies examined the effects of multiple tows (up to 6 per unit area of bottom) and observational studies in Australia assessed the effects of 1-4 tows on emergent epifauna. Trawling in four studies was limited to a single event (1 day to 1 week), whereas the Grand Banks experiment was designed to evaluate the immediate and cumulative effects of annual 5-day trawling events in a closed area over a three-year period.

7.4.3.1 Physical effects

A test tank experiment showed that trawl doors produce furrows in sandy bottom that are 2 cm deep, with a berm 5.5 cm high. In sandy substrate, trawls smoothed seafloor topographic features, re-suspended and dispersed finer surface sediment, but had no lasting effects on sediment composition. Trawl door tracks lasted up to one year in deep water, but only for a few days in shallow water. Seafloor topography recovered within a year.

7.4.3.2 Biological effects

Single disturbance experimental studies

Two single-event studies were conducted in commercially trawled areas. In one of these studies, otter trawling caused high mortalities of large sedentary and/or immobile epifaunal species. In the other, there were no effects on benthic community diversity. Neither of these studies investigated effects on total abundance or biomass. Two studies were performed in un-exploited areas. One study documented effects on attached epifauna. In one, single tows reduced the density of attached macrobenthos (>20 cm) by 15% and four tows by 50%. In the other, two tows removed 28% of the epifauna on mud and sand substrate and epifauna in all trawled quadrats showed signs of damage. These results were not reported separately for sand bottom. Total infaunal abundance was not affected, but the abundance of one family of polychaetes was reduced.

Repeated disturbance experimental studies

Intensive experimental trawling on the Grand Banks reduced the total abundance and biomass of epibenthic organisms and the biomass and average size of a number of epibenthic species. Significant reductions in total infaunal abundance and the abundance of 15 taxa (mostly polychaetes) were detected during only one of three years, and there were no effects on biomass or taxonomic diversity.

Observational studies

Changes in macrofaunal abundance in a lightly trawled location in the North Sea were not correlated with historical changes in fishing effort, but there were fewer benthic organisms and species in a trawling ground in the Irish Sea than in an un-exploited site near a shipwreck. In the other "shipwreck study," however, changes in infaunal community structure at increasing distances from the wreck were related to changes in sediment grain size and organic carbon content. The Alaska study showed that epifauna attached to sand were less abundant inside a closed area, significantly so for sponges and anemones. A single tow in a closed area in Australia removed 89% of the large sponges in the trawl path.

7.4.4 Otter Trawls – Gravel/Rocky Substrate

Three studies of otter trawl effects were conducted on gravel and rocky substrates. All three were conducted in North America. Two were done in glacially-affected areas in depths of about 100 to 300 meters using submersibles and the third was done in a shallow coastal area in the southeast U.S. One involved observations made in a gravel/boulder habitat in two different years before and after trawling affected the bottom. The other two were experimental studies of the effects of single trawl tows. One of these was done in a relatively un-exploited gravel habitat and the other on a smooth rock substrate in an area not affected by trawling. Two studies examined effects to the seafloor and on attached epifauna and one only examined effects on epifauna. There were no assessments of effects on infauna. Recovery was evaluated in one case for a year.

7.4.4.1 Physical effects

Trawling displaced boulders and removed mud covering boulders and rocks and rubber tire ground gear left furrows 1-8 cm deep in less compact gravel sediment.

7.4.4.2 Biological effects

Trawling in gravel and rocky substrate reduced the abundance of attached benthic organisms (*e.g.*, sponges, anemones, and soft corals) and their associated epifauna and damaged sponges, soft corals, and brittle stars. Sponges were more severely damaged by a single pass of a trawl than soft corals, but 12 months after trawling all affected species – including one species of stony coral – had fully recovered to their original abundance and there were no signs of damage.

7.4.5 Otter Trawls – Mixed Substrates

Three studies of the effects of otter trawls on mixed substrates are summarized. All three were conducted in North America and relied on sonar and observations made by divers or from a submersible. One of them combined submersible observations and benthic sampling to compare the physical and biological effects of trawling in a lightly fished and heavily fished location in California with the same depth and variety of sediment types. One was a survey of seafloor features produced by trawls in a variety of bottom types and the other primarily examined the physical effects of single trawl tows on sand and mud bottom.

7.4.5.1 Physical effects

Trawl doors left tracks in sediments that ranged from less than 5 cm deep in sand to 15 cm deep in mud. In mud, fainter marks were also made between the door tracks, presumably by the footgear. A heavily trawled area had fewer rocks, shell fragments, and biogenic mounds than a lightly trawled area.

7.4.5.2 Biological effects

The heavily trawled area in California had lower densities of large epifaunal species (*e.g.*, sea slugs, sea pens, starfish, and anemones) and higher densities of brittle stars and infaunal nematodes, oligochaetes, and one species of polychaete. There were no differences in the abundance of molluscs, crustaceans, or nemerteans between the two areas. However, since this was not a controlled experiment, these differences could not be attributed to trawling. Single trawl tows in Long Island Sound attracted predators and suspended epibenthic organisms into the water column.

7.4.6 New Bedford Scallop Dredges – Sand

Three studies of the effects of New Bedford scallop dredges on sand substrate were conducted, one in an estuary on the Maine coast and two on offshore banks in the Gulf of Maine. Two of them were observational in nature, but did not include any direct observations of dredge effects. The other one was a controlled experiment conducted in an unexploited area in which a single dredge was towed repeatedly over the same area of bottom during a single day. One study examined physical effects and two examined physical and biological effects. One of them included an analysis of geochemical effects to disturbed silty-sand sediments.

7.4.6.1 Physical effects

Dredging disturbed physical and biogenic benthic features (sand ripples and waves, shell deposits, and amphipod tube mats, caused the loss of fine surficial sediment, and reduced the food quality of the remaining sediment. Sediment composition was still altered six months after dredging, but the food quality of the sediment had recovered by then.

7.4.6.2 Biological effects

There were significant reductions in the total number of infaunal individuals in the estuarine location immediately after dredging and reduced abundances of some species (particularly one family of polychaetes and photid amphipods), but no change in the number of taxa. Total abundance was still reduced four months later, but not after six months. The densities of two megafaunal species (a tube-dwelling polychaete and a burrowing anemone) on an offshore bank were significantly reduced after commercial scallop vessels had worked the area.

7.4.7 New Bedford Scallop Dredges - Mixed Substrates

Three studies have been conducted on mixed glacially-derived substrates. All were done in the northwest Atlantic (one in the U.S. and two in Canada) at depths of 8 to 50 m. Two observational studies examined physical effects and one experimental study examined effects on sediment composition to a sediment depth of 9 cm. The experimental study evaluated the immediate effects of a single dredge tow. None of these studies evaluated habitat recovery or biological effects, although one examined geochemical effects.

7.4.7.1 Physical effects

Direct observations in dredge tracks in the Gulf of St. Lawrence documented a number of physical effects to the seafloor, including bottom features produced by dredge skids, rings in the chain bag, and the tow bar. Gravel fragments were moved and overturned and shells and rocks were dislodged or plowed along the bottom. Sampling one day after a single dredge tow revealed that surficial sediments were re-suspended and lost and that the dredge tilled the bottom, burying surface sediments and organic matter to a depth of 9 cm, increasing the grain size of sediments above 5 cm, and disrupting a surface diatom mat. Microbial biomass at the sediment surface increased as a result of dredging.

7.4.8 Hydraulic Clam Dredges – Sand

Six hydraulic dredge studies were conducted in sandy substrates. Five of them examined the effects of “cage” dredges of the type used in the Northeast region of the U.S. and one examined the effects of escalator dredges, which affect sandy bottom habitats similarly to “cage” dredges. Three were performed in North America (two in the U.S. and one in Canada), one in the Adriatic Sea and two in Scotland. There have been no published studies in North America since 1982. One of the North American studies was conducted on the U.S. continental shelf at a depth of 37 m and two in near shore waters and depths of 7 – 12 m. The two European studies were done in even shallower water (1.5 – 7 m). The North American studies were all observational in nature and the European studies were controlled experiments. One study compared effects in commercially dredged and un-dredged areas and four were conducted in un-dredged areas. The sixth study compared infaunal communities in an actively dredged, a recently dredged, and an un-dredged location off the New Jersey coast. All six studies examined physical and biological effects of dredging. Recovery was evaluated in four cases for periods ranging from just a few minutes (sediment plumes) to 11 weeks.

7.4.8.1 Physical effects

Hydraulic clam dredges created steep-sided trenches 8-30 cm deep that started deteriorating immediately after they were formed. Trenches in a shallow, inshore location with strong bottom currents filled in within 24 hours. Trenches in shallow, protected, coastal lagoons were still visible two months after they were formed. Hydraulic dredges also fluidized sediments in the bottom and sides of trenches, created mounds of sediment along the edges of the trench, re-suspended and dispersed fine sediment, and caused a re-sorting of sediments that settled back into trenches. In one study, sediment in the bottom of trenches was initially fluidized to a depth of 30 cm and in the sides of the trench to 15 cm. After 11 weeks, sand in the bottom of the trench was still fluidized to a depth of 20 cm. Silt clouds only last for a few minutes or hours. Complete recovery of seafloor topography, sediment grain size, and sediment water content was noted after 40 days in a shallow, sandy environment that was exposed to winter storms.

7.4.8.2 Biological effects

Some of the larger infaunal organisms (*e.g.*, polychaetes, crustaceans) retained on the wire mesh of the conveyor belt used in an escalator dredge, or that drop off the end of the belt, presumably die. Benthic organisms that are dislodged from the sediment, or damaged by the dredge, temporarily provided food for foraging fish and invertebrates. Hydraulic dredging caused an immediate and significant reduction in the total number of infaunal organisms in two studies and in the number of macrofaunal organisms in a third study. There were also significant reductions in the number of infaunal species in one case and in the number of macrofaunal species and biomass in another. In this study, polychaetes were most affected. One study failed to detect any reduction in the abundance of individual taxa. Evidence from the study conducted off the New Jersey coast indicated that the number of infaunal organisms and species, and species composition, were the same in actively dredged and un-dredged locations.

Recovery times for infaunal communities were estimated in three studies. All of them were conducted in very shallow (1.5-7 m) water. Total infaunal abundance and species diversity had fully recovered only five days after dredging in one location where tidal currents reach maximum speeds of three knots. Some species had recovered after 11 weeks. Total abundance recovered 40 days after dredging in another location exposed to winter storms, when the site was re-visited for the first time. Total infaunal abundance (but not biomass) recovered within two months at a protected, commercially exploited site, where recovery was monitored at three-week intervals for two months, but not at a nearby, unexploited site. The actual recovery time at the exposed sub-tidal site was probably much quicker than 40 days, the only point in time when the post-experimental observations were made.

7.4.9 Hydraulic Clam Dredges - Mixed Substrates

An *in situ* evaluation of hydraulic dredge effects in sand, mud, and coarse gravel in the mid-Atlantic Bight indicated that trenches fill in quickly, within several days in fine sediment and more rapidly than that in coarse gravel. Dredging dislodged benthic organisms from the sediment, attracting predators.

7.5 Economic Environment

The purpose of this section is to describe and characterize the various fisheries in which skates are caught. It is meant to supplement and update sections of the 2000 Stock Assessment and Fishery Evaluation (SAFE) Report for the Northeast Skate Complex (NEFMC 2001), completed as part of the FEIS for the original Skate FMP (NEFMC 2003). Descriptive information on the fisheries is included, and where possible, quantitative commercial fishery and economic information is presented. The 2000 SAFE Report incorporated skate fishery data through 1999, so this report will use available data from 2000 on. Detailed historical aspects of skate fisheries are also documented in the 2000 SAFE Report.

7.5.1 Description of Directed Skate Fisheries

7.5.1.1 The Skate Bait Fishery

One of the primary markets for skate products in the northeast U.S. is for bait. Small, whole skates are among the preferred baits for the regional American lobster (*Homarus americanus*) fishery. Most of the skate bait fishery occurs in southern New England waters, and is largely comprised of little skate (>90%), with a smaller percentage of winter skate occurring seasonally. The following sections describe the major ports and other aspects of the skate bait fishery.

7.5.1.1.1 Rhode Island Bait Fishery

Skates have been targeted commercially in Rhode Island for decades for utilization primarily as lobster bait. The majority of bait skates landed in Rhode Island are little skates, with a small percentage of winter skates. There is also a seasonal gillnet incidental catch fishery as part of the directed monkfish gillnet fishery, in which skates (mostly winter skates) are sold both for lobster bait and as cut wings for processing. Fishermen have indicated that the market for skates as lobster bait has been relatively consistent.

The directed skate fishery by Rhode Island vessels occurs primarily in federal waters less than 40 fathoms from the Rhode Island/Connecticut/New York state waters boundary east to the waters south of Martha's Vineyard and Nantucket out to approximately 69 degrees. The vast majority of the landings are caught south of Block Island in federal waters. Effort on skates increases in state waters seasonally to accommodate the amplified effort in the spring through fall lobster fishery. In terms of the directed lobster bait fishery, it is estimated that between 20 - 30 Rhode Island otter trawl vessels ranging from 50 – 70 feet dominate the bait market. Approximately eight of those vessels from RI have identified directed skate bait fishing as their sole source of income between June – October annually, with less than 5% of their trip revenues from other species during that time.

Dayboat vessels (<24 hours) directing on skates land between 5,000 – 20,000 pounds of skates per trip, while trip boats fishing (>24 hours) generally 2 days, land approximately 40,000 – 50,000 pounds per trip. Incidental catches of skates from vessels targeting either groundfish or the southern New England mixed trawl fishery (squids, scup, fluke, whiting, mackerel, monkfish, etc.) are estimated at 500 – 2,000 pounds and are often sold directly to a lobster vessel (rather than through a dealer). Otherwise, many vessels indicate they do not bother to keep skates caught incidentally due to low market value or deck/hold capacity.

As the number of vessels targeting lobsters has decreased so has the demand for skates. Trap reductions in both the inshore and offshore fisheries as well as the collapse of the LI sound fishery have contributed to the decreased demand. Vessels that used to fish 3,500 traps now fish approximately 1,800. Skates are the preferred bait for the southern New England inshore and offshore lobster pot fishermen, as the skate meat is tough and holds up longer in the pot than other soft bait choices. Herring, mackerel, and menhaden are also used for bait, usually on trips of shorter duration, in colder water temperatures, or when skates are in short supply. Although there is an overall decrease in demand maintaining a supply is still very difficult for a variety of reasons. As DAS are adjusted via the Multispecies FMP, fewer days or hours can be allocated to fishing for low value species such as skates. These DAS will be reserved for groundfish or leased to other vessels. Many vessels run out of DAS by December also limiting supply and multispecies vessels are forced to take a 20 day block between March and May, prohibiting the use of a DAS which is a requirement of the directed skate fishery. More recently, high fuel prices are causing vessels to work on more profitable species. Rather than fishing an area where it is known to be largely skate, vessels now need to land a mixed trip (skate & groundfish) in order to justify the DAS usage.

Skates caught for lobster bait are landed whole by otter trawlers and either sold 1) fresh, 2) fresh salted, or 3) salted and strung or bagged for bait by the barrel. Inshore lobster boats usually use 2 – 3 skates per string, while offshore boats may use 3 – 5 per string. Offshore boats may actually “double bait” the pots during the winter months when anticipated weather conditions prevent the gear from being regularly tended. There has also been a tremendous increase in crabbing during these winter months (avg. $0.65/lb). The presence of sand fleas and parasites, water temperature, and anticipated soak time between trips are determining factors when factoring in the amount of bait per pot.

Size is a factor that drives the dockside price for bait skates. For the lobster bait market, a “dinner plate” is the preferable size to be strung and placed inside lobster pots. Little and winter skates are rarely sorted prior to landing, as fishermen acknowledge that species identification between little skates and small winter skates is very difficult. Ex-vessel skate prices remain relatively stable at an average of about $0.08 - $0.10 per pound. Quality and cleanliness of the skate are also factors in determining the price paid by the dealer, rather than just supply and demand. The quantity of skates landed on a particular day has little effect on price because there has been ready supply of skates available for bait from the major dealers, and the demand for lobster bait has been relatively consistent. Numerous draggers and lobster vessels have historically worked out seasonal cooperative business arrangements with a stable pricing agreement for skates.

In Rhode Island, there are two major dealers involved in the skate bait market. One reports supplying skates to 100 lobster businesses located in Point Judith, Wickford, Newport, Westerly, and Jamestown, RI, along with businesses scattered throughout Connecticut and Massachusetts. The company buys from 12- 15 vessels throughout the year, and ten employees are charged with offloading, salting, and stringing bait for inshore and offshore lobster vessels. The lobster businesses supplied by the company employ between 2 - 4 crewmembers per vessel. The other major skate dealer in Rhode Island supplies local Newport, Sakonnet, and New Bedford vessels and numerous offshore lobster vessels fishing in the Gulf of Maine. Skates are supplied to this dealer from draggers working out of Newport and Tiverton, RI and New Bedford, MA.

Approximately eighty percent of the skates landed for bait are sold as strung bait, at about $1.04 for a string of three skates, usually 120 strings (of three) per barrel for $121.00. Under current lobster pot limitations, the minimum bait costs for inshore areas limited to 800 pots is estimated at $832 per trip and $2,000 per trip for offshore lobster vessels limited to 1800 pots. Offshore vessels reported carrying between 15 – 30 barrels of bait per trip, which could reflect different baiting patterns. Skates are also sold by the barrel unsalted and unstrung ($50 - $60) or by the barrel unstrung and salted ($65). A tremendous volume of salt is used in the bait operations, up to 130,000 pounds weekly during the peak of lobster season. Barrels of skates may weigh between 400 – 500 pounds. Menhaden bait (pogies) prices vary between $50 – $70 per barrel ($56 per 30gl barrel), depending upon the port and the weight.

Due to direct, independent contracts between draggers and lobster vessels landings of skates are estimated to be under-documented. While bait skates are always landed (rather than transferred at sea) they are not always reported because they can be sold directly to lobster vessels by non federally permitted vessels, which are not required to report as dealers.

7.5.1.1.2 Other Bait Fishery Ports

Vessels from other ports (New Bedford and Martha's Vineyard, MA; Block Island, Long Island, Stonington, CT, and, to a lesser degree, Chatham and Provincetown, MA) have been identified as participating in the directed skate bait fishery to some extent. Suppliers indicate that some of these vessels have independent contracts with lobster vessels and supply them directly with skates on a seasonal basis. Refer to Section 7.5.1.3.5 for a description of skate bait landings by port.

Lobster bait usage varies regionally and from port to port, based upon preference and availability. Some lobstermen in the northern area (north of Cape Cod) prefer herring, mackerel, menhaden and hakes (whiting and red hake) for bait, which hold up in colder water temperatures; however, the larger offshore lobster vessels still indicate a preference for skates and Acadian redfish in their pots. Some offshore boats have indicated they will use soft bait during the summer months when their soak time is shorter. Skates used by the Gulf of Maine vessels are caught by vessels fishing in the southern New England area.

7.5.1.1.3 The Southern New England Sink Gillnet Fishery

The southern New England sink gillnet fishery targets winter skates seasonally along with monkfish. Highest catch rates are in the early spring and late fall when the boats are targeting monkfish, at about a 5:1 average ratio of skates to monkfish. Little skates are also caught incidentally year-round in gillnets and sold for bait. Several gillnetters indicated that they keep the bodies of the winter skates cut for wings and also salt them for bait. Gillnetters have become more dependent upon incidental skate catch due to cutbacks in their fishery mandated by both the Monkfish and Multispecies FMPs. Gillnet vessels use 12-inch mesh when monkfishing, catching larger skates. Southern New England fishermen have reported increased catches of barndoor skates in the last few years.

7.5.1.1.4 Regulatory Issues for the Bait Fishery

Two existing and significant regulatory limitations on the directed bait skate fishery include lobster regulations which mandate a decrease in pot limits and groundfish DAS requirements. A majority of directed skate fishermen fish in federal waters, possess multispecies permits, and fish for skates with gear capable of catching multispecies. This, in turn, means that they must use a DAS when fishing for skates unless fishing in an exempted fishery. There are currently two exempted skate fisheries in the Southern New England Exemption Area; one gillnet fishery and one deepwater trawl fishery (see **Map 2** for a map of these areas).

Effort in the skate fishery is reduced during the winter months because it becomes more difficult to budget DAS usage, especially for vessels that fish for groundfish either seasonally or year-round (in addition to directing on skates). Due to effort reductions in the multispecies fishery (e.g., Amendment 13, Framework 42), the majority of full-time skate vessels are presently limited to less than 50 DAS per fishing year.

Since the implementation of the Skate FMP in 2003, vessels fishing in the skate bait fishery that wish to be exempt from the skate possession limits (see Section **5.2.8.1**) must acquire a Letter of Authorization (LOA) from the Regional Administrator. A number of vessels remain under the mistaken impression that this LOA also exempts them from DAS requirements. However, these vessels must still be fishing in an exempted fishery to be exempt from DAS.

7.5.1.2 The Skate Wing Fishery

The other primary market for skates in the region is the wing market. Larger skates, mostly captured by trawl gear, have their pectoral flaps, or wings, cut off and sold into this market. Attempts to develop domestic markets were short-lived, and the bulk of the skate wing market remains overseas. Winter, thorny, and barndoor skates are considered sufficient in size for processing of wings, but due to their overfished status, possession and landing of thorny and barndoor skates has been prohibited since 2003. Winter skate is therefore the dominant component of the wing fishery, but illegal thorny and barndoor wings still occasionally occur in landings (Table 50).

Table 50. Preliminary skate wing fishery species composition (% total) in sampled landings by state (2006-2007). Source: Experimental skate wing dockside sampling process, NMFS Fisheries Statistics Office.

Species	ME	MA	RI	NJ
Winter	95.4	93.3	95.8	61.7
Thorny	3.0	6.7	0.2	0.0
Barndoor	1.6	0.0	0.1	0.0
Little*	0.0	0.0	4.0	14.9
Clearnose	0.0	0.0	0.0	23.4
Smooth	0.0	0.0	0.0	0.0
Rosette	0.0	0.0	0.0	0.0
N wings sampled	3,931	11,360	3,761	2,049

*likely misidentified winter skate

Only in recent years have skate wing landings been identified separately from general skate landings. Landed skate wings are seldom identified to species by dealers. Skate processors buy whole, hand-cut, and/or onboard machine-cut skates from vessels primarily out of Massachusetts and Rhode Island. Because of the need to cut the wings, it is relatively labor-intensive to fish for skates. Participation in the skate wing fishery, however, has recently grown due to increasing restrictions on other, more profitable groundfish species. It is assumed that more vessels land skate wings as an incidental catch in mixed fisheries than as a targeted species.

New Bedford emerged early-on as the leader in production, both in landed and processed skate wings, although skate wings are landed in ports throughout the Gulf of Maine and extending down into the Mid-Atlantic. New Bedford still lands and processes the greatest share of skate wings. Vessels landing skate wings in ports like Portland, ME, Portsmouth, NH, and Gloucester, MA are likely to be landing them incidentally while fishing for species like groundfish and monkfish. Refer to Section 7.5.1.3.5 for a description of skate wing landings by port.

The current market for skate wings remains primarily an export market. France, Korea, and Greece are the leading importers. There is a limited domestic demand for processed skate wings from the white tablecloth restaurant business. Winter skates landed by gillnet vessels are reported to go almost exclusively to the wing market. Fishermen indicate that dealers prefer large-sized winter skates for the wing market (over three pounds live weight).

7.5.1.3 Commercial Fishery Landings

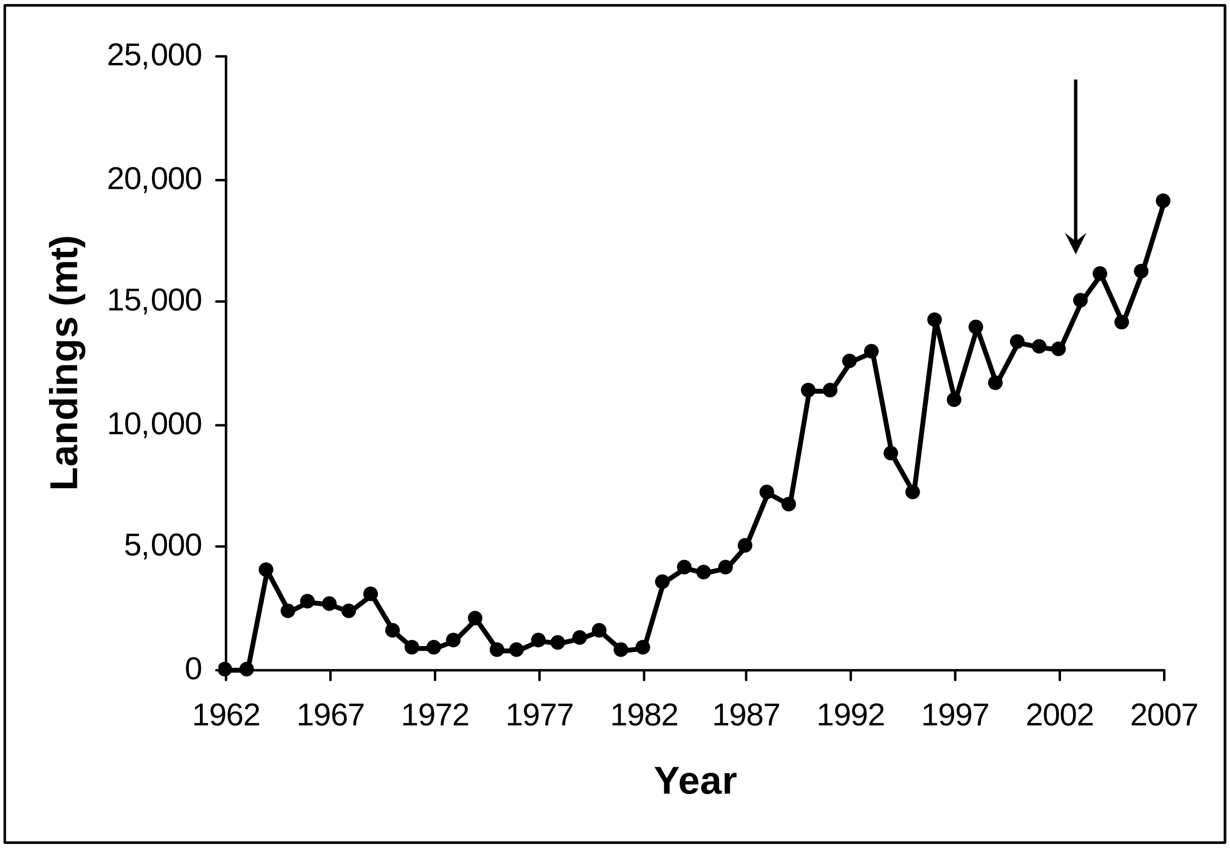
This section presents available commercial landings information for the northeast region skate complex from 2000-2007. This includes total annual landings; landings by market category; landings by state, gear type, port, and area fished; Canadian skate landings; and recreational skate landings. For data previous to 2000, refer to the 2000 SAFE Report (NEFMC 2001).

Note that NMFS estimates commercial skate landings from the dealer weighout database and reports total skate landings according to *live weight* (i.e., the weight of the whole skate). This means that a conversion factor is applied to all wing landings so that the estimated weight of the entire skate is reported and not just the wings. While *live weight* is necessary to consider from a biological and stock assessment perspective, it is important to remember that vessels' revenues associated with skate landings are for *landed weight* (vessels in the wing fishery only make money for the weight of wings they sell, not the weight of the entire skate from which the wings came).

7.5.1.3.1 Total Commercial Landings

Due to the relative absence of recreational skate fisheries, virtually all skate landings are derived from regional commercial fisheries. Skates have been reported in New England fishery landings since the late 1800s. However, commercial fishery landings never exceeded several hundred metric tons until the advent of distant-water fleets during the 1960s. Skate landings reached 9,500 mt in 1969, but declined quickly during the 1970s, falling to 800 mt in 1981 (Figure 10). Landings have since increased substantially, partially in response to increased demand for lobster bait and the increased export market for skate wings. In 2007, skate landings were the highest ever recorded, exceeding 19,000 mt. The increased demand for skate products since the mid-1980s has concurrently resulted in declining discard rates for skates (Figure 10).

Figure 10. Total Annual U.S. Landings (mt) of Atlantic Skates, 1962 – 2007. The arrow indicates the year that the Skate FMP was implemented (2003).



7.5.1.3.2 Landings by State

Table 51 presents commercial landings of skates by individual states from 2000 – 2007. Massachusetts and Rhode Island continue to dominate the skate fishery, averaging about 10 – 20 million lb annually across the time series. Skate landings from Massachusetts and Rhode Island comprised 85-94% of the total reported annual skate landings during this period. Rhode Island landings have remained fairly consistent, while Massachusetts landings have increased significantly since 2000. New Jersey, New York, Connecticut, Maine, New Hampshire, and Virginia land relatively small amounts of skates. Reported skate landings from Maine and New Hampshire have decreased in recent years. Very few skates are landed in Maryland and North Carolina, and Delaware reported minimal skate landings for the time series.

Table 51. U.S. Landings of Skates (thousands lbs) by State, 2000-2007.
Source: NMFS Fisheries Statistics Office

STATE	2000	2001	2002	2003	2004	2005	2006	2007
CT	1,088.64	1,364.42	810.33	956.05	973.70	779.03	572.33	564.89
DE	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
MA	14,369.07	14,734.32	13,966.06	17,852.75	22,213.16	19,816.73	24,542.89	29,881.92
MD	144.68	122.38	114.57	59.26	13.60	18.51	32.18	40.19
ME	304.30	304.73	302.43	168.38	29.34	23.92	3.31	65.81
NC	45.33	0.29	0.60	1.72	1.09	1.20	0.30	0.62
NH	84.74	73.12	53.99	32.83	23.31	20.72	24.75	12.29
NJ	1,244.64	1,377.30	1,283.85	989.25	825.08	738.01	995.64	1,155.47
NY	854.69	808.37	1,020.48	778.87	490.99	347.16	505.55	716.24
RI	10,637.12	10,000.49	11,088.15	12,161.75	10,760.55	9,301.28	8,931.88	9,522.51
VA	679.43	139.70	27.95	78.67	100.65	66.82	12.22	114.18
Grand Total	29,452.63	28,925.13	28,668.39	33,079.53	35,431.47	31,113.37	35,621.05	42,074.11

7.5.1.3.3 Landings by Market Category

The Skate FMP implemented new reporting requirements for skates beginning in 2003. A list of the available skate codes in the dealer weighout database is included in Table 52. Federally permitted dealers report most of the skate wings they purchase by two separate market categories: unclassified wings (code 3651) or "big skate" (code 3671). They mostly report whole/bait skate landings as little skate (code 3660) or unclassified whole skates (code 3650). Landings reported as little skate are known to include amounts of juvenile winter skate. Although reporting of skate landings by species has been encouraged, species identification by vessels and dealers remains problematic, and most landings continue to be unclassified or misrepresented (Figure 11).

While the landings by market category from the dealer weighout data may not be entirely complete, they can be examined to identify the general proportion of skate landings that are used for either the lobster bait market or the seafood market. They can also be disaggregated into individual ports to characterize skate fishing activity in the port.

According to Table 53, more pounds of skates are caught for the wing market than for the bait market. For the time series, skate wing landings (*live weight*) accounted for 65-74% of the total landings. In general, the proportion of skate landings reported as wings has increased since 2000, which is also apparent in landings data for the state of Massachusetts, presented in Table 51.

Revenues from wing landings are generated from *landed weight*. Wing landings receive a significantly higher ex-vessel price than bait landings, as fewer landed pounds of wings generated substantially higher revenues than the larger amounts of whole skates landed. Based on the data summarized in Table 53, the price for whole skates averaged $0.07-0.10 per lb, and the price for skate wings averaged $0.30-0.55 per lb. The price for whole skates has remained relatively constant, whereas the price for skate wings has been increasing since 2001.

Table 52. List of skate species and market codes used in the dealer weighout database since 2003. Note: Big skate is an alternative common name for winter skate (Leucoraja ocellata), and does not indicate the Pacific big skate (Raja binoculata).

Species Code (NESPP4)	Common Name	Grade Description	Market Description
3650	SKATES	ROUND	MIXED OR UNSIZED
3650	SKATES	ROUND	UNKNOWN
3670	SKATE, BIG	ROUND	UNKNOWN
3720	SKATE, CLEARNOSE	ROUND	UNKNOWN
3660	SKATE,LITTLE	ROUND	UNKNOWN
3640	SKATE, ROSETTE	ROUND	UNKNOWN
3680	SKATE,BARNDOOR	ROUND	UNKNOWN
3670	SKATE, WINTER	ROUND	UNKNOWN
3700	SKATE, THORNY	ROUND	UNKNOWN
3690	SKATE, SMOOTH	ROUND	UNKNOWN
3651	SKATES	WINGS	MIXED OR UNSIZED
3651	SKATES	WINGS	UNKNOWN
3671	SKATE, BIG	WINGS	UNKNOWN
3721	SKATE, CLEARNOSE	WINGS	UNKNOWN
3661	SKATE,LITTLE	WINGS	UNKNOWN
3641	SKATE, ROSETTE	WINGS	UNKNOWN
3681	SKATE,BARNDOOR	WINGS	UNKNOWN
3671	SKATE, WINTER	WINGS	UNKNOWN
3701	SKATE, THORNY	WINGS	UNKNOWN
3691	SKATE, SMOOTH	WINGS	UNKNOWN

Figure 11. Weights of landed skates by reported species code in the dealer weighout database, 2007.

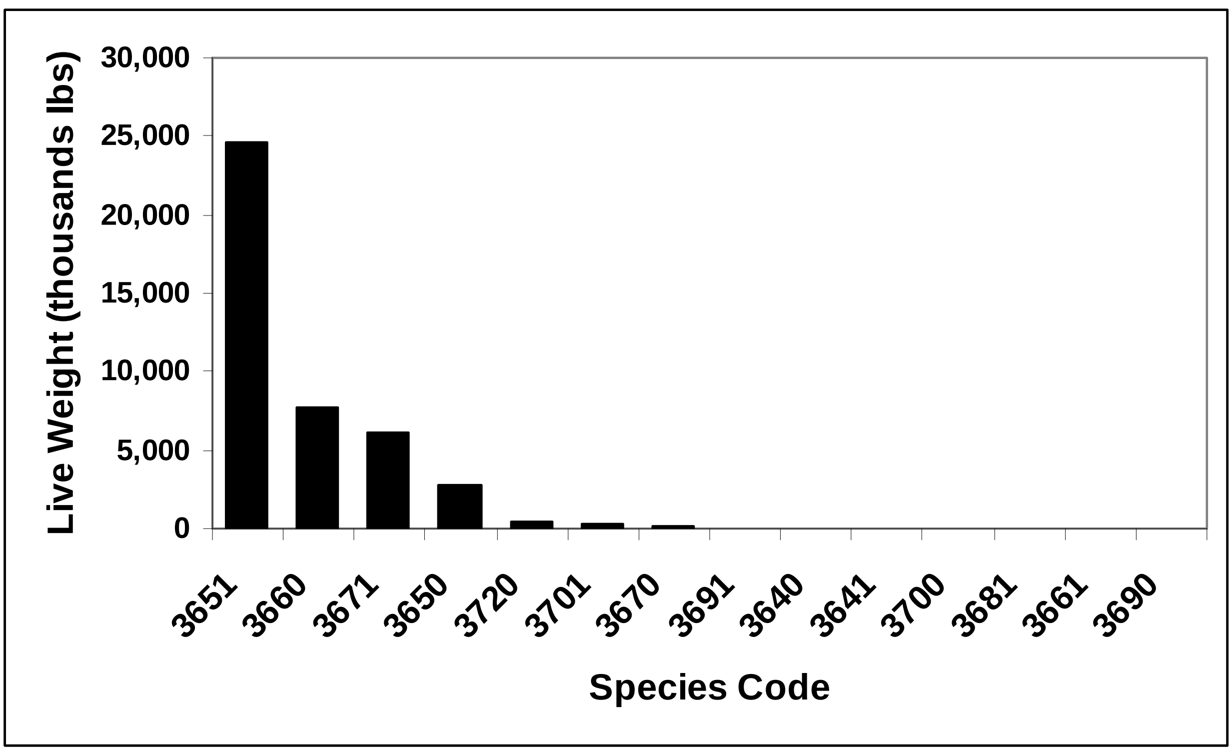


Table 53. Total Annual Landings and Revenue of Skates by Market Category (2000-2007).
Source: Dealer Weighout Database, NMFS
Revenues are generated from landed pounds.

YEAR	Category	Landed Weight (lb)	Live Weight (lb)	Revenue
2000	Whole	10,293,442	10,293,442	$754,767
	Wings	8,440,041	19,159,191	$3,069,363
2000 Total		18,733,483	29,452,633	$3,824,130
2001	Whole	9,704,044	9,704,044	$818,533
	Wings	8,467,303	19,221,086	$2,535,978
2001 Total		18,171,347	28,925,130	$3,354,511
2002	Whole	9,693,394	9,693,394	$866,305
	Wings	8,358,879	18,974,996	$2,679,627
2002 Total		18,052,273	28,668,390	$3,545,932
2003	Whole	9,543,292	9,543,292	$716,735
	Wings	10,368,270	23,536,237	$3,370,561
2003 Total		19,911,562	33,079,529	$4,087,296
2004	Whole	8,538,845	8,538,845	$673,390
	Wings	11,846,858	26,892,626	$4,399,004
2004 Total		20,385,703	35,431,471	$5,072,394
2005	Whole	8,770,170	8,770,170	$908,503
	Wings	9,842,683	22,343,201	$4,286,557
2005 Total		18,612,853	31,113,371	$5,195,060
2006	Whole	9,958,544	9,958,544	$968,720
	Wings	11,304,925	25,662,509	$5,927,302
2006 Total		21,263,469	35,621,053	$6,896,022
2007	Whole	11,028,358	11,028,358	$1,089,444
	Wings	13,676,353	31,045,755	$7,573,756
2007 Total		24,704,711	42,074,113	$8,663,200

7.5.1.3.4 Landings by Gear

Table 54 presents annual skate landings (2000-2007) from the dealer weighout database by gear type and by market category as a percentage of the annual total. Otter trawl is the primary gear used to catch skates. Approximately 65-86% of the total skate landings during this period were captured by trawl gear. About 40% of the skates caught with otter trawls are landed for the lobster bait market, with the other 60% landed for the wing market (Table 54). Almost all skates caught for the lobster bait fishery are caught with a trawl. Gillnets are the secondary gear used to catch skates. Almost all skates that are caught with gillnets are landed as wings. Between 2000 and 2007, 93-98% of the total gillnet landings of skates were wings (Table 54). Gillnet landings of skates increased over the time series, representing 13.6% of the total landings in 2000, but up to 32.6% of the total in 2007.

Other gears in which skates are consistently caught include traps, hook gear (including longlines), and scallop dredges. Almost 100% of the skates that are caught with hook gear are landed as wings. The overall contribution of skate landings from gears other than trawl and gillnets is relatively insignificant.

Table 54. Annual Skate Landings (Live Weight, thousands lbs) by Gear Type and Market Category as a Percentage of Total Skate Landings
Source: Dealer Weighout Database, NEFSC
* Landings from other codes were incorporated into the 3650 category.

Hook and Line includes bottom longlines, handlines (rod and reel), and the combined troll and handline category.
Gillnet includes sink, stake, and drift gillnets.
Otter trawl includes fish, shrimp, scallop, and other otter trawls.
Seines include common, Danish, and Scottish seines.
Pots/traps include floating, fish, and lobster traps.
Other dredges include crab, conch, and surf clam/ocean quahog dredges.
Other gear includes pound nets, fyke nets, beam trawls, and trammel nets

GEAR NAME	CATEGORY	2007	2006	2005	2004	2003	2002	2001	2000
TRAWL	**Whole**	10,686	9,483	8,106	8,341	9,023	9,198	9,542	10,094
	% Whole	38.7%	40.9%	39.6%	33.1%	38.8%	43.3%	40.0%	40.0%
	Wings	16,950	13,723	12,371	16,826	14,243	12,037	14,287	15,137
	% Wings	61.3%	59.1%	60.4%	66.9%	61.2%	56.7%	60.0%	60.0%
Trawls Total		27,636	23,206	20,477	25,167	23,266	21,235	23,828	25,232
	% of Total Landings	**65.7%**	**65.1%**	**65.8%**	**71.0%**	**70.3%**	**74.1%**	**82.4%**	**85.7%**
GILLNET	**Whole**	289	363	298	181	484	488	157	142
	% Whole	2.1%	3.4%	3.7%	1.9%	5.0%	6.6%	3.1%	3.6%
	Wings	13,411	10,194	7,717	9,168	9,185	6,864	4,856	3,854
	% Wings	97.9%	96.6%	96.3%	98.1%	95.0%	93.4%	96.9%	96.4%
Gill nets Total		13,699	10,557	8,015	9,349	9,669	7,352	5,013	3,997
	% of Total Landings	**32.6%**	**29.6%**	**25.8%**	**26.4%**	**29.2%**	**25.6%**	**17.3%**	**13.6%**
OTHER NET	**Whole**	17	58	107	1	1	3	3	2
	% Whole	3.6%	7.3%	14.4%	0.1%	7.1%	15.6%	13.8%	6.2%
	Wings	465	735	636	585	8	18	20	27
	% Wings	96.4%	92.7%	85.6%	99.9%	92.9%	84.4%	86.2%	93.8%
Other nets Total		482	793	743	586	9	21	23	29
	% of Total Landings	**1.1%**	**2.2%**	**2.4%**	**1.7%**	**0.0%**	**0.1%**	**0.1%**	**0.1%**
UNKNOWN	**Whole**	23	22	217	7	0	0	0	24
	% Whole	12.0%	3.0%	17.6%	3.9%	0.0%	0.0%	9.4%	69.1%

	Wings	170	687	1,016	170	0	0	5	11
	% Wings	88.0%	97.0%	82.4%	96.1%	0.0%	100.0%	90.6%	30.9%
Unknown Total		193	709	1,233	176	0	0	5	34
	% of Total Landings	**0.5%**	**2.0%**	**4.0%**	**0.5%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**
LONGLINE	**Whole**	3	2	1	0	0	2	0	0
	% Whole	10.2%	9.6%	0.3%	0.0%	0.0%	6.0%	0.0%	0.0%
	Wings	24	23	387	55	66	29	29	83
	% Wings	89.8%	90.4%	99.7%	100.0%	100.0%	94.0%	100.0%	100.0%
Long lines Total		27	25	388	55	66	31	29	83
	% of Total Landings	**0.1%**	**0.1%**	**1.2%**	**0.2%**	**0.2%**	**0.1%**	**0.1%**	**0.3%**
DREDGE	**Whole**	8	12	3	0	0	0	0	0
	% Whole	72.9%	4.2%	2.2%	0.0%	10.3%	0.0%	0.0%	0.0%
	Wings	3	279	139	9	4	3	8	3
	% Wings	27.1%	95.8%	97.8%	100.0%	89.7%	100.0%	100.0%	100.0%
Dredges Total		11	291	143	9	4	3	8	3
	% of Total Landings	**0.0%**	**0.8%**	**0.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
TRAPS	**Whole**	2	3	5	4	35	1	0	32
	% Whole	17.4%	18.4%	14.9%	8.2%	85.4%	9.0%	2.9%	49.0%
	Wings	12	13	29	43	6	13	14	33
	% Wings	82.6%	81.6%	85.1%	91.8%	14.6%	91.0%	97.1%	51.0%
Traps Total		14	15	34	47	41	15	15	65
	% of Total Landings	**0.0%**	**0.0%**	**0.1%**	**0.1%**	**0.1%**	**0.1%**	**0.1%**	**0.2%**
HOOK	**Whole**	0	16	0	5	0	1	1	0
	% Whole	2.2%	65.2%	0.2%	12.5%	0.3%	18.5%	31.2%	0.7%
	Wings	12	8	47	32	24	3	3	11
	% Wings	97.8%	34.8%	99.8%	87.5%	99.7%	81.5%	68.8%	99.3%
Hook Total		12	24	47	37	25	4	4	11
	% of Total Landings	**0.0%**	**0.1%**	**0.2%**	**0.1%**	**0.1%**	**0.0%**	**0.0%**	**0.0%**
HAND	**Whole**	0	0	33	0	0	0	0	0
	% Whole	0.0%	100.0%	100.0%	3.2%	0.0%	0.0%	0.0%	0.0%

	Wings	0	0	0	5	0	7	0	0
	% Wings	0.0%	0.0%	0.0%	96.8%	0.0%	100.0%	0.0%	0.0%
Hand Total		0	0.025	33	4.927	0	7.366	0	0
	% of Total Landings	**0.0%**	**0.0%**	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
OTHER	**Whole**	0	0	0	0.71	0	0	0	0
	% Whole	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%
	Wings	0	0.633	1.055	0	0	0	0	0
	% Wings	0.0%	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Total		0	0.633	1.055	0.71	0	0	0	0
	% of Total Landings	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**
Grand Total		**42,074**	**35,621**	**31,113**	**35,431**	**33,080**	**28,668**	**28,925**	**29,453**

7.5.1.3.5 Landings By Port

Table 55 and Figure 12 present annual skate landings (from the dealer weighout database) by port and by market category for 2000-2007. The top 10 ports in 2007 represented over 94% of the total skate landings in the region (Figure 12). The top ports landing skates (total) currently are New Bedford, MA; Chatham, MA; Point Judith, RI; Tiverton, RI; Newport, RI; Boston, MA; Stonington, CT; Gloucester, MA; Barnegat Light, NJ; and Hampton Bays, NY.

Currently, the top ports landing whole skates for lobster bait are:
1. Point Judith, RI
2. Tiverton, RI
3. New Bedford, MA
4. Newport, RI
5. Stonington, CT

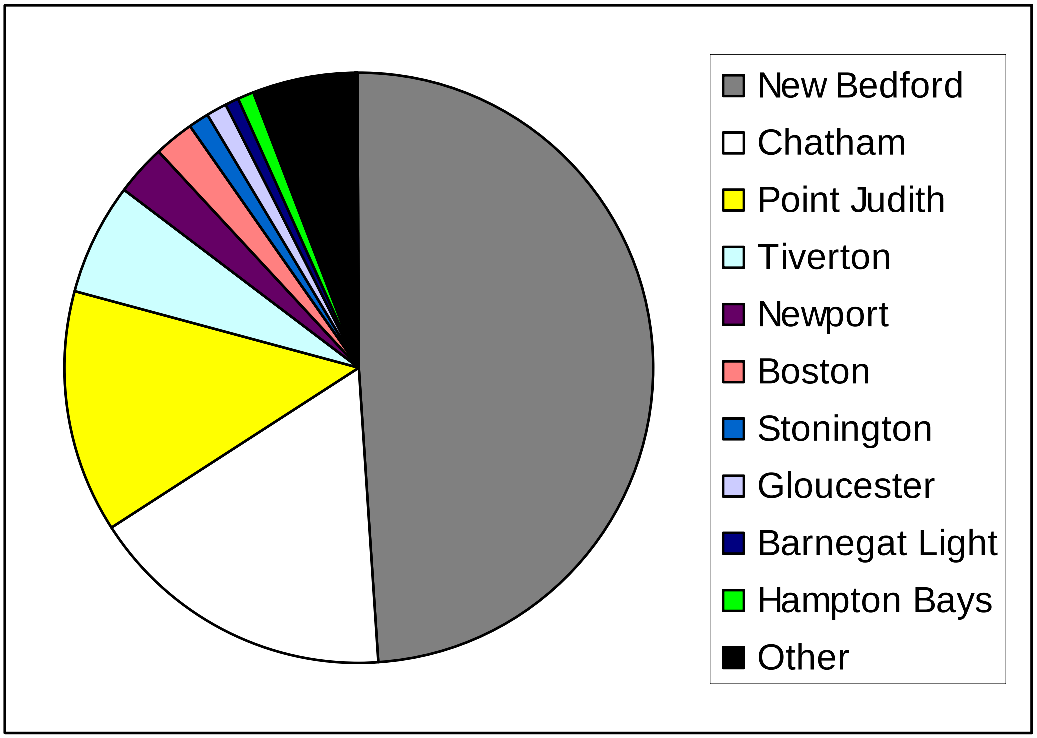
Currently, the top ports landing skate wings are:
1. New Bedford, MA
2. Chatham, MA
3. Point Judith, RI
4. Boston, MA
5. Barnegat Light, NJ

New Bedford, MA and Point Judith RI clearly dominate skate landings, averaging over 60% of the total skate landings across the time series. New Bedford dominates skate wing landings, and Point Judith dominates skate bait landings. Between 2000-2007, an average of 97% of New Bedford's skate landings were classified as wings, and an average of 77% of Point Judith's skate landings were classified as whole skates (Table 55). Since 2000, skate wing landings in Provincetown, MA have declined, while landings in Chatham, MA have increased substantially. New Bedford's wing landings have accounted for about 47-62% of the total annual wing landings between 2000-2007. Point Judith's bait landings have accounted for 39-67% of the total annual bait landings from 2000-2007, with a decline in recent years. This appears to be due to significant increases in bait skate landings in New Bedford, MA, and Newport and Tiverton, RI (Table 55).

Table 55. Annual Skate Landings (Live Weight, thousands lbs) for Top 10 Ports by Market Category and as a Percentage of Total Skate Landings (2000-2007).
Source: Dealer Weighout Database, NEFSC
* Landings from other codes were incorporated into the 3650 category.

Table 40 is redacted to comply with confidentiality laws in the Magnuson-Stevens Act.

Figure 12. Top 10 ports for skate landings in 2007, based on the percentage of total landings by port.



7.5.1.3.6 Landings by Day-at-Sea Program

Upon implementation of the Skate FMP in 2003, vessels were required to fish on a Multispecies, Monkfish, or Scallop Day-at-Sea (DAS) to possess skates, unless fishing in an exempted fishery. This management measure was an indirect method to control effort in the skate fishery, which has a great deal of overlap with these fisheries. The tables and figures below characterize the skate landings in each of these DAS programs.

The vast majority (73-84%) of skate landings from a DAS program are landed on Multispecies A DAS (Table 56). During the time series, 15.3 – 22.2 million lb of skates were landed in this program. This program represents the majority of effort in the northeast groundfish fleet. Landings by vessels fishing on Monkfish DAS have been relatively stable at 0.6 – 1.9 million lb per year. Vessels fishing on combination Monkfish/Multispecies A DAS landed 2.0 – 5.6 million lb annually. Skate landings by vessels fishing on Scallop DAS have been relatively negligible. Skates captured by scallop dredge vessels tend to be discarded.

Landings in the Multispecies B DAS program have increased since its implementation in 2004 (Table 56). This program was designed to allow vessels to target healthy groundfish stocks, primarily haddock, in specific areas using certain gears without using their A DAS. Since B DAS vessels fishing with trawl gear may only possess up to 500 lb of skates, the increase in skate landings observed in 2007 in this program was mainly attributed to vessels fishing with gillnets (Figure 15). Virtually all of the skate landings in the Multispecies B DAS program are landed for the wing market (Figure 13).

Table 56. Total skate landings (lb live weight) by DAS program, 2000-2007.

Calender Year	MUL A	MUL B	MNK	MNK/MUL	SC
2000	16,673,711	NA	1,037,993	2,817,080	66,012
2001	15,320,262	NA	764,437	3,037,382	6,405
2002	17,538,086	NA	665,661	3,845,897	2,796
2003	22,205,726	NA	601,063	4,123,343	63
2004	19,760,823	547,717	1,271,352	1,991,829	0
2005	17,715,403	967,069	1,911,588	2,754,418	10,835
2006	19,083,200	64,956	1,358,881	5,652,650	4,629
2007	20,349,972	1,715,633	1,087,857	2,571,196	0

Source: NMFS, Fisheries Statistics Office

In the earlier parts of this time series, skate wing landings by trawl vessels far exceeded the landings of other gears on A DAS. Since 2003, however, gillnets have become the dominant gear landing skate wings on A DAS (Figure 14). As noted above, gillnets are also the primary gear for skate wings in the B DAS program.

Figure 13. Skate Bait and Wing landings by Multispecies A and B vessels, 2000-2007.

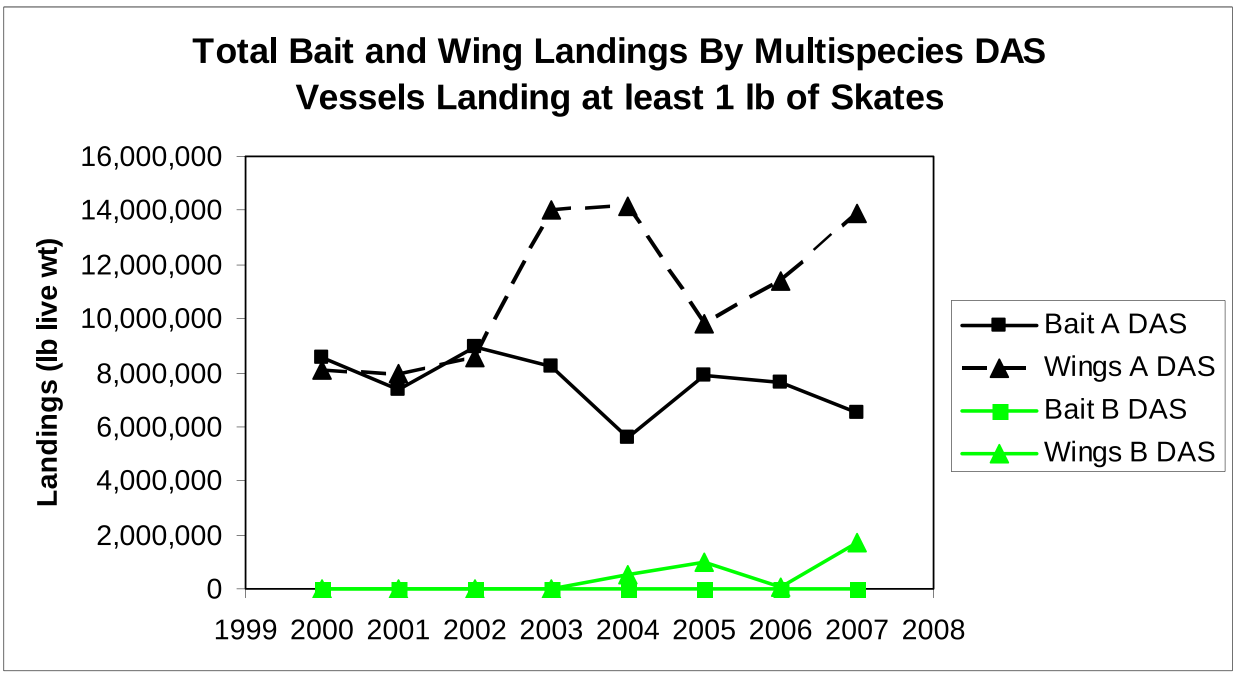


Figure 14. Skate Wing landings by gear type on Multispecies A DAS, 2000-2007

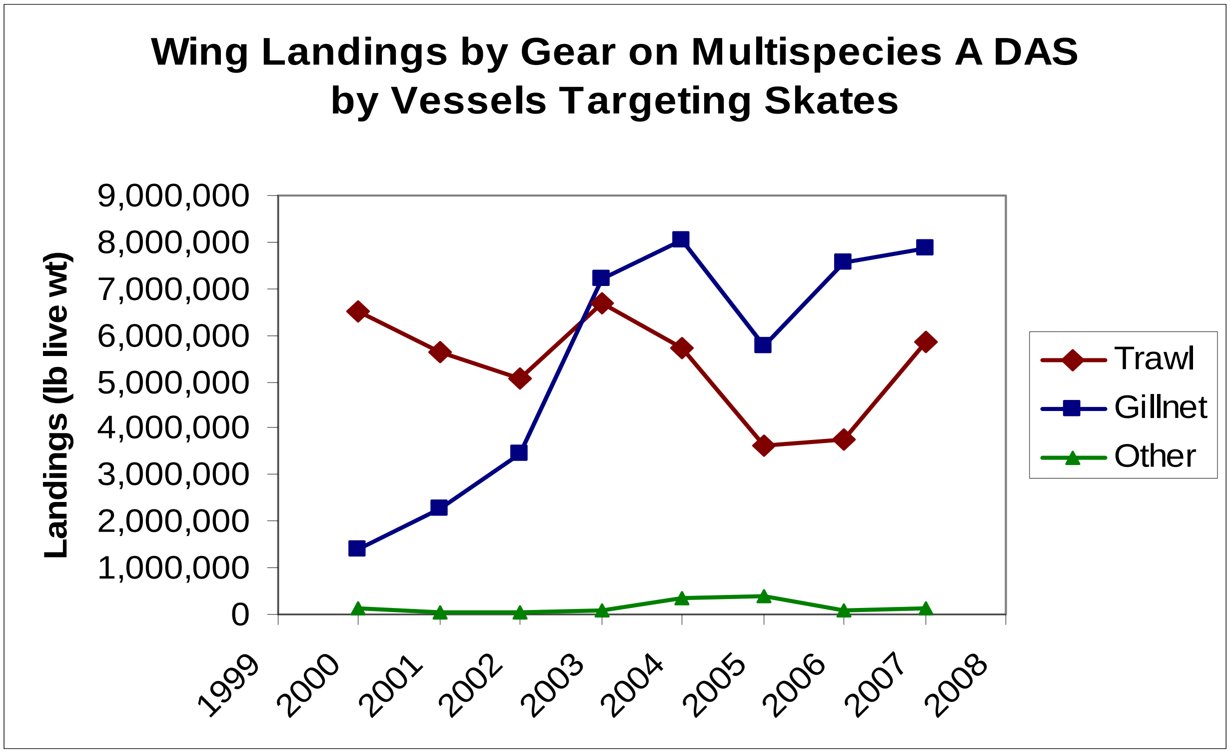
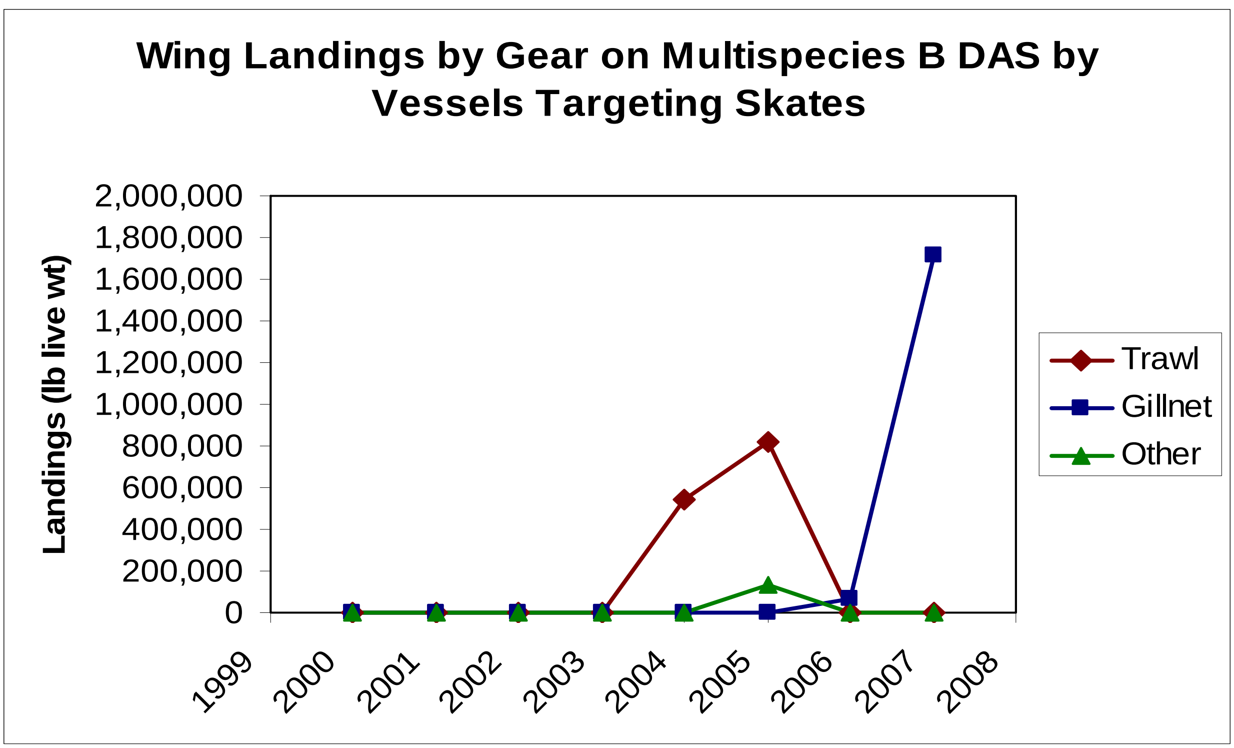


Figure 15. Skate Wing landings by gear type on Multispecies B DAS, 2000-2007.



7.5.1.4 Fishing Areas

Vessels landing skates for the wing market either target skates on Georges Bank, in the Great South Channel near Cape Cod, MA, or west of the Nantucket Lightship Area in Southern New England waters. Maps of effort distributions are presented in Section 8.3.1 , which analyzes the effect of skate management areas on skate fishing. Vessels using gillnets often target skates to supply the wing market by fishing east of Cape Cod, MA.

Other vessels land skates for the wing market while fishing for other species. Vessels fishing for groundfish and in particularly flounders often land an incidental catch of skates. These vessels often fish in Massachusetts Bay and on Georges Bank. Some vessels fishing for scallops using dredges also land skates, but in particular scallop vessels with general category permits that fished in the Great South Channel often land skates. There is also a mixed monkfish/skate fishery that occurs west of the Nantucket Lightship Area and off Northern NJ, near Point Pleasant.

A skate fishery in RI and to a lesser extent in New Bedford supplies a lobster bait market, by landing whole skates while fishing inshore waters of Southern New England. Most of these vessels use trawls and often fish in an exempted fishery.

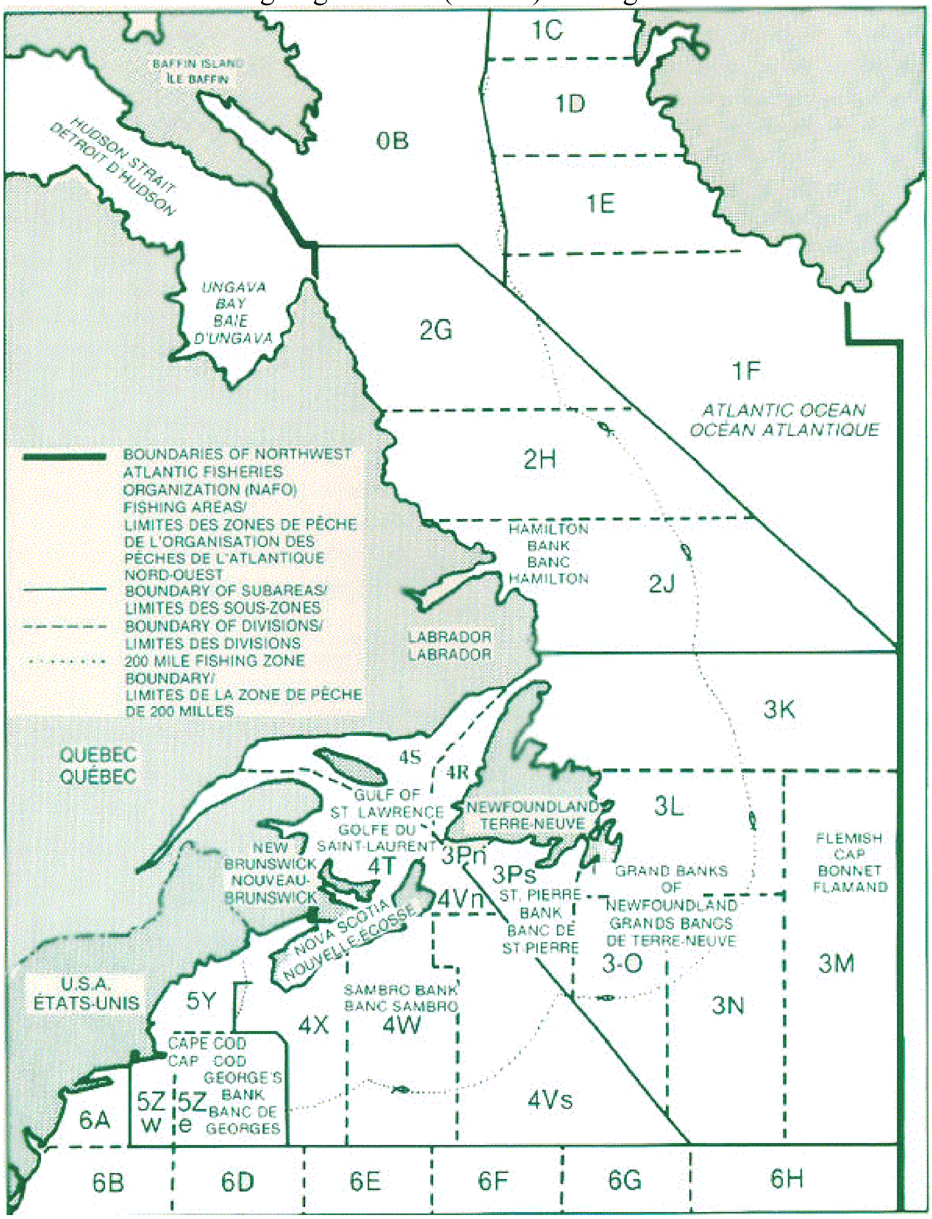
7.5.1.5 Canadian Landings of Skates

Historical information on Canadian skate fisheries and management was described in the 2000 SAFE Report for skates, and can also be found in Swain et al. (2006) and Kulka et al. (2007). Prior to 1994, skates were only caught incidentally in Canadian fisheries like those for groundfish. However, a Canadian directed skate fishery was initiated in 1994 as a response to closures in the traditional Canadian groundfish fishery and an increasing international market for skate wings. Canadian skate catches have declined from 4200t in 1994, to 1100t in 2006 (Kulka et al. 2007).

The directed skate fishery evolved on the eastern Scotian Shelf, in NAFO Divisions 4Vs and 4W (Map 23) and targets primarily winter skate (~90%) with a small bycatch of thorny skate (less than 10%) (NEFMC 2001). A Total Allowable Catch (TAC) for the directed skate fishery in 4VsW was set in 1994 and every year thereafter to ensure that the fishery would not expand beyond sustainable levels. The TAC has been lowered almost every year since 1994 in response to interim assessments, concerns over the response of winter skate to directed fishing, and decreasing participation in the fishery. In 1994, winter skate landings exceeded 2000 mt, but as the quota has been progressively reduced, landings have fallen to less than 300 mt since 2001 (Swain et al. 2006) (Table 57). In 2005, winter skate in the southern Gulf of St. Lawrence was designated as endangered by the Committee on the Status of Endangered Wildlife in Canada. Winter skate on the eastern Scotian Shelf was also designated as threatened (Swain et al. 2006). In addition to fishing mortality, observed winter skate population declines may be influenced by natural mortality, specifically increased predation by seals (Swain et al. 2006).

While winter skate range from south of Georges Bank to the Gulf of St. Lawrence, they are near their northern limit of distribution on the offshore banks of the eastern Scotian Shelf. From observations of discontinuities in distribution, Canadian scientists believe that the winter skates in Division 4VsW are probably part of a separate stock (although very little work has been completed on skate stock delineation). Frisk et al. (2008), however, hypothesize that population connectivity exists between winter skates on the Scotian Shelf and on Georges Bank, based on trends in U.S. and Canadian trawl survey data.

Map 23. Northwest Atlantic Fishing Organization (NAFO) Fishing Areas



Map Source: Nova Scotia Department of Fisheries and Aquaculture, http://www.gov.ns.ca/fish/

Table 57. Estimated winter skate removals (tons) from NAFO Areas 4VsW, 1999-2004.

YEAR	TONS OF SKATES
1999	592
2000	358
2001	235
2002	278
2003	39
2004	233

Source: Swain et al. (2006)

In addition to the directed winter skate fishery in Division 4VsW, there is a fishery for thorny skates in the Grand Banks, Divisions 3L, 3N, 3O, and 3Ps depicted in Map 23. Table 58 summarizes the skate landings from these areas. Since 1998, the gears used in this fishery have been evenly distributed between gillnet, longline, and otter trawl.

Thorny skate range from Greenland to South Carolina in the northwest Atlantic, with a center of abundance on the Grand Banks. It is not presently known if the population comprises a single stock, or if there is structure between U.S., Canada, and other regional populations. Canadian assessments indicate that the thorny skate population in Areas 3LNOPs has been near historic low levels for the last 14 years, and there is evidence of hyper-aggregation (Kulka et al. 2007). The current TACs for thorny skate in Canada exceed the recommended level of exploitation to rebuild the stock.

Table 58. Canadian skate landings (tons) from NAFO Areas 3LNOPs, 1999-2006.

	NAFO Areas			
Year	**3L**	**3N**	**3O**	**3Ps**
1999	74	85	1,166	1,284
2000	139	156	620	1,053
2001	273	270	644	2,007
2002	245	385	1,175	1,503
2003	80	404	1,032	2,014
2004	50	209	536	1,200
2005	40	294	798	963
2006	23	0	246	1,149

Source: Kulka et al. (2007)

7.5.1.6 Recreational Fishery Catch

In general, skates have little to no recreational value and are not intentionally pursued in any recreational fisheries. Catch information for Atlantic coast skates from the Marine Recreational Fishery Statistics Survey (MRFSS) is presented in Table 59 and Table 60. Recreational skate catches between 2000 and 2007 ranged from 1.4 million fish in 2001 to 3.3 million fish in 2003. Recreational *harvest* of skates (MRFSS A+B1 data), where skates were retained and/or killed by the angler, represent only 0.4 – 3.0% of the estimated total catch during this time period Table 59. The vast majority of skates caught by recreational anglers are therefore released alive.

New Jersey, New York, North Carolina, Massachusetts, and Virginia reported the largest recreational skate catches over the time series, but the annual catch estimates for each of those states appear to be rather inconsistent and do not illustrate any clear trends. Recreational fishers in Maine did not report catching any skates in 2004, 2006, and 2007. Catch estimates from Delaware, Maryland, Virginia, and North Carolina suggest that some of the skates caught recreationally are either clearnose or rosette skate, or other species of skates that are not included in the northeast complex.

Reliability of skate recreational catch estimates from MRFSS is a concern. The shaded cells in Table 59 and Table 60 indicate that the catch estimate is associated with a proportional standard error (PSE) of 0.2 or less. PSEs provide a measure of precision and represent another way to express error associated with a point estimate. Estimates with a PSE of 0.2 or less are considered to be more reliable than those with higher PSEs, and generally, PSEs of 0.2 or less are considered acceptable for fisheries data. Note that many cells in Table 59 and Table 60 are not shaded. This suggests that skate recreational catch data from MRFSS are not very reliable. Total catch estimates (A+B1+B2), however, appear to be more reliable than harvest estimates (A+B1 only). Since skates are not valuable and heavily-fished recreational species, the number of MRFSS intercepts from which these estimates are derived is likely to have been very low. The fewer intercepts from which to extrapolate total catch estimates there are, the less reliable the total catch estimates will be.

Table 59. Recreational Harvest and Total Catch of Skates (Family Rajidae) on Atlantic Coast, 2000-2007.

Type A catch is fish that are landed in a form that can be identified by trained interviewers.

Type B1 catch is fish that are used for bait, released dead, or filleted - they are killed, but identification is by individual anglers rather than trained interviewers.

Type B2 catch are fish that are released alive.

Year	HARVEST (TYPE A + B1)	TOTAL CATCH (TYPE A + B1 + B2)
2000	47,106	1,640,629
2001	5,799	1,422,319
2002	10,540	1,965,316
2003	17,297	3,264,740
2004	13,306	2,623,681
2005	19,090	2,731,706
2006	138,880	2,863,752
2007	69,857	2,303,413

Shaded values are those associated with a proportional standard error (PSE) of 0.20 or less and are considered more reliable than those with higher PSEs.

Source: National Marine Fisheries Service, MRFSS

Table 60. Recreational Catch (A + B1 + B2) in Numbers of Skates by State, 2000-2007.

	2000	2001	2002	2003	2004	2005	2006	2007
Maine	702	392	438	575	0	2,640	0	0
New Hampshire	26,751	21,052	23,029	11,792	14,998	18,872	13,070	82,478
Massachusetts	124,894	190,288	242,652	174,619	347,101	126,173	149,497	161,860
Rhode Island	61,777	78,199	100,512	53,007	86,039	65,711	66,680	112,061
Connecticut	181,702	3,213	9,163	125,226	38,606	34,603	70,184	57,347
New York	81,504	219,977	362,120	629,360	441,955	612,763	806,481	708,476
New Jersey	437,377	389,688	772,825	1,482,234	761,320	731,176	1,032,249	676,716
Delaware	42,346	71,405	71,186	136,875	150,229	160,301	166,025	77,725
Maryland	12,287	6,392	20,419	64,920	24,508	26,825	55,721	19,585
Virginia	83,611	142,068	102,231	114,594	171,898	412,604	207,181	151,542
North Carolina	577,586	290,527	248,340	439,677	565,723	528,014	287,051	234,890

Shaded values are those associated with a proportional standard error (PSE) of 0.20 or less and are considered more reliable than those with higher PSEs.

Source: National Marine Fisheries Service,MRFSS

7.5.1.7 Discards

Commercial fishery discard estimates of skates, for all species combined, were calculated and described in SAW 44 (NEFSC 2006). The method for calculating discards was revised from the method used in the previous skate assessment (SAW 30). The estimates were derived by a ratio-estimator approach, using discard/kept ratios, as described by Rago et al. (2005). Data from 1989 – 2005 are presented in the SAW 44 report, but updated estimates for 2000-2006, using the same method, are presented in Table 61. Discards have largely exceeded reported skate landings.

Table 61. Total estimated skate discards (mt) in Northeast Region commercial fisheries, 2000-2006.

Year	Total Discards
2000	47,995
2001	30,240
2002	49,296
2003	45,377
2004	19,885
2005	25,176
2006	15,372

Source: NEFSC

In general, skate discards have been declining since the 1990s (NEFSC 2006). Estimated discards for 2006 were by far the lowest of the recent time series (Table 61). Since 2000, approximately 65 – 83% of the total discards have been derived from otter trawl fisheries. Scallop dredge gear is the second largest discard component, followed by sink gillnet gear (NEFSC 2006). Effort reductions in the groundfish and scallop fisheries since the 1990s are thought to contribute to the decreasing trends in total skate discards, but increasing demand for skate wings may also be a significant factor (NEFSC 2006).

The discard mortality rates of skates captured by commercial fishing gear remains one of the biggest unknowns in the skate fisheries biology. A review of the primary literature reveals very little information on discard mortality of skate species of the northwest Atlantic or elsewhere. Acute mortality of several ray and skate species in an Australian prawn fishery was estimated at 56%, with highest mortality in smaller individuals and male specimens (Stobutzki et al. 2002). In a squid trawl fishery off the Falkland Islands, the acute mortality of several ray species was estimated at about 40% (Laptikhovsky 2004). Benoit (2006) hypothesized that winter skate acute discard mortality is at least 50% based on observations aboard trawl survey vessels in Canada. Based on this limited information, the Skate PDT and SSC have set all catch limits and associated targets using a 50% discard mortality assumption.

Delayed mortality resulting from injury, disease, or increased predation risk has not yet been investigated in any skate or ray species. Mortality is likely influenced by a suite of factors, including species, size, sex, gear, handling time and method, and environmental conditions. Research is currently under way to empirically assess acute and delayed discard mortality in members of the NE skate complex.

7.5.2 Description of the Skate Processing Sector

This section has not been updated since the 2000 SAFE Report for skates (NEFMC 2001). Much of the following information is also presented in Sections 7.5.1.1 and 7.5.1.2 of this SAFE Report.

Skates caught for lobster bait are landed whole by otter trawlers and either sold 1) fresh, 2) fresh salted, or 3) salted and strung or bagged for bait by the barrel. Bait skates are "processed" in that most are salted and strung or bagged by the buyers as preparation for use in lobster pots. A tremendous volume of salt is used in the bait operations, up to 130,000 pounds weekly during the peak of lobster season. Barrels of skates may weigh between 500 – 600 pounds. All "processing" of skates for lobster bait occurs at the level of the buyer/dealer and not the processor. No processing facilities are involved with skate products for use as lobster bait.

Skate wings are processed for export to various international markets. Winter skate, thorny skate, and barndoor skate are considered sufficient in size for processing of wings. Processors state that they prefer skate wings of at least 1-1 1/4 lb. skin-on. A one-pound skinless wing is estimated to weigh about 1.3-pounds skin-on. Skate processors buy whole, hand-cut, and/or onboard machine-cut skates from vessels primarily out of Massachusetts and Rhode Island. Cutting machines were developed in 1988 in response to increasing markets for skate wings and increased participation in the fishery. However, the practice of onboard machine cutting has decreased since that time and may not exist at all anymore. Cutting machines have been somewhat problematic because they can leave wing meat on the body of the skate or cut too close to the cartilage, decreasing the quality of the product and/or requiring additional hand-cutting. Processors prefer hand-cut wings because hand-cutting generally produces a better product and higher yield.

There are currently four known major skate wing processors in New England and another two companies in the Mid-Atlantic. The companies reportedly buy wings from vessels mostly from New Bedford and Mid-Atlantic ports. One major skate processing facility in New Bedford reports that about 90% of its product is landed in New Bedford, with the remainder trucked from Provincetown, Scituate, and other ports primarily in Massachusetts. Processors report that while demand for the product is generally consistent, profit margins are extremely low.

In total, nine processors from MA, RI, NY, and NH reported processing 3.9 million pounds of unspecified skate products. No further description of product form is available (e.g., whether frozen or fresh). Sales amounted to $3.2 million, for an average price of $0.81. These firms employ 514 workers.

The activities involved with skate processing depend on the market which the product serves. However, almost all wings are frozen for export. Wings processed for export to Europe are either skinless or skinless and boneless, and they are individually wrapped. In contrast, the Korean market prefers a whole frozen skate.

Data of annual production of processed and exported skate products is sparse. Limited trade data was collected by NOAA/NMFS for the New England Fisheries Development Program in 1975. Reports from an international seafood trade expert at the Seafood Institute indicate that skate export poundage was tracked through “Euro Stat Data” until 1995 or 1996, then abandoned. Customs does not track the exports, and no census data exists specific to skate exports.

7.5.3 Domestic and International Markets for Skates

This section has not been updated since the 2000 SAFE Report for skates (NEFMC 2001). Much of the following information is also presented in Sections 7.5.1.1 and 7.5.1.2 of this SAFE Report.

The current market for skate wings remains primarily an export market. France, Korea, and Greece are the leading importers. France prefers skate wings, a processed product that is either skinless or skinless and boneless; frozen individually wrapped in poly (IWP). The Korean market generally prefers whole processed skates, and there is a Japanese market for wings. There is also a market for skate wings in Portugal. The Portuguese market is reported to prefer barndoor skates over winter and thorny skates because they are the least stringy, most tender and flavorful of the wing skates. Interestingly, barndoor skates are said to fetch the lowest ex-vessel prices of the wing skates because they cannot be skinned by machine, as the skin tears too easily.

Brokers have also secured skates for the European and Asian markets from Argentina and Canada. Argentina initially produced a significant amount of skates, but they were reportedly of poor quality. Processing techniques have improved, and Argentina now provides the bulk of the European and Asian market. Argentina supplements their skate production with large skates produced from the U.S. west coast fishery. Canadian production of skates for the export market has diminished, as some of the industry switched toward more lucrative crab and shrimp fisheries.

7.5.4 Economic information

This section presents available economic information on the skate fishery. This includes a brief summary of the economic frameworks (supply and demand) for both the lobster bait market and the wing market; information about dockside prices for skates; trends in revenues from skate landings; and information about skate vessels, dealers, processors, and trade.

7.5.4.1 Economic Framework

The dockside markets for skate wings and bait are depicted in Figure 16 and Figure 17 in stylized form. These graphs are intended only to convey a sense of the economic benefits and costs of regulating skate fisheries. That is, we do not yet have the data necessary to estimate empirical demand and supply relationships.

The dockside demand for skate wings is derived from consumer demand in overseas markets Figure 16. In the most simple case where the U.S. provides only a small quantity of the global supply of skate wings, dockside price is set by international demand and supply of raw fish. The dockside prices of other export products such as Atlantic bluefin tuna, monkfish, and sea urchin roe are probably similarly determined. A restriction on skate wing landings (if that happens) puts a kink in the U.S. landings supply at the dotted line. The short run costs of such a restriction on the fishing industry and U.S. economy is triangular area ***A*** in Figure 16, which is above the competitive supply curve (which traces costs) and below the price line. (Impacts on foreign businesses and consumers generally are not factored into a benefit-cost analysis of domestic fisheries management.) Over the long run, recovery of skate populations (if that is a problem) would increase supply (i.e., shift the supply curve to the right), so the net effect of current losses and future gains would have to be weighed.

In contrast, the demand for skate bait is an input demand from the lobster fishery Figure 17. In this case, a regulation that reduces skate bait landings in the short run could increase dockside price from “low” where demand and supply intersect to “high” where the new, lower landings hit demand. Conventional economic wisdom would then have costs increase in the lobster fishery, reducing supply. The area ***A’*** in Figure 17 is the overall short run loss of net benefits felt by the lobster fishery and, to an extent, consumers and the seafood sector (depending on the type of demand). Likewise, area ***A*** in Figure 17 measures the same loss in the dockside skate market. In the long run, the economic sense of such a regulation depends on the cumulative results over time.

Figure 16 and Figure 17 oversimplify the skate wing and bait markets in order to illustrate essential market economics. For example, the cost of skate wing landings would be close to zero when skates are, in fact, an incidental harvest in other fisheries. In addition, these graphs leave out a number of factors that comprise dockside demand, including attributes of the landed products and the prices of substitutes. For example, “dinner plates” are the preferred size of skate bait, and herring, mackerel, and menhaden are also used for lobster bait depending on the harvesters’ preferences. Finally, these few lines do not adequately distinguish between benefit-cost analysis on the one hand and regional economic and financial analyses on the other. See Edwards (1994) for a primer.

7.5.4.2 Dockside Prices for Skates

Prices reveal important information about the economic benefits and costs of fishery regulations. Only a general review of 1999 prices will be provided in this first Skate SAFE Report.

During 1999, virtually all skate landings reported in the dealer reports (weighout data) were classified as skate wings (n=14,027 trips) or "unclassified skates" (n=1434 trips). The low average price of $0.06 per pound for "unclassified skates" suggests that these landings were primarily intended for lobster bait. This is supported by the bait utilization code reported by most dealers. About 67 percent of the assumed bait landings were priced at $0.06, and over 99 percent of the trips were priced at $0.13 or less. In contrast, the average trip price for skate wings was $0.38 in 1999, and 99 percent of the prices were a dollar or less. The average price of barndoor skates reportedly landed on 25 trips was $0.13.

The price data were analyzed for differences across month, state, and fishing gear. The "unclassified skate" data were limited to records that dealers identified as skate bait and were priced at $0.13 or less (n=1079). Skate wing records were limited to those priced at $1 or less (n=13,550).

Average dockside prices of skate landings during 1999 are reported by month in Figure 18 and Figure 19. Bait prices varied significantly by month with $0.06 lows during February and September and a $0.08 peak in June (Figure 18). There were also significant monthly differences in dockside skate wing prices with a low of $0.28 in June and high of $0.54 in March (Figure 19).

Price differences were also found among fishing gears. Skate bait caught by fish otter trawls averaged about $0.06 during 1999 (n=952) compared to about $0.08 received by sink gillnetters (n=112). Other gears that landed skate bait took fewer than 10 trips. The prices of skate wings landed by otter trawl vessels (n=8318) were similar but significantly greater than sink gillnet dockside prices (n=4551) (Figure 20). The other gears included in Figure 20 had fewer than 250 trips.

Finally, skate prices also varied by state during 1999. Bait prices in NJ where skates are caught primarily by gillnet vessels averaged 2 cents more than what otter trawl vessels received in RI ($0.08 versus $0.06). Dealer reports from the CT general canvas do not specify the intended use of skate landings, but the average price of $0.06 suggests bait. In contrast, skate wings are landed throughout the northeast region except in NC (Figure 21). Maine fishermen were paid an average of $0.45 for skate wing landings compared to $0.40 in MA, NY, and NJ. Average prices in other states were significantly less than $0.40.

Figure 16 Stylized Dockside Market for Skate Wings

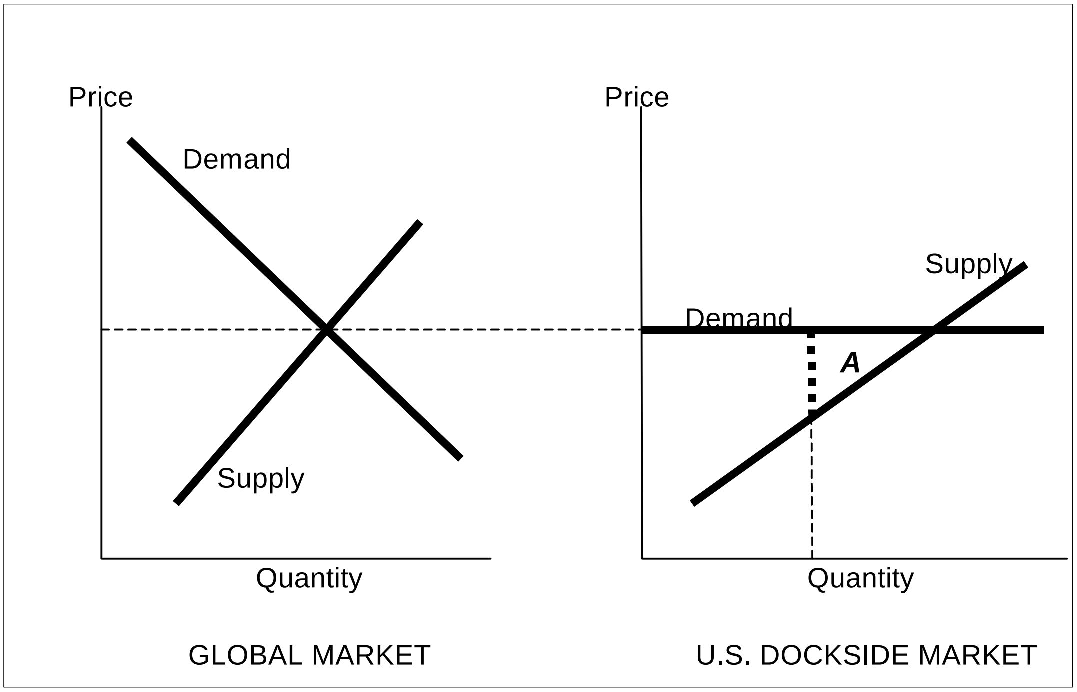


Figure 17 Stylized Dockside Market for Skates as Lobster Bait

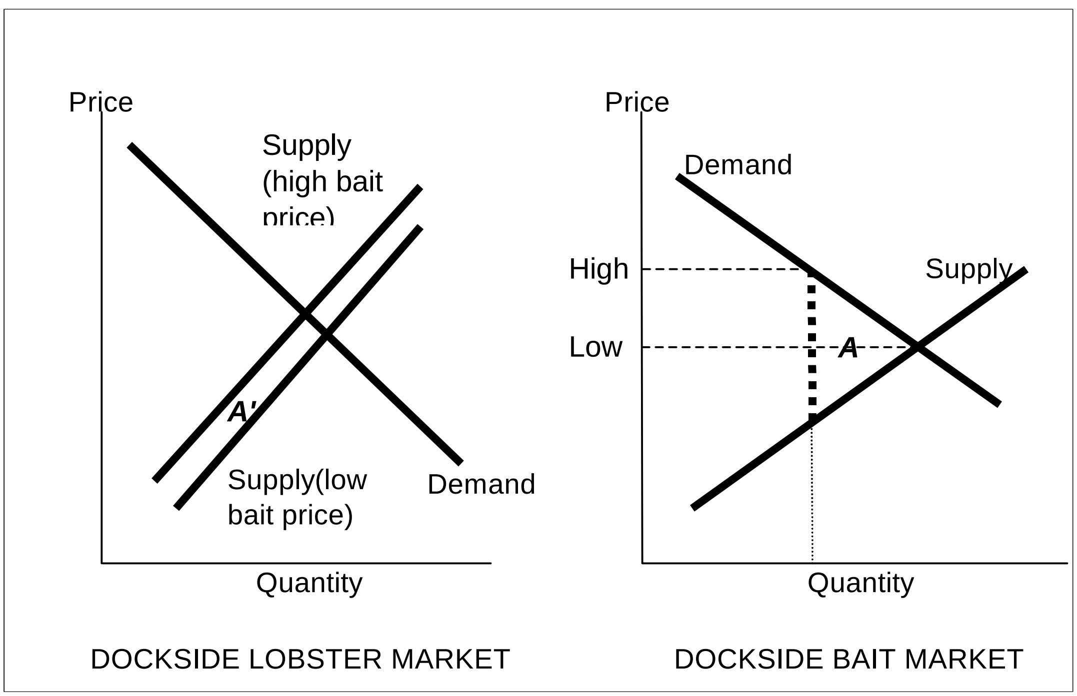


Figure 18 Monthly Averages of Individual Trip Skate Bait Prices ($ per pound landed)

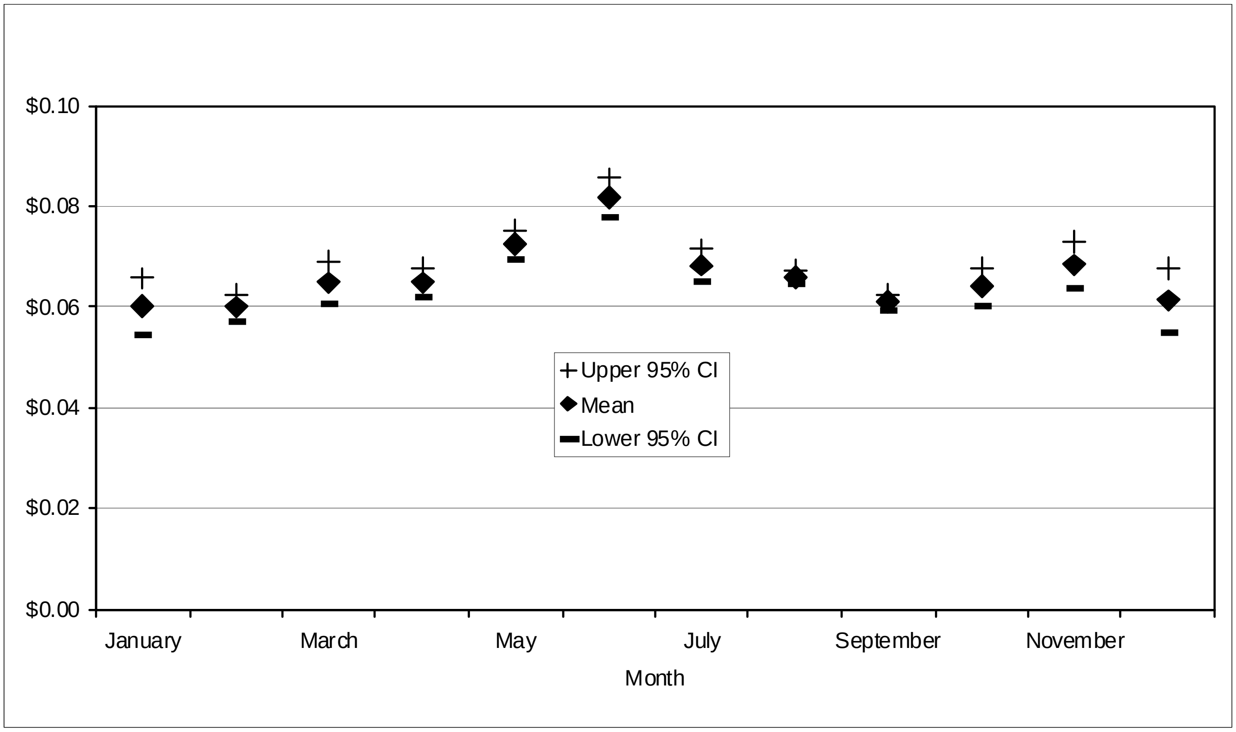


Figure 19 Monthly Averages of Individual Trip Skate Wing Prices ($ per pound landed)

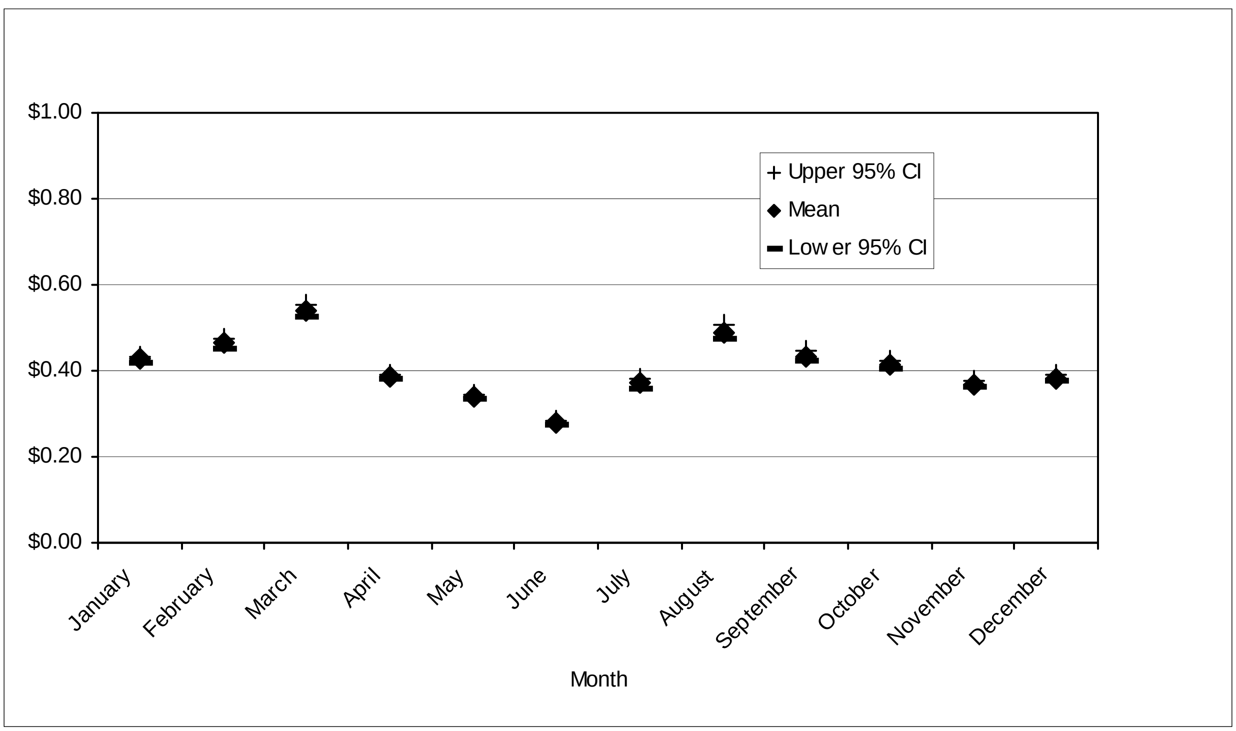


Figure 20 Comparison of Average Skate Wing Prices ($ per pound) by Gear, 1999

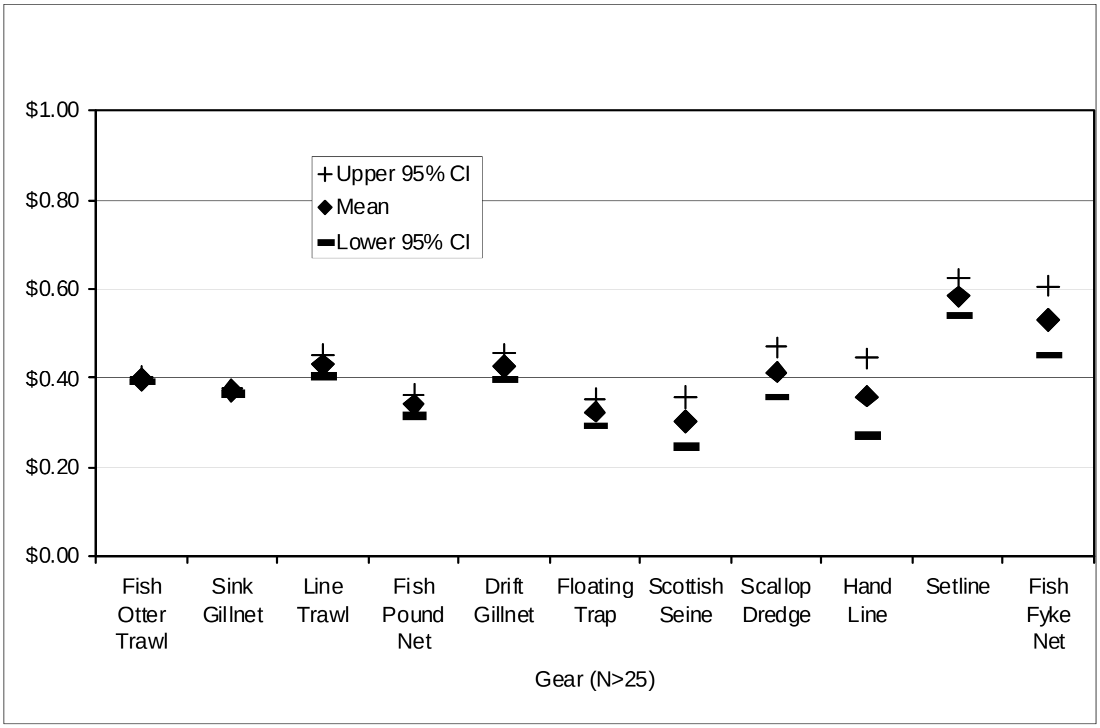
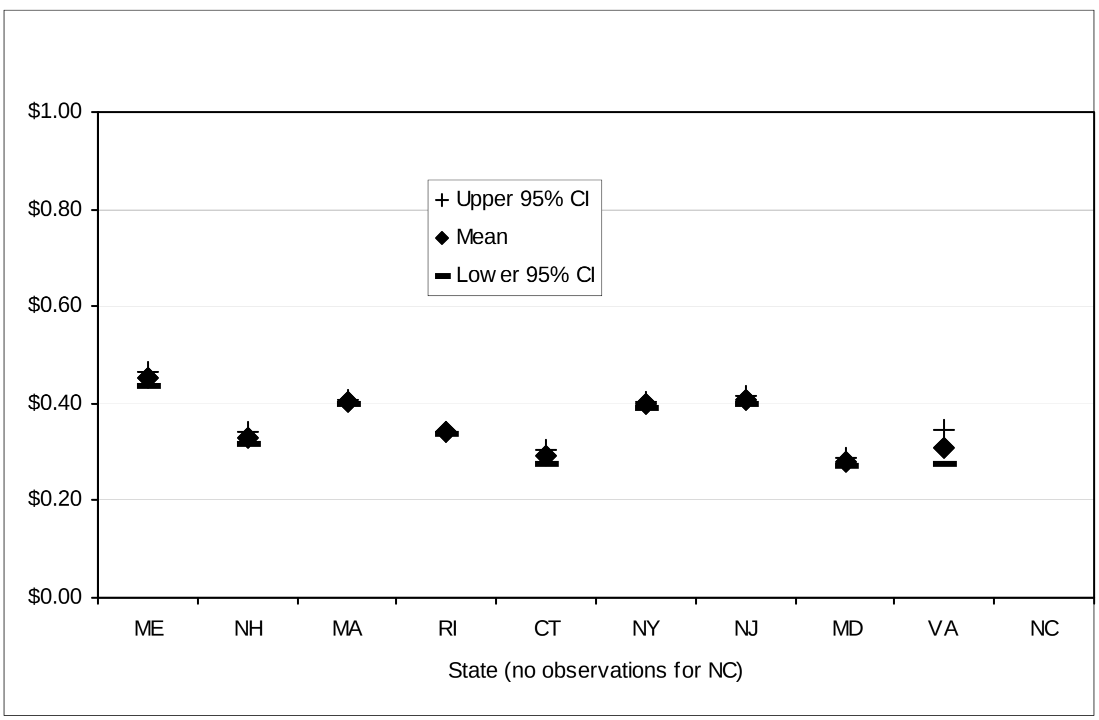


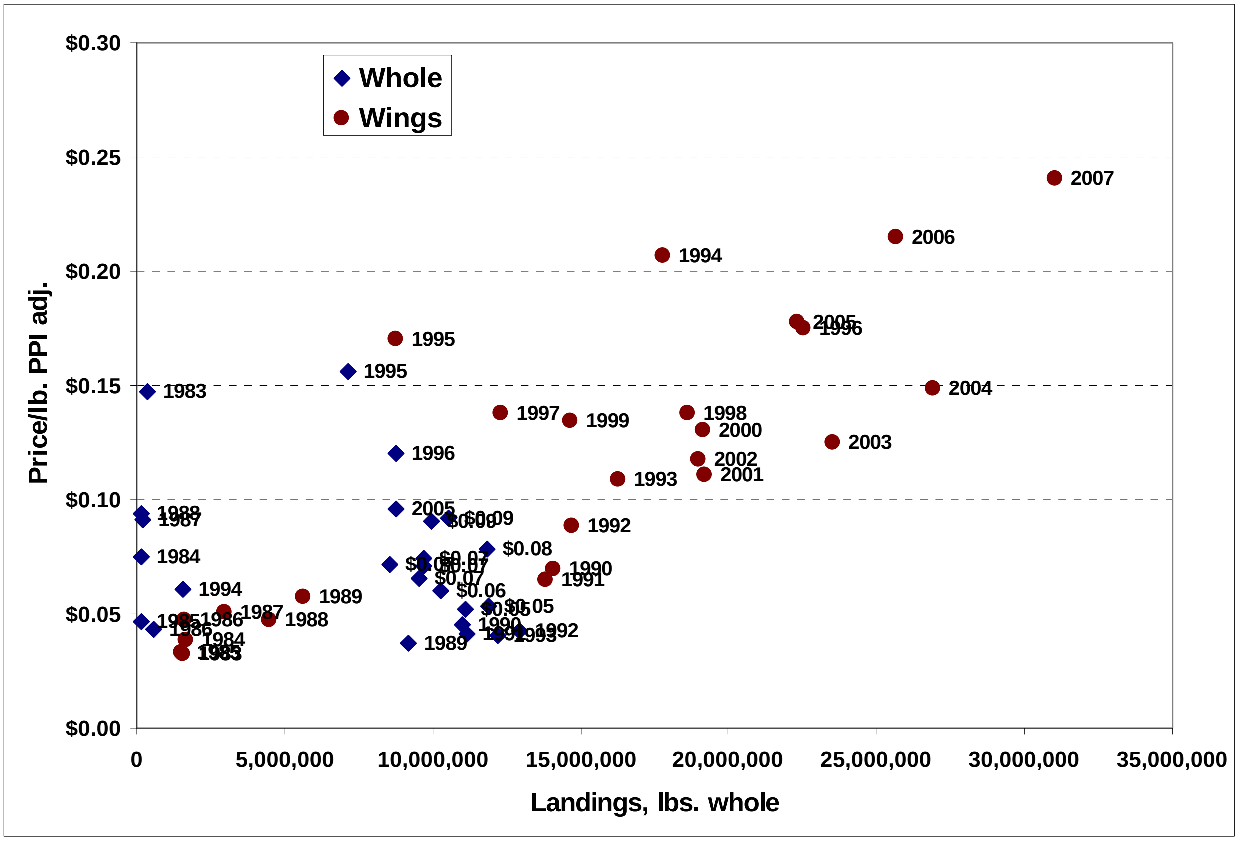
Figure 21 Comparison of Average Skate Wing Prices ($ per pound) by State



More recently, PPI-adjusted prices for skate wings have risen (Figure 22) and landings have risen, partially as a result of the higher prices but also because vessels with DAS allocations have been subject to greater groundfish fishing restrictions. Generally, the prices paid for skate wings has been higher than those paid for whole skates (presumably product quality is better for a food market) and since 2004, prices have been above $0.15 per pound.[42] Average skate wing prices in 2007 rose to nearly $0.25 per pound and the 2007 skate wing landings were the highest on record.

PPI-adjusted prices for whole skates, most of which are landed to supply bait to the lobster fishery, have been relatively stable. Except for three years[43], whole skate prices have been generally less than $0.10 per pound and annual landings in recent years have been around 10,000,000 lbs.

Figure 22. PPI adjusted annual prices for skate wing and whole skate landings compared to quantity landed (whole weight).



7.5.4.3 Price Models

See Section 8.7.3 which analyzes the effects of Amendment 3 alternatives and updates skate price models to estimate producer and consumer surplus.

7.5.4.4 Revenues from Skate Landings

Fishermen in the northeast region earned $3.178 million from skate landings in 1999. Skate wings returned $2.461 million, and revenues in the dealer "unclassified" market category – nearly all skate bait

42 Prices for skate wings are actually higher by a factor of 2.27, but these wing prices have been converted to a whole-weight equivalent to be on the same metric as prices for whole skate landings.
43 The higher prices in 1983, 1995, and 1996 may have been influenced by mis-reported (or erroneously recorded) landings of skate wings.

– were $0.717 million. Dockside skate revenues contributed less than 0.3 percent to total fisheries revenues in the northeast region in 1999.

Revenues from skate landings are reported by state in Figure 23. Rhode Island was the leading skate bait state where fishermen grossed $571 thousand for skate bait, more than all other states combined. Fishermen from Connecticut and New Jersey received an order of magnitude less revenue from skate bait landings – $59 thousand and $50 thousand, respectively. Skate bait revenues were less than $8 thousand in all other states. In contrast, Massachusetts lead all states in skate wings dockside revenues with more than $1.8 million, followed distantly by RI ($196 thousand), NJ ($187 thousand), NY ($129 thousand), and ME ($105 thousand) (Figure 23). Skate wings revenues were less than $25 thousand in all other states.

Figure 23 also reports the relative contribution of skate dockside revenues to total state fishery revenues in 1999. In Rhode Island, the leading skate bait state, total skate revenues (bait and wings) was not quite one percent of total fisheries earnings. In Massachusetts, the leading skate wings state, total skate returns were 0.7 percent of total dockside revenues. Revenues from skate landings amounted to less than 0.25 percent of total fisheries revenues in all other states.

Figure 24 reports the contribution of skate landings to total dockside revenues during 1999 by gear type. Otter trawl fishermen received $2.644 million from skate wings and bait landings – 83 percent of total skate revenues in the region – which amounted to 1.5 percent of total gross returns for this gear. Sink gillnet fishermen were paid $447 thousand for skate landings – 14 percent of total skate revenues – which amounted to one percent of the gear's total earnings in the region. Skate landings contributed less than 0.25 percent to returns from other gear sectors.

The state and gear data were cross-tabulated to more closely examine dependence on skate earnings. Figure 25 shows results for combinations of states and gear types with at least 0.5 percent dependence on skates. Sink gillnet fishermen in New Jersey received 4.3 percent of their total annual revenues from skate landings, followed by line trawl fishermen with 3.9 percent. All other combinations were less than 3 percent dependent on skates landings during 1999, including otter trawl and sink gillnet fishermen in Massachusetts and Rhode Island.

Finally, skate dockside revenues were also investigated by port (Figure 26). Provincetown, Massachusetts received 6.1 percent of its total $3.5 million in dockside revenues from skate landings, followed by Tiverton, Rhode Island with 4.2 percent out of $3.8 million for the entire port. The principal skate ports – Point Judith, RI for bait and New Bedford, MA for wings – obtained 1.1 percent of total fisheries revenues from skate landings.

Figure 23 Contribution of Skate Landings to Total State Fisheries Revenue, 1999

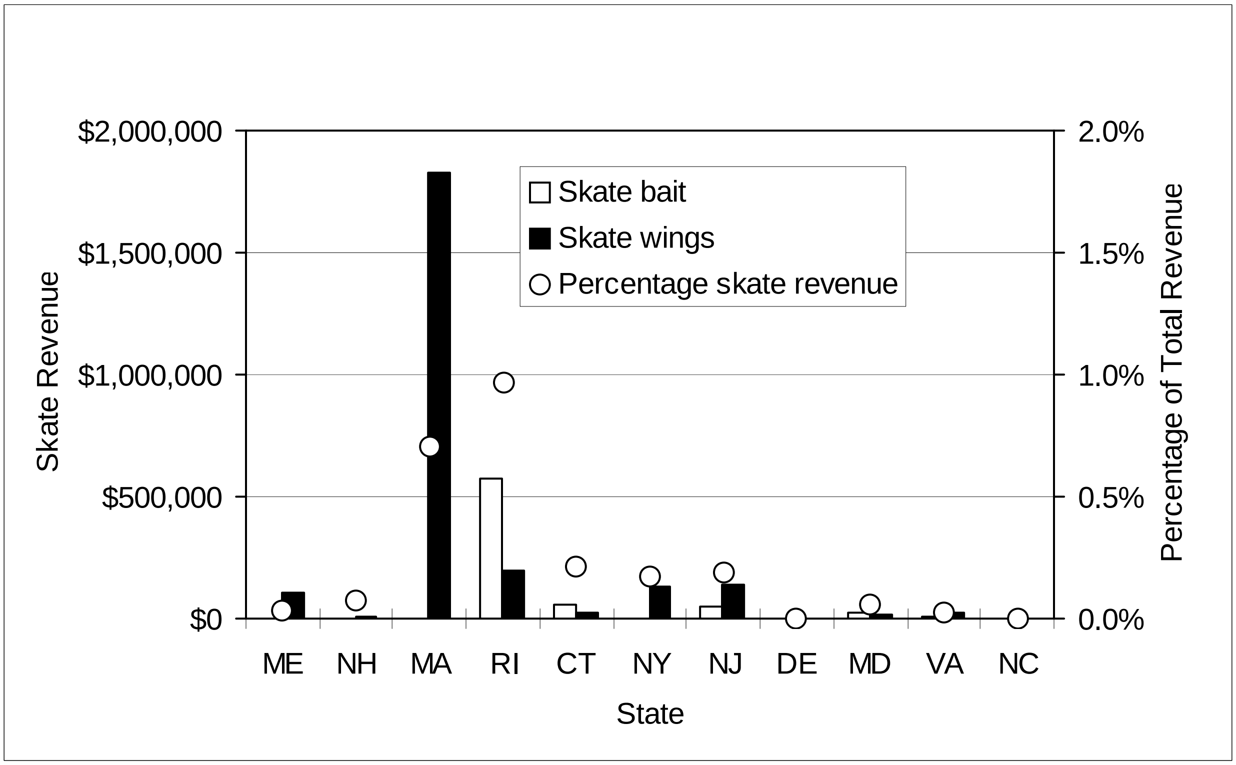


Figure 24 Contribution of Skate Landings to Total Gear Revenue, 1999

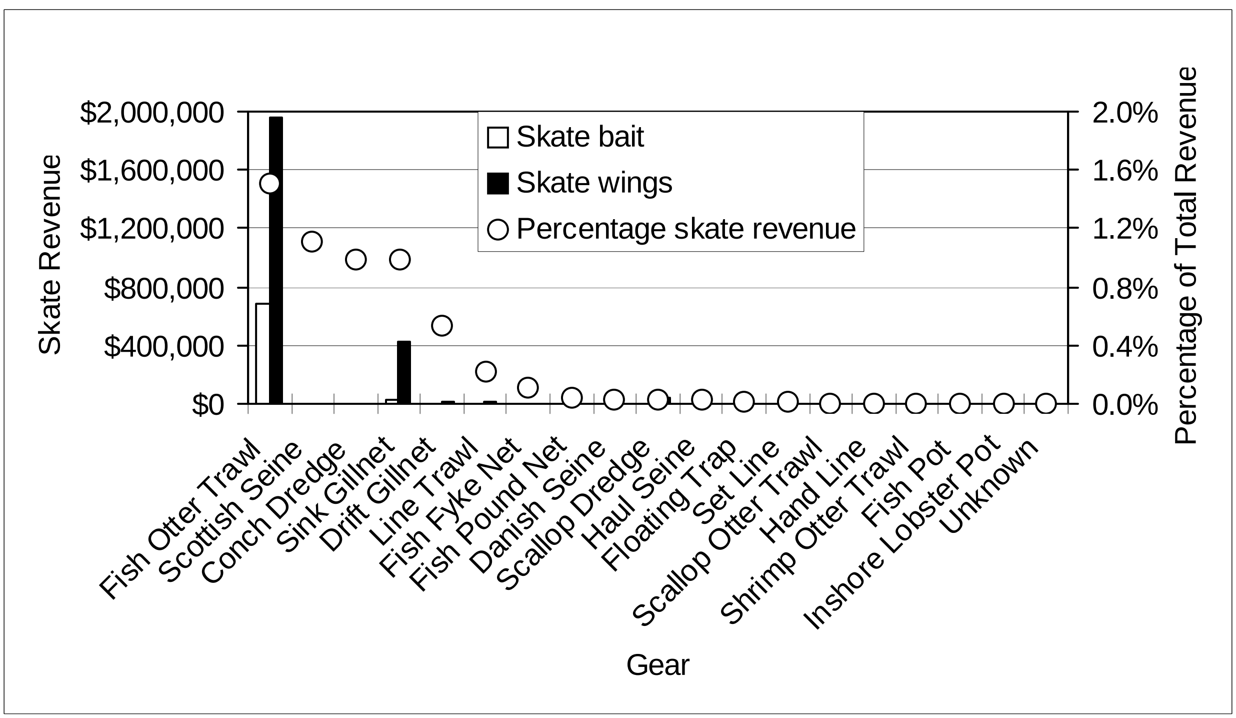


Figure 25 Contribution of Skate Revenues (0.5% or more) to Combinations of Gear and State, 1999

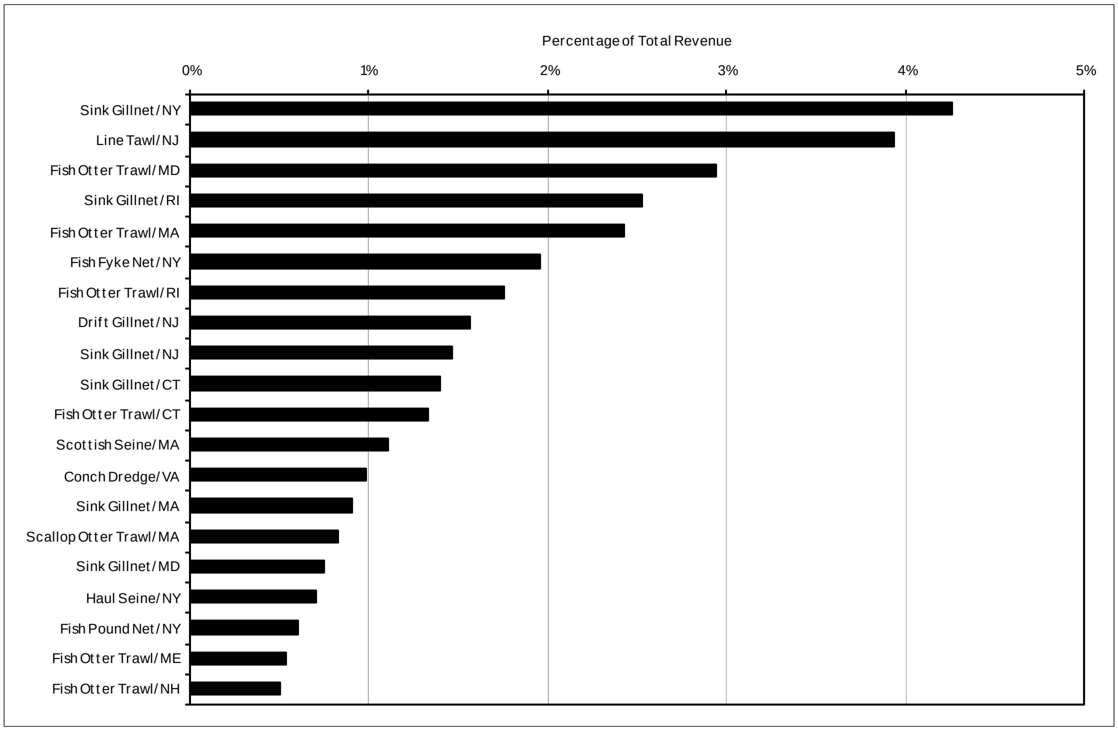
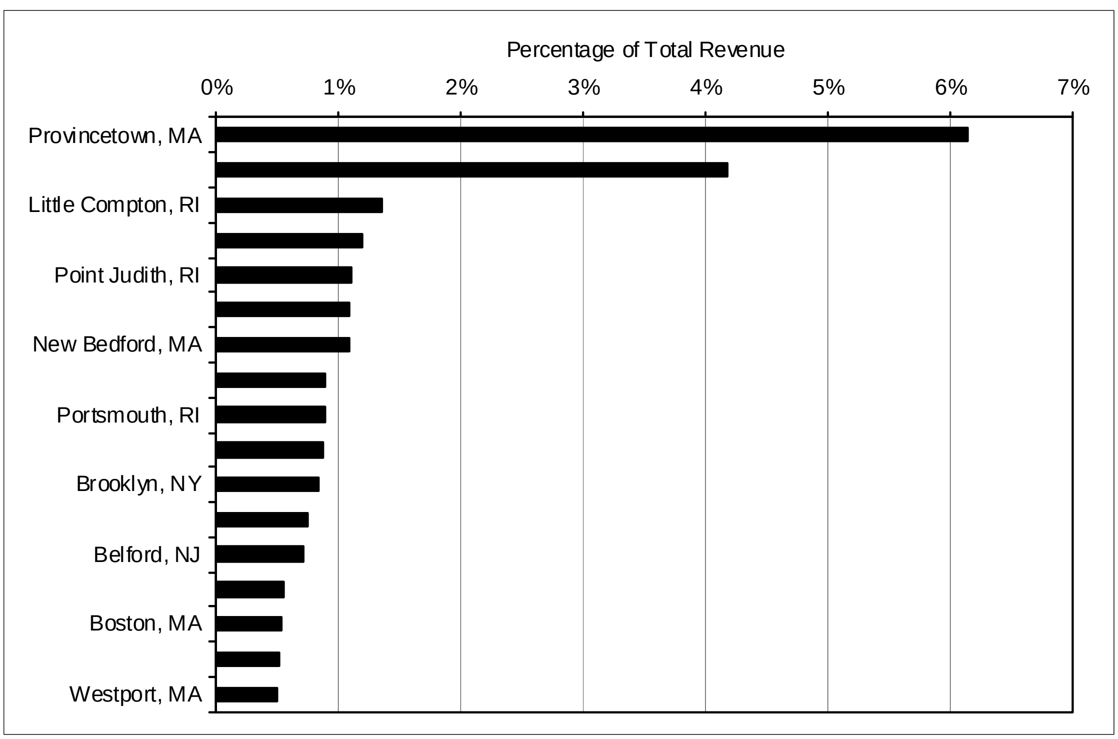


Figure 26 Contribution of Skate Revenues (0.5% or more) to Ports



7.5.5 Skate Vessels

Fishery landings data were investigated for skate landings at the vessel level during 1999. According to the fishermen's logbook source, 817 vessels reported skate landings on 15,500 fishing trips in 1999. The dealer report (so-called "weighout") figures were similar – 802 vessels landing skates on 14,508 trips. The difference between these two sources - 15 vessels and 992 trips - is due to information missing from state General Canvas data at the vessel and trip levels, especially from CT, NY, and NJ.

Vessel and trip counts from dealer data were also made by market category. "Unclassified skates" (primarily skate bait) was landed by 120 vessels on 1,304 trips, and 775 vessels landed skate wings on 13,614 trips. A comparison of these market category results with the combined results reported above indicate that 93 vessels landed both skate bait and wings on 410 trips. As above, vessels aggregated in the state General Canvas reports could not be included.

The vessel and trip counts from 1999 dealer data are separated by ton class in Table 62. About 56 percent of the vessels that landed skate bait or skate wings during 1999 were of ton class 2 size, and these vessels made the most trips. Ton class 3 vessels were also common, especially among vessels that landed skate bait where they comprised 40 percent of both the vessel population and trips. The 72 ton class 4 vessels that landed skate wings comprised over nine percent of the vessel population and less than five percent of trips. Ton class 2 and 3 vessels which landed skate bait averaged 11 trips. In contrast, ton class 2 and 3 vessels which landed skate wings averaged 20 trips and 16 trips, respectively.

Table 62 also contains information related to vessel gross performance (landings and gross revenues before costs). Although ton class 2 vessels were most numerous and took most trips, ton class 3 vessels landed two (wings) to three (bait) times more skates in 1999. Total dockside revenues were likewise greater. In addition, ton class 2 vessels were less productive than ton class 3 vessels. For example, ton class 3 vessels averaged 14.3 thousand pounds of skate bait per trip and $875 per trip compared to 3.3 thousand pounds and $210 by ton class 2 vessels. Similarly, ton class 4 vessels averaged $650 per trip from skate wing landings compared to $350 and $65 by ton class 3 and 2 vessels, respectively. Average revenues per trip were at least 2.5 times greater for skate bait landings than for skate wing landings.

Information in Table 62 also highlights the contribution of skate revenues to total trip and annual revenues. Skate bait landings comprised about 21 percent and 30 percent of total trip revenues for the ton class 2 and 3 vessels, respectively. When total annual fishing activity is considered (all fisheries), the contribution of skate bait drops to about three percent or less for these vessels. From a different standpoint, revenues earned from all trips that landed skate bait (all species on these trips) contributed about ten percent of annual gross returns from all fisheries for both ton classes.

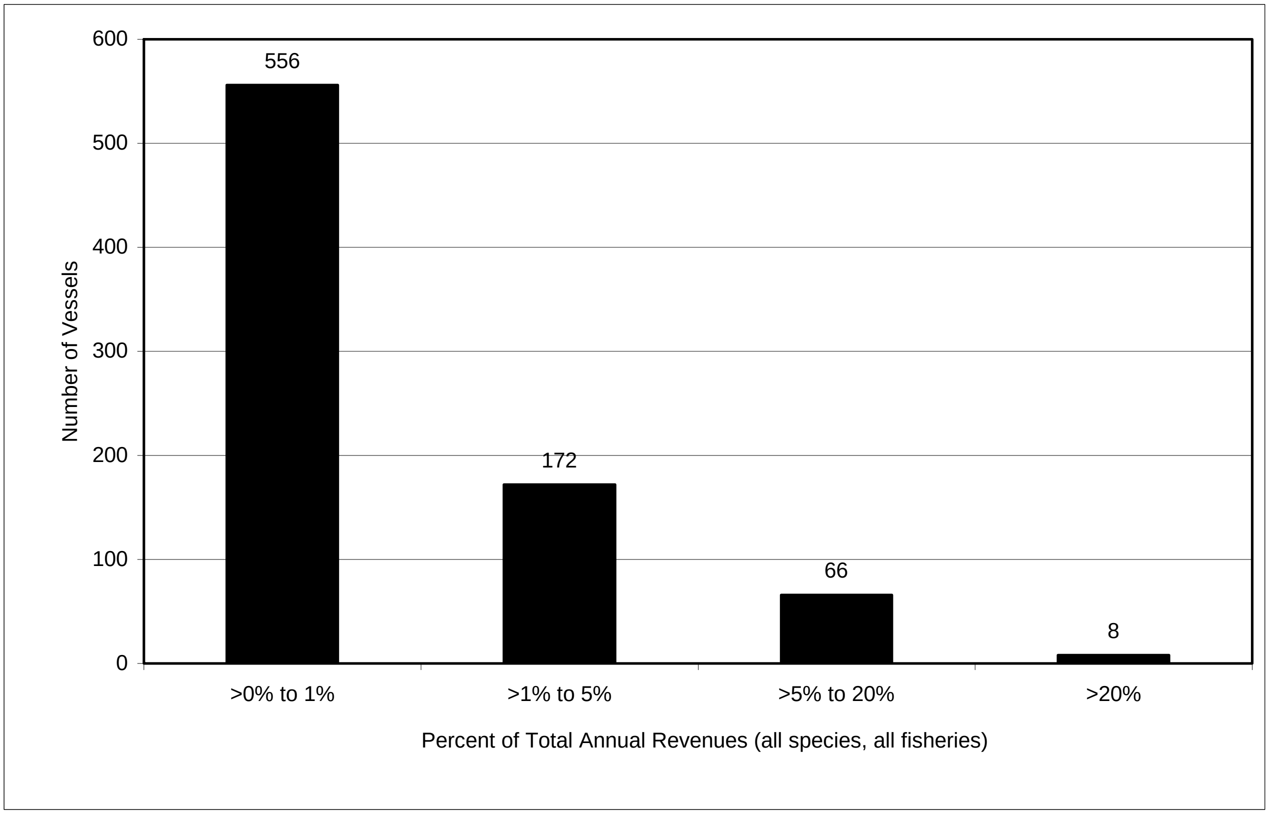
Overall, vessels that land skate wings are less dependent on skate resources for annual revenues (Table 62). Ton class 3 vessels derived 5.5 percent of trip revenues from skate wings compared to about three percent by the ton class 2 and 4 vessels. Once all species are included for the year, the dependence on skate wings drops to less than two percent for each tonnage class. Total revenues from trips that landed skate wings amounted to 28 percent or more of total annual revenues for each ton class.

Figure 27 groups the 802 vessels from the 1999 dealer reports into categories depending on the relative importance of skate revenues to total annual revenues from all species. Nearly 70 percent of these vessels earned one percent or less of total annual revenues from skate bait and wings landings during 1999. In contrast, eight vessels – one percent of total vessels landing skates in 1999 – derived at least 20 percent of gross revenues from skates.

Table 62 Vessel Counts, Trip Counts, and Measures of Economic Importance
**Trips Were Limited To Vessels Identified In The Weighout Data*

Categories	Measure	Tonnage Class			
		1	**2**	**3**	**4**
Trips Landing Bait	Number of vessels	1	68	48	3
	Number of trips	1	766	524	13
	Trips per vessel	-	11	11	4
	Landed weight (M lbs)	-	2.496	7.477	0.021
	Landings per trip (lbs)	-	3260	14,270	1600
	Dockside revenue ($K)	-	$162	$459	$2.5
	Revenue per trip ($)	-	$210	$875	$190
	Revenue per vessel ($)	-	$2380	$9560	$830
	Total trip revenue (all species caught) ($K)	-	$786	$1539	$36
	Skate revenue (% of trip revenues)	-	20.6%	29.8%	6.9%
	Vessels' total annual revenue ($K)	-	$8041	$14,727	$1,568
	Skate revenue (% of annual revenue)	-	2.0%	3.1%	0.2%
	Trip revenues (% of annual revenue)	-	9.8%	10.4%	2.3%
Trips Landing Wings	Number of vessels	1	437	265	72
	Number of trips	1	8838	4137	638
	Trips per vessel	-	20	16	9
	Landed weight (M lbs)	-	1.693	3.636	1.018
	Landings per trip (lbs)	-	190	880	1600
	Dockside revenue ($K)	-	$570	$1437	$414
	Revenue per trip ($)	-	$65	$350	$650
	Revenue per vessel ($)	-	$1300	$5420	$5750
	Total trip revenue (all species caught) ($K)	-	$18,329	$25,968	$14,325
	Skate revenue (% of trip revenues)	-	3.1%	5.5%	2.9%
	Vessels' total annual revenue ($K)	-	$51,443	$87,363	$51,515
	Skate revenue (% of annual revenue)	-	1.1%	1.6%	0.8%
	Skate trip revenue (% of annual revenue)	-	35.6%	29.7%	27.8%
Trips Landing Bait and/or Wings	Number of vessels	1	455	272	74
	Number of trips	1	9446	4410	650
	Landed weight (M lbs)	-	4.189	11.113	1.039
	Dockside revenue ($K)	-	$732	$1896	$416
	Total trip revenue (all species caught) ($K)	-	$18,834	$26,473	$14,357
	Skate revenue (% of trip revenues)	-	3.8%	7.2%	2.9%
	Skate trip revenue (% of annual revenue)	-	1.4%	2.1%	0.8%

Figure 27 Dependence of Individual Vessels (N=802) on Skate Revenues in 1999: Percent of Total Annual Revenues



The results in Table 62 suggest that there is a skate bait fishery but that skate wings are caught primarily in mixed-species fisheries. These possibilities were explored by looking at only a subset of vessels that met the following two arbitrary criteria: (1) landed skate bait (wings) on at least four trips; and (2) skate revenues amounted to at least 25 percent of total trip revenues. These criteria resulted in 21 vessels (mostly ton class 2) that landed skate bait on 699 trips, and 37 different vessels (mostly ton class 3) that landed skate wings on 598 trips. Nineteen of the skate bait vessels used otter trawl gear, and the other two vessels used sink gillnets. Regarding skate wings, 31 vessels used otter trawls, five vessels used gillnets, and one vessel used a sea scallop dredge.

The 21 vessels that presumably targeted skates for bait landed 7.8 million pounds of skates in 1999, or 80 percent of the total skate bait landings by vessels identified in the dealer weighout data. These vessels averaged 33 trips in 1999 (three times more than the total population average). Skate landings (11.1 thousand pounds) and revenues ($680) per trip averaged more than three times more than the population average for ton class 3. (These results are influenced somewhat by the inclusion of six ton class 4 vessels). Skate revenues averaged nearly 50 percent of total trip revenues and 15 percent of total annual revenues for these vessels.

The 37 vessels that presumably targeted skates for wings landed 2.0 million pounds of skate wings, or nearly a third of the total skate bait landings by vessels identified in the dealer weighout data. The average of 16 trips a year did not differ from the population of ton class 2 and 3 vessels, but average skate landings (3.3 thousand pounds) and revenues ($1300) per trip were considerably greater. Skate revenues averaged 44 percent of total trip revenues and six percent of total annual revenues for these vessels.

Other species harvested while on presumed skate trips are summarized in Table 63. In this case, a targeted trip (vis-à-vis vessels that target skates during the year as addressed above) was arbitrarily defined as follows: (1) skate bait landings >=10,000 pounds; and (2) skate wing landings >=4,000 pounds (9,000 pounds live weight). This selection resulted in 317 skate bait trips by 15 vessels, and 304 skate wing trips by 80 vessels.

Skates amounted to 93 percent of total landings, by weight, on the skate bait trips but only 47 percent of trip revenues. Groundfish, monkfish, and summer flounder comprised 49 percent of total revenues one these trips. Skates amounted to 58 percent of total landings on skate wing trips (live-weight basis), but only 17 percent of total trip revenues. Groundfish was the most important source of revenues (69 percent), but monkfish (7 percent) and lobster (6 percent) were also important to the profit margin.

Table 63 Other Species Landed While Targeting Skates
Trips were selected if the following criteria were met: (1) skate bait landings >=10,000 pounds; and (2) skate wing landings >=4,000 pounds (9,000 pounds live weight). This selection resulted in 317 skate bait trips by 15 vessels, and 304 skate wing trips by 80 vessels. Landings are on a live weight basis in thousands of pounds. Revenues are in thousand of dollars.

Species/FMP	Skate Bait Trips		Skate Wings Trips	
	Landings	Revenues	Landings	Revenues
Skates	7773	$479	6266	$1074
Groundfish (10 large mesh species)	191	$215	3890	$4445
Groundfish (3 small mesh species)	35	$8.3	0.1	$0.07
Monkfish	251	$186	535	$466
Summer flounder	41	$97	22	$46
Squid/Mackerel/Butterfish	19	$14	1.7	$1.6
Scup/Black sea bass	6.8	$8.6	0	0
Sea scallop (General Category)	0.8	$0.5	20	15
Lobster	0.4	$1.6	85	$391
Spiny dogfish	0	0	0.01	$0.004
Other	23	$9.7	65	$15

Table 64 provides additional preliminary information on the economic performance of skate bait vessels in Rhode Island. This information was taken from the 1999 vessel logbook data instead of dealer reports because logbooks are the only source of data on crew size and trip length. In order to single out directed trips, the analysis was restricted to trips that landed at least 10,000 pounds of skates (captain's hail weight on logbooks) and were no more than four days long. Revenues were calculated using a $0.06 price per pound.

The (non-random) sample of directed bait trips was partitioned by tonnage class and trip length (Table 64). Day-trips by tonnage class 2 and 3 vessels each averaged 0.5 days, but the larger vessels used one more crew and had greater horsepower. As a consequence, skate landings and revenues were greater on overnight trips which averaged at least two days. However, catch and revenues per unit effort were at least twice as large on day-trips. Trip expenses such as fuel need to be factored in before the profitability of trip lengths can be assessed.

The data summarized in Table 64 were also used to estimate a preliminary trip production function for vessels targeting skate bait. The Cobb-Douglas algebraic form – i.e.,
$Q = aL^bK^c$, where L is labor, K is capital, and lower case letters are parameters that need to be estimated – was selected because of its familiarity. This form is linear in the parameters when transformed by natural logarithms. Trip landings were regressed on fishing effort, crew, and horsepower. Know that crew size

was increased by one for all records because the natural logarithm of crew size when crew is equal to one is undefined. These data were from only 1999, but a longer time series would also require specification of skate stock size (i.e., natural capital).

Table 64 Vessel Characteristics and Gross Performance of RI Vessels that Targeted Skate Bait During 1999

Data are from vessel logbooks. Values other than number of vessels and trips are averages. CPUE is skate landings per unit effort (i.e., day-at-sea), and RPUE is skate revenue per unit effort.

Variable	Tonnage Class 2 (5-50 GRT)		Tonnage Class 3 (51-150 GRT)	
	Trip <=1 Day	Trip >1 to 4 Days	Trip <=1 Day	Trip >1 to 4 Days
Number of vessels	6	5	6	7
Number of trips	185	33	239	115
Effort (days-at-sea)	0.5	2.4	0.5	2.0
Landings (hail weight in pounds)	8166	13,492	16,091	33,110
CPUE	15,457	6055	34,892	16,919
Revenues	$491	$810	$965	$1987
RPUE	$927	$363	$2094	$1015
Skate as percentage of total trip landings	97%	93%	96%	93%
Crew size	1.9	1.7	2.7	2.9
Horsepower	271	293	545	425
Gross registered tons	26	21	93	93

The estimated skate bait trip production model is reported in Table 65. More than 50 percent of the variation in trip landings is explained by this model (R^2=0.53). Much of the remaining variation probably could be explained by captain skill and within year changes in stock size and fish size. Each input is a significant determinant of landings. There appear to be diminishing returns to effort. That is, a one percent change in effort results in less than a one percent change in landings. In contrast, the crew size and horsepower parameters are about equal to one, which suggests that landings change in equal proportions. The potential effects of multicollinearity on parameter estimates should be investigated before this model is used to predict the effects of these inputs on landings, however.

Similar production functions were not estimated for mixed species trips that landed skate bait or wings because this requires specifying more complex models with joint outputs. That is, substantial quantities of species other than skates are landed on other trips.

7.5.5.1 Skate Dealers

Nearly three-quarters of the 522 dealers who bought raw fish from fishermen in the northeast region in 1999 did not purchase skate landings. Skates amounted to one percent or less of total expenditures for raw fish by 104 dealers (Figure 28). In contrast, payments for skate landings amounted to at least five percent of total dockside purchases for 11 dealers from MA (8), RI (2) and NY (1). Three of these dealers were at least 20% dependent on skates for their total dockside purchases in 1999. Dealers that are not specifically identified in the General Canvas reports from some states (e.g., CT) are not included in these totals.

Table 65 Preliminary Regression Model of Skate Bait Landings on Targeted Trips by RI Trawl Vessels, 1999

The regression (F-statistic) and parameters (t-statistic) are significant at the 99 percent level of confidence. The dependent (landings) and independent (production inputs) are natural log transformed. Some trips had only one crew which has an undefined logarithm; there, 1 was added to all values of crew. The regression (F-statistic) and parameters (t-statistic) are significant at the 99 percent level of confidence.

Regressor	Parameter Estimate	t-statistic	N	F-statistic	R^2
Intercept	3.012	7.067	572	214.22	0.53
Effort (days-at-sea)	0.574	15.58			
Crew (value plus 1)	1.157	7.26			
Horsepower	0.868	9.93			

7.5.5.2 Processors

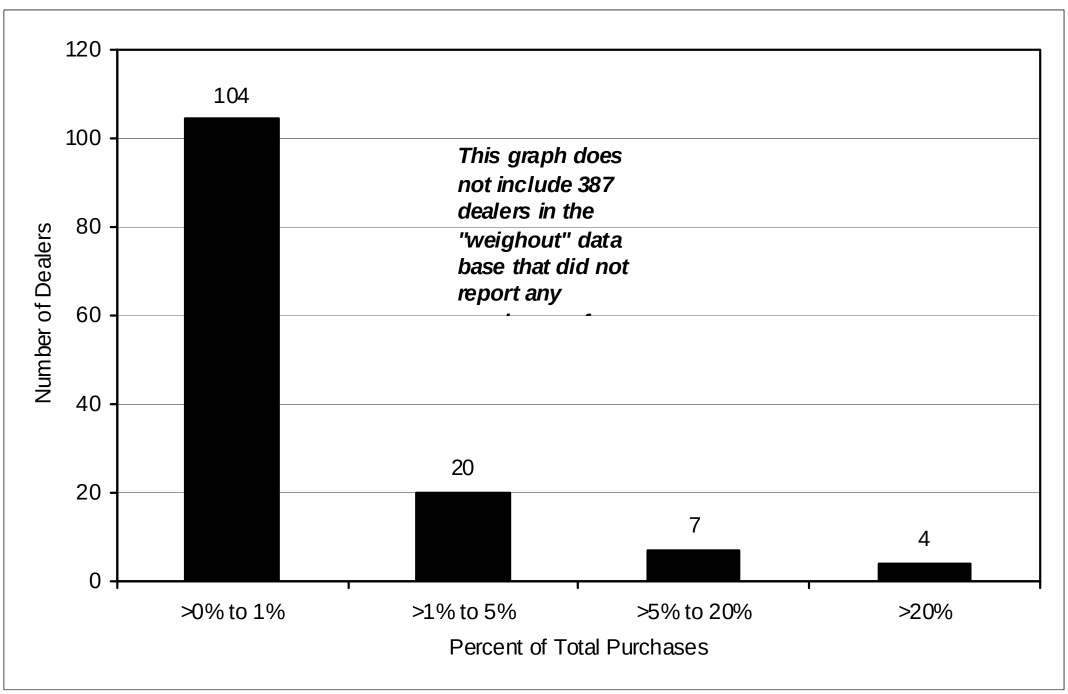
Current information about skate processors is presented in Section 7.5.2 of this document.

Nine processors from MA, RI, NY, and NH reported processing 3.9 million pounds of unspecified skate wings in 1999. No further description of product form is available (e.g., whether frozen or fresh). Sales amounted to $3.2 million, for an average price of $0.81. These firms employ approximately 514 workers.

7.5.5.3 International Trade

The U.S. Customs Bureau and U.S. Census do not report separate trade statistics for skate products.

Figure 28 Dependence of Individual Dealers on Skate Landings: Percent of Total Purchases of Raw Fish



7.6 Social Environment

7.6.1 Vessels by Homeport and Owner's Residence

When applying for a permit the vessel owner must identify a "Homeport" for the vessel, theoretically the port where their vessel is primarily docked when not at sea. Further, the vessel owner must his or her home address. There are 62 towns with 10 or more permits in one or both of these categories. Of these, 14 towns (in italics) have 30 or more permits listing it as either homeport or town of owner's residence. Only 9 (also in bold) have 50 or more permits. These are, in descending order of number of permits, New Bedford (261 & 207) and Gloucester (210 & 152), MA; Cape May, NJ (170 & 89); Point Judith/Narragansett, RI (124 & 27); Montauk, NY (111 & 72); Chatham, MA (85 & 29); Barnegat Light/Long Beach, NJ (75 & 36); Portland, ME (63 & 31); Point Pleasant/Point Pleasant Beach, NJ (55 & 20); and Ocean City/West Ocean City (50 & 6).

When examined as a percent of all skate permits only these nine plus Hampton Bays/Shinnecock have at least 2% of all skate permits either as homeport or as residence. Only four ports have at least 5%: New Bedford and Gloucester, MA; Cape May, NJ and Point Judith/Narragansett, RI. It is interesting that Cape May has so many permits, as it has a relatively low level of landings (see Table below). Ocean City also has a very low level of landings.

Table 66. All Towns listed on 10 or more Northeast Skate Permits as Homeport or Owner's Residence for 2007

ST	CITY	HOMEPORT	RESIDENCE	% HOMEPRT of ALL SKT Permits	% RESIDENCE OF ALL SKT PERMITS
MA	**New Bedford**	**261**	**207**	***9.72%***	***7.71%***
MA	**Gloucester**	**210**	**152**	***7.82%***	***5.66%***
NJ	**Cape May**	**170**	**89**	***6.33%***	***3.31%***
RI	**Point Judith/Narragansett**	**124**	**27**	***4.62%***	***1.01%***
NY	**Montauk**	**111**	**72**	***4.13%***	***2.68%***
MA	**Chatham**	**85**	**29**	***3.17%***	***1.08%***
NJ	**Barnegat Light/Long Beach**	**75**	**36**	***2.79%***	***1.34%***
ME	**Portland**	**63**	**31**	***2.35%***	***1.15%***
NJ	**Point Pleasant/Point Pleasant Beach**	**55**	**20**	***2.05%***	***0.74%***
MD	**Ocean City/West Ocean City**	**50**	**6**	***1.86%***	***0.22%***
NY	*Hampton Bays/Shinnecock*	*41*	*23*	*1.53%*	*0.86%*
MA	Boston	38		1.42%	0.00%
NH	Portsmouth	37	11	1.38%	0.41%
VA	Newport News	34	12	1.27%	0.45%
MA	Scituate	30	23	1.12%	0.86%
NC	Wanchese	29	17	1.08%	0.63%
RI	Newport	28	16	1.04%	0.60%
NH	Seabrook	27	21	1.01%	0.78%
MA	Plymouth	27	18	1.01%	0.67%
NJ	Belford/Middletown	27	7	1.01%	0.26%
MA	Fairhaven	26	36	0.97%	1.34%

ST	CITY	HOMEPORT	RESIDENCE	% HOMEPRT of ALL SKT Permits	% RESIDENCE OF ALL SKT PERMITS
MA	Provincetown	22	11	0.82%	0.41%
MA	Newburyport	21	8	0.78%	0.30%
NH	Rye	20	16	0.74%	0.60%
MA	Harwich	19	22	0.71%	0.82%
CT	New London	19	0	0.71%	0.00%
VA	Chincoteague	18	6	0.67%	0.22%
VA	Hampton	17	15	0.63%	0.56%
NC	Beaufort	17	8	0.63%	0.30%
NJ	Port Norris	16	8	0.60%	0.30%
NJ	Sea Isle City	16	5	0.60%	0.19%
NJ	Atlantic Beach	16		0.60%	0.00%
NC	Oriental	14	16	0.52%	0.60%
NH	Hampton	14	16	0.52%	0.60%
NC	New Bern	14	14	0.52%	0.52%
MA	Marshfield	14	11	0.52%	0.41%
NY	New York	14		0.52%	0.00%
ME	Harpswell	13	20	0.48%	0.74%
VA	Virginia Beach	13	14	0.48%	0.52%
NY	Freeport	13	10	0.48%	0.37%
MA	Green Harbor	13		0.48%	0.00%
MA	Rockport	12	13	0.45%	0.48%
VA	Seaford	12	13	0.45%	0.48%
MA	Westport	11	14	0.41%	0.52%
NH	Newington	11	12	0.41%	0.45%
NC	Lowland	11	11	0.41%	0.41%
MA	South Bristol	11	10	0.41%	0.37%
MA	Sandwich	11		0.41%	0.00%
ME	Bremen	10	9	0.37%	0.34%
CT	Noank	10		0.37%	0.00%
NC	Engelhard	10		0.37%	0.00%
RI	Little Compton	7	13	0.26%	0.48%
RI	Wakefield		55	0.00%	2.05%
RI	Charlestown		20	0.00%	0.74%
NJ	Cape May Courthouse		17	0.00%	0.63%
MA	Manchester		15	0.00%	0.56%
MA	West Chatham		15	0.00%	0.56%
MD	Berlin		15	0.00%	0.56%
MA	South Chatham		14	0.00%	0.52%
NJ	West Creek		13	0.00%	0.48%
NJ	Brick		12	0.00%	0.45%
NJ	North Cape May		11	0.00%	0.41%

7.6.2 Other Permits Held by Skate Permit Holders

In 2007 there were 2,685 vessels with a Skate Permit. Of these, most held permits in a variety of other Northeast fisheries. This is actually a common pattern for all Northeast vessels, which typically hold permits even in fisheries in which they are not active. The most common other permits held were Bluefish, Multispecies, Dogfish and Monkfish.

Bluefish were solidly category 1 (2,123) - Commercial. Most lobster permits (1002) were in category 1 – Commercial, Non-Trap. Multispecies permits were primarily in category A (992) - DAS - and category HB (704) – Open Access Handgear. There is only one dogfish category – General. Monkfish were 75% in category E (1,691) – Incidental Catch. Looking at other permits held, Scallop permits were primarily in categories 1A (1102) – General Category with no VMS and 1B (786) General Category with VMS. SMB permits were primarily in the Atlantic Mackerel (2,066 permits) and Squid/Butterfish Incidental Catch (1,829 permits) categories. Two thirds of Summer Flounder permits were in category 1 (881) – Commercial Moratorium. Black Sea Bass were primarily in category 1 (740) – Commercial Moratorium, as were Scup (744). Over 80% of Herring permits were in category 2 (1,688) – Open Access, will catch under 500mt. For Skate, 99% were category D (2019) Incidental Catch. Red Crab were almost entirely category A (1,603) – Open Access.

Table 67. Other Permits Held by the 2,685 Vessels with Skate Permits in 2007

Multi-species	Monk fish	Dog fish	Blue fish	Squid/ Mackerel/ Butter fish	Scallop	Skate	Red Crab	Lobster	Summer Flounder	Black Sea Bass	Scup	Her-ring
2438	2413	2443	2530	2401	2208	2041	1605	1445	1279	1101	1102	2072

7.6.3 Commercial Ports of Landing

There are a total of 88 ports where skate was landed in 2007. They include ports from all states in the Northeast plus North Carolina.

Table 68. All Ports Landing Skates in 2007

ST	CNTY	PORT
CT	MIDDLESEX	OLD SAYBROOK
CT	NEW HAVEN	BRANFORD
CT	NEW HAVEN	GUILFORD
CT	NEW LONDON	EAST LYME
CT	NEW LONDON	NEW LONDON
CT	NEW LONDON	NOANK
CT	NEW LONDON	STONINGTON
CT	NEW LONDON	WATERFORD
DE	SUSSEX	INDIAN RIVER
DE	SUSSEX	MISPILLION
MA	BARNSTABLE	CHATHAM
MA	BARNSTABLE	DENNIS
MA	BARNSTABLE	FALMOUTH
MA	BARNSTABLE	HARWICHPORT
MA	BARNSTABLE	HYANNISPORT

ST	CNTY	PORT
MA	BARNSTABLE	ORLEANS
MA	BARNSTABLE	OTHER BARNSTABLE
MA	BARNSTABLE	PROVINCETOWN
MA	BARNSTABLE	SANDWICH
MA	BARNSTABLE	WOODS HOLE
MA	BRISTOL	FAIRHAVEN
MA	BRISTOL	FALL RIVER
MA	BRISTOL	NEW BEDFORD
MA	BRISTOL	WESTPORT
MA	ESSEX	GLOUCESTER
MA	ESSEX	NEWBURYPORT
MA	ESSEX	ROCKPORT
MA	MIDDLESEX	CAMBRIDGE
MA	PLYMOUTH	MARSHFIELD
MA	PLYMOUTH	OTHER PLYMOUTH
MA	PLYMOUTH	PLYMOUTH
MA	PLYMOUTH	SCITUATE
MA	SUFFOLK	BOSTON
MD	NOT-SPECIFIED	OTHER MARYLAND
MD	WORCESTER	OCEAN CITY
ME	CUMBERLAND	PORTLAND
NC	CARTERET	BEAUFORT
NC	DARE	HATTERAS
NC	DARE	WANCHESE
NC	HYDE	ENGELHARD
NC	HYDE	OCRACOKE
NC	PAMLICO	ORIENTAL
NH	ROCKINGHAM	PORTSMOUTH
NH	ROCKINGHAM	RYE
NH	ROCKINGHAM	SEABROOK
NJ	CAPE MAY	AVALON
NJ	CAPE MAY	CAPE MAY
NJ	CAPE MAY	SEA ISLE CITY
NJ	MONMOUTH	BELFORD
NJ	OCEAN	BARNEGAT
NJ	OCEAN	BARNEGAT LIGHT/LONG BEACH
NJ	OCEAN	POINT PLEASANT
NJ	OCEAN	WARETOWN
NY	NASSAU	FREEPORT
NY	NASSAU	POINT LOOKOUT
NY	SUFFOLK	AMAGANSETT
NY	SUFFOLK	CENTER MORICHES
NY	SUFFOLK	GREENPORT
NY	SUFFOLK	HAMPTON BAYS
NY	SUFFOLK	ISLIP
NY	SUFFOLK	MATTITUCK
NY	SUFFOLK	MONTAUK
NY	SUFFOLK	OTHER SUFFOLK
NY	SUFFOLK	SHINNECOCK

ST	CNTY	PORT
NY	SUFFOLK	WAINSCOTT
RI	NEWPORT	LITTLE COMPTON
RI	NEWPORT	NEWPORT
RI	NEWPORT	OTHER NEWPORT
RI	NEWPORT	TIVERTON
RI	WASHINGTON	CHARLESTOWN
RI	WASHINGTON	POINT JUDITH
RI	WASHINGTON	SOUTH KINGSTOWN
RI	WASHINGTON	WESTERLEY
VA	ACCOMACK	ACCOMAC
VA	ACCOMACK	CHINCOTEAGUE
VA	ACCOMACK	WACHAPREAGUE
VA	CITY OF HAMPTON	HAMPTON
VA	CITY OF HAMPTON	OTHER CITY OF HAMPTON
VA	CITY OF NEWPORT NEWS	NEWPORT NEWS
VA	CITY OF NORFOLK	NORFOLK
VA	CITY OF VIRGINIA BEACH	VIRGINIA BEACH/LYNNHAVEN
VA	GLOUCESTER	OTHER GLOUCESTER
VA	LANCASTER	OTHER LANCASTER
VA	MATHEWS	MATHEWS
VA	MIDDLESEX	OTHER MIDDLESEX
VA	NORTHAMPTON	CAPE CHARLES
VA	NORTHAMPTON	OTHER NORTHAMPTON
VA	NORTHUMBERLAND	OTHER NORTHUMBERLAND

There are several ways to present landings data to show different kinds of importance of skate to communities. Three tables below illustrate importance due to total levels of revenue and landings versus importance due to percent of skate revenue and landings relative to all commercial revenue and landings by port.

Only 31 ports (32 if you include the port of “Other Suffolk, NY”) receive at least $10,000 per year from skate; only 9 ports receive at least $100,000 per year. In descending order of revenue received these are: New Bedford, MA; Chatham, MA; Point Judith, RI; Boston, MA; Tiverton, RI; Newport, RI; Barnegat Light/Long Beach, NJ; Gloucester, MA and Provincetown, MA (in bold).

There are 34 ports (37 if you include the three “Other something” ports) that landed at least 10,000lbs of skate; 15 ports landed at least 100,000lbs. In descending order of pounds landed they are: New Bedford, MA; Point Judith, RI; Chatham, MA; Tiverton, RI; Newport, RI; Boston, MA; Stonington, CT; Sea Isle City, NJ; Barnegat Light/Long Beach, NJ; Gloucester, MA; Hampton Bays, NY; Provincetown, MA; Fall River, MA; Belford, NJ and Montauk, NY (in italics).

Table 69. Top skate ports by value and pounds: Ports with at least $10,000 or 10,000lbs of skate in 2007

ST	CNTY	PORT	SKTVAL	SKLBS
MA	***BRISTOL***	***NEW BEDFORD***	***$4,869,521***	***10,179,163***
MA	***BARNSTABLE***	***CHATHAM***	***$1,550,200***	***3,101,339***
RI	***WASHINGTON***	***POINT JUDITH***	***$658,754***	***4,841,657***

ST	CNTY	PORT	SKTVAL	SKLBS
MA	***SUFFOLK***	***BOSTON***	***$294,610***	***497,194***
RI	***NEWPORT***	***TIVERTON***	***$239,485***	***2,632,083***
RI	***NEWPORT***	***NEWPORT***	***$179,018***	***925,977***
NJ	***OCEAN***	***BARNEGAT LIGHT/LONG BEACH***	***$158,096***	***210,091***
MA	***ESSEX***	***GLOUCESTER***	***$107,764***	***205,707***
MA	***BARNSTABLE***	***PROVINCETOWN***	***$103,502***	***166,160***
NY	*SUFFOLK*	*HAMPTON BAYS*	*$92,426*	*167,340*
NJ	OCEAN	POINT PLEASANT	$59,587	97,608
NJ	*MONMOUTH*	*BELFORD*	*$57,748*	*106,536*
NY	*SUFFOLK*	*MONTAUK*	*$56,364*	*101,295*
MA	PLYMOUTH	SCITUATE	$47,130	82,957
CT	*NEW LONDON*	*STONINGTON*	*$46,406*	*441,302*
NJ	*CAPE MAY*	*SEA ISLE CITY*	*$36,357*	*300,445*
RI	NEWPORT	LITTLE COMPTON	$36,267	75,243
VA	ACCOMACK	ACCOMAC	$31,389	24,128
VA	CITY OF VIRGINIA BEACH	VIRGINIA BEACH/LYNNHAVEN	$20,023	12,537
VA	ACCOMACK	CHINCOTEAGUE	$18,078	45,794
MA	BARNSTABLE	SANDWICH	$17,557	42,644
ME	CUMBERLAND	PORTLAND	$16,794	28,990
NY	SUFFOLK	CENTER MORICHES	$16,721	33,883
NJ	CAPE MAY	CAPE MAY	$14,960	91,715
MA	BRISTOL	WESTPORT	$14,388	32,515
MA	PLYMOUTH	OTHER PLYMOUTH	$13,897	24,425
NJ	CAPE MAY	AVALON	$13,733	17,459
NY	SUFFOLK	ISLIP	$13,376	18,278
MA	PLYMOUTH	PLYMOUTH	$11,943	35,952
MA	*BRISTOL*	*FALL RIVER*	*$11,270*	*124,220*
NY	SUFFOLK	OTHER SUFFOLK	$10,657	18,259
NY	SUFFOLK	SHINNECOCK	$8,598	16,578
CT	NEW LONDON	NEW LONDON	$7,872	44,808
MD	NOT-SPECIFIED	OTHER MARYLAND	$7,758	19,872
RI	NEWPORT	OTHER NEWPORT	$6,937	10,005
VA	CITY OF HAMPTON	HAMPTON*	$5,665	3,793
VA	ACCOMACK	WACHAPREAGUE	$5,264	20,712
MD	WORCESTER	OCEAN CITY	$5,027	10,309

*Included because it is noted in the economic analyses, even though it does not reach either $10,000 or 10,000lbs.

In terms of actual value or pound dependence, a slightly different picture emerges. Some of the ports with the highest levels of skate landings also have very high levels of other landings and so are only minimally dependent on skate in terms of their importance relative to total landed pounds or revenue. Only 3 ports depend on skate for at least 10% of their revenue. Here Center Moriches, NY - which has low total skate landings and low landings overall – appears as more dependent on skate than some of the larger landings ports. Only 9 ports depend on skate for at least 10% of their pounds landed. Here Center Moriches appears again, as well as Cambridge, MA – which lands under 100lbs of skate and under 500 lbs of any fish and thus is technically highly dependent but in actual fact does not rely on skate to maintain its economy.

However, it is interesting to note that Chatham and Tiverton, which are among the top skate ports by actual revenue and pounds are also among the highly dependent ports. And Point Judith, Newport and Provincetown which have high levels of landings and revenue are dependent by pounds landed. This means, too, that the counties of Barnstable, MA and Washington, RI each have 2 dependent ports. For RI the addition of neighboring Newport County is also notable.

Table 70. Top skate ports by value dependence

ST	CNTY	PORT	SKTVAL/TOTVAL	SKTLBS/TOTLBS
RI	NEWPORT	TIVERTON	33%	89%
MA	BARNSTABLE	CHATHAM	11%	37%
NY	SUFFOLK	CENTER MORICHES	10%	26%

Table 71. Top skate ports by pounds landed dependence

ST	CNTY	PORT	SKTVAL/TOTVAL	SKTLBS/TOTLBS
RI	NEWPORT	TIVERTON	33%	89%
MA	BARNSTABLE	CHATHAM	11%	37%
NJ	CAPE MAY	SEA ISLE CITY	2%	36%
NY	SUFFOLK	CENTER MORICHES	10%	26%
CT	NEW LONDON	STONINGTON	1%	16%
MA	MIDDLESEX	CAMBRIDGE	2%	14%
RI	WASHINGTON	POINT JUDITH	2%	14%
MA	BARNSTABLE	PROVINCETOWN	3%	12%
RI	NEWPORT	NEWPORT	1%	11%

7.6.4 Census Data for Top Skate Ports

The communities, then, for which profiles will be provided in Appendix I, Document 15 are: Boston, New Bedford, Gloucester, Provincetown, Chatham and Fall River, MA; Stonington, CT; Tiverton, Point Judith, Little Compton and Newport, RI; Montauk and Hampton Bays/Shinnecock, NY; Belford/Middleton, Barnegat Light/Long Beach, Sea Isle City, Cape May, and Point Pleasant/Point Pleasant Beach, NJ and Portland, ME. In addition, a profile will be added for Virginia Beach, VA as a result of the Economic analysis. As can be seen in Table 72, levels of occupations in fishing farming and forestry vary widely, as do levels of families in poverty and of education. Communities with higher dependence on fishing, higher poverty and lower educational level are generally more at risk, though these factors must also be considered in relation to relative dependence specifically on skate.

These and other census data can be found in the port profiles in Appendix I, Document 15, where they are placed in greater context. Here they are order by descending percentage of occupations in farming, fishing and forestry relative to all occupations. It should be kept in mind, however, that fishermen may be undercounted due to being listed as self-employed. The top three communities for percent occupations in farming, fishing and forestry are Long Beach/Barnegat Light, NJ; Montauk, NY and Chatham, MA. These are, of course, all species and gears and cannot be broken out to show skate only. The three communities with the highest percentages of families in poverty are New Bedford, Boston and Fall River, MA. The three communities with the lowest total population are Chatham, MA; Sea Isle City, NJ and Provincetown, MA. The three communities with the lowest percentage of persons age 25 or over who have graduated at least high school are Fall River and Boston, MA and Tiverton, RI. The three communities with the highest unemployment levels are Montauk and Hampton Bays/Shinnecock, NY and Gloucester, MA.

Of the top three ports by total landings and pounds (New Bedford, Chatham and Point Judith), Chatham has the highest level of occupational dependence, while New Bedford has the highest poverty level and lowest level of education. Of the three top ports by pounds and dollar dependence (Tiverton, Chatham and Sea Isle City), Chatham has the highest level of occupational dependence while Sea Isle City has the highest level of poverty and Tiverton has the lowest level of education.

Table 72. Selected census variables for profiled communities

ST	Port Community	Median cost of a home	Occupations in farming, fishing and forestry*	Median household income	Families in poverty	Total pop.	Median Age	Pop. (25 or over) High School Graduate or Higher	% Pop. Over 16 In Labor Force and Unemployed
ME	*Portland*	$121,200	7.10%	$48,763	9.20%	64,257	35.7	88.30%	3.30%
NJ	*Long Beach/ Barnegat Light*	$334,400/ $299,400	None*/ 6.50%	$48,697/ $52,361	3.8%/ 2.60%	3,329/ 764	57.3/ 54.9	92.0%/ 92.10%	2.3%/ 1.20%
NY	*Montauk*	$290,400	6.10%	$42,329	8.30%	3,851	39.3	84.00%	7.70%
MA	*Chatham*	$372,900	3.60%	$47,037	0.90%	1,667	53.3	89.90%	2.00%
NJ	*Point Pleasant/ Point Pleasant Beach*	$160,100/ $223,600	0.3%/ 2.60%	$55,987/ $51,105	2.00%/ 5.00%	19,366/ 5,112	39.4/ 42.6	88.50%/ 87.10%	2.50%/ 3.10%
NJ	*Belford/ Middletown*+	$146,000/ $210,700	2.3%/ 0.20%	$66,964/ $75,566	1.3%/ 1.90%	1,340/ 66,327	35.8/ 38.8	89.7%/ 90.70%	2.20% 2.20%
RI	*Little Compton*	$228,200	2.10%	$55,368	3.70%	3,593	43.5	91.00%	2.00%
MA	*Gloucester*	$204,600	2.00%	$47,722	7.10%	30,273	40.2	85.70%	3.20%
NY	*Hampton Bays/ Shinnecock*#	$178,000	1.70%	$50,161	6.70%	12,236	38.8	86.60%	3.40%
RI	*Point Judith/ Narragansett*#	$195,500	1.60%	$39,918	8.80%	3,671	44.5	87.50%	2.20%
MA	*Provincetown*	$333,100	1.00%	$32,731	8.70%	3,192	45.4	85.10%	13.10%
MA	*New Bedford*	$113,500	1.00%	$27,569	17.30%	93,768	35.9	57.60%	5.00%
RI	*Newport*	$161,700	0.60%	$40,669	12.90%	26,475	34.9	87.00%	4.70%
RI	*Tiverton*	$144,400	0.60%	$49,977	2.90%	15,260	40.8	79.50%	3.40%
NJ	*Cape May*	$212,900	0.40%	$33,462	7.70%	4,668	47.4	87.60%	3.80%
ME	*Portland*	$121.20	0.40%	$48,763	9.20%	64,257	35.7	88.30%	3.30%
CT	*Stonington*	$168,200	0.30%	$52,437	2.90%	17,906	41.7	88.20%	2.00%
MA	*Fall River*	$132,900	0.30%	$29,014	14.00%	91,938	35.7	56.60%	4.10%
VA	*Hampton*	$91,100	0.30%	$39,532	8.80%	146,437	34	85.50%	3.70%
MA	*Boston*	$190,600	0.10%	$39,629	15.30%	589,141	31.1	78.90%	4.60%
NJ	*Sea Isle City*	$280,100	None*	$45,708	6.40%	2,835	51.3	85.20%	3.70%

***** The census is known to undercount those employed in fishing. Further, fishing data are unavailable as a unique category due to confidentiality issues. Finally, those who fish out of this community may not live there.

+ These communities have two sets of census data, though socially and in terms of fishing they are best treated as a single community. For example, in some cases fish are landed in one area but fishermen live in the other, or sometimes one houses the majority of the recreational fishing and the other the majority of commercial fishing.
# These communities include a port of landing for which no census data are available plus census data for the smallest census unit which encompasses the port.

7.6.5 Skate Dealers

There were 195 skate dealers in 2007. The vast majority (156) depended on skate for only 0-5% of the ex-vessel value of all species they bought, though there were 4 dealers that depended on skate for 95-100% of this value. The absolute amount of this percentage varied widely, however, with the largest group of dealers (56) reporting an ex-vessel value of $100,000 to $500,000 for skate and groups of 20-30 vessels reporting anywhere from $1,000 to $10,000 and $1,000,000 to $5,000,000.

Table 73. Federally permitted dealer dependence on skate in 2007

Percentage Level of Dependence	Number of Dealers	Absolute Level of Dependence	Number of Dealers
0-5%	156	$0-100	0
6-10%	12	$101-1000	4
11-15%	7	$1001-10,000	25
16-20%	4	$10,001-50,000	21
21-25%	3	$50,001-$100,000	30
26-30%	1	$100,001-500,000	56
31-35%	0	$500,001-1,000,000	17
36-40%	1	$1,000,001-5,000,000	28
41-45%	0	$5,000,001-$10,000,000	5
46-50%	0		
51-55%	2		
56-60%	1		
61-65%	1		
66-70%	2		
71-75%	0		
76-80%	0		
81-85%	1		
86-90%	0		
91-95%	0		
96-100%	4		
TOTAL	195		186

There were 55 ports where dealers bought skate (57 if you count the "Other something" ports). Of these only 4 had 10 or more dealers: Hampton Bays/Shinnecock, NY (20), Montauk, NY (17), Point Judith, RI (15), and New Bedford, MA (12). An additional 7 had at least 5 dealers: Chatham, Provincetown and Gloucester, MA; Little Compton and Newport, RI (6 each), Scituate, MA and Mattituck, NY (5 each). Here the total number of dealers may exceed 195, as some dealers buy in multiple ports. On factor to note in regard to the large number of dealers in Montauk is that many individual vessel owners have acquired dealers permits in order to sell skate as bait to local lobster and whelk fishermen44.

Table 74. Federally permitted dealer dependence on skate in 2007 – by port*

State	Port	Number of Federal Skate Dealers	Percentage Dependence on Skate of These Dealers	Number of Federal Skate Dealers	Absolute Dependence on Skate of These Dealers
Massachusetts	Chatham	6	0-100%	6	$1k-5M
	Cambridge	1			
	New Bedford	12	0-5% (6), 10-60% (6)	9	$1k-5M
	Fall River	2			
	Westport	4			
	Fairhaven	1			
	Gloucester	6	0-10%	4	$10k-1M
	Boston	4	0-10%	4	$500k-1M
	Newburyport	1			
	Orleans	1			
	Other Barnstable	2			
	Other Plymouth	1			
	Provincetown	6	0-10%	6	$10k-5M
	Rockport	1			
	Sandwich	2			
	Scituate	5	0-15%	5	$10k-5M
	Westport	4	0-70%	4	$10-100k
	Woods Hole	1			
	Dennis	1			
	Falmouth	2			
	Harwichport	1			
	Hyannisport	1			
	Marshfield	2			
Maryland	Ocean City	2			
Maine	Portland	1			
North Carolina	Wanchese	1			
New Hampshire	Portsmouth	2			
New Jersey	Avalon	2			
	Barnegat	1			
	Belford/Middleton	3			
	Cape May	4	0-5%	2	
	Point Pleasant	2			
	Long Beach/ Barnegat Light	3			

44 Pers. Comm.. from Victor Vecchio, NMFS Port Agent in East Hampton, NY.

State	Port	Number of Federal Skate Dealers	Percentage Dependence on Skate of These Dealers	Number of Federal Skate Dealers	Absolute Dependence on Skate of These Dealers
	Sea Isle City	3			
	Waretown	1			
New York	Amagansett	4	0-5%	4	$50-500k
	Center Moriches	2			
	Freeport	1			
	Montauk	17	0-10%	17	$0-100k (5), $500k (6), $1-5M (6)
	Hampton Bays/ Shinnecock	20	0-5% (19)	20	$1-10k (5), $50-100k (5), $500k (5), $1-5M (5)
	Mattituck	5	0-5%	5	$10-500k
	Greenport	3			
	Islip	3			
	Other Suffolk	3			
	Point Lookout	2			
	Wainscott	3			
Rhode Island	Charlestown	1			
	Little Compton	6	0-15%	6	$10k-5M
	Newport	6	0-5% (4)		$10k-5M
	Other Newport	1			
	Point Judith	15	0-5% (12)	15	$10-100k (6), $5000k-1M (4), $5-10M (5)
	South Kingstown	1			
	Tiverton	3			
	Westerley	1			
Virginia	Cape Charles	1			
	Chincoteague	1			
	Wachapreague	1			

* Data on ports with 3 or fewer dealers not reported for reasons of confidentiality.

7.6.6 Skate Processors

Skate processors include: AML International (about 90 employees), Bergie's Seafood (about 35 employees), Sea Trade (about 75 employees), and the Whaling City Auction (about 30 employees) in New Bedford, MA; Sea Fresh in Portland, ME and Point Judith, RI (about 50 employees total); Zeus Packing (about 200 employees) in Gloucester, MA; Ideal Seafood in Boston, MA; Agger Company in Brooklyn, NY.

Old Point Packing in Newport News, VA and Amory Seafood in Hampton, VA previously worked a lot with skate, but not at present.

Table 75. All ports for which profiles are provided in Appendix I, Document 15.

CT	Stonington
MA	Boston
MA	Chatham
MA	Fall River
MA	Gloucester
MA	New Bedford
MA	Provincetown
MD	Ocean City/West Ocean City
ME	Portland
NJ	Barnegat Light/Long Beach
NJ	Belford/Middletown
NJ	Cape May
NJ	Point Pleasant/Point Pleasant Beach
NJ	Sea Isle City
NY	Hampton Bays/Shinnecock
NY	Montauk
RI	Little Compton
RI	Newport
RI	Point Judith/Narragansett
RI	Tiverton
VA	Hampton

Bait Skate versus Food Skate and Targeted Skate versus Bycatch Skate

Among the top ports listed above, ports which heavily land skate for bait include: Point Judith, Tiverton, Newport, New Bedford and Stonington (CT) Secondarily, bait skate is landed in, Chatham and Provincetown. Point Judith's landings have accounted for 39-67% of bait landings between 2000-2007. Point Judith landings have declined somewhat in recent years, while landings in Newport, Tiverton and New Bedford have risen significantly. Other ports such as Montauk have individual vessels which sell skate directly to lobster and other pot fishermen for bait, though there are no major skate bait dealers here. Bait skate is primarily landed by trawlers, often as a secondary species while targeting monkfish or groundfish. Since 2003, with the implementation of the original Skate FMP, all vessels landing skate must be on a groundfish Day-at-Sea (DAS).

New Bedford is one of the major skate wing or food skate ports. Skate wings are also landed significantly in Gloucester, Chatham, Point Judith, Boston and Barnegat Light. Secondarily they are landed in Portland. Since 2000, skate wing landings in Provincetown have been on the decline, while Chatham landings have risen. Both trawlers and gillnets catch food skate. Some trawlers target skate, with others catching skate as a bycatch. Most of the gillnet vessels are targeting skate. The gillnets are based largely in Chatham but also in New Bedford. There is a very small skate wing fleet in Virginia, though it has dramatically declined in recent years. Most of these are monkfish gillnets though some draggers caught skate as a bycatch at the height of the fishery.

7.6.7 Skate Fishing Areas

Vessels landing skates for the wing market generally fish on Georges Bank, in the Great South Channel near Cape Cod, or west of the Nantucket Lightship Area in Southern New England (SNE) waters. Gillnet wing vessels often also fish east of Cape Cod.

Vessels that land skate as a bycatch often fish in Massachusetts Bay and on Georges Bank. Scallop dredges with general category permits often catch skate while fishing in the Great South Channel. There is also a mixed monkfish/skate fishery west of the Nantucket Lightship Area and off northern New Jersey, near Point Pleasant.

Vessels landing bait skate generally fish in the inshore waters of SNE, are most often trawlers, and frequently fish in an exempted fishery.

7.6.8 Data on Lobster Fishing in Top Skate Ports

By order of dependence on lobster landings, the top five lobster ports where skate is also landed are in Other Rhode Island, followed by Sea Isle City, NJ; Portland ME; Fall River, MA; and Little Compton, RI. It should be noted, however, that Portland lobstermen do not currently use skate for bait. By total value of lobster landings, the top five lobster ports where skate are also landed are: Gloucester, MA; Portland, ME; Point Judith, RI; New Bedford, MA and Other Rhode Island.

Table 76. Lobster landings and value of at least $10,000 or 10,000lbs in skate ports

ST	COUNTY	PORT	LOBVAL	LOBLBS	LOBVAL /TOTVAL	LOBLBS /TOTLBS	Rank in Value of ALL Lobster Ports
RI	NOT-SPECIFIED	OTHER R.I.	$5,083,319	967,196	75.95%	87.66%	19th
MA	BARNSTABLE	PROVINCETOWN	$1,664,494	306,541	45.34%	22.13%	58th
NJ	CAPE MAY	SEA ISLE CITY	$832,688	143,406	41.69%	17.34%	87th
ME	CUMBERLAND	PORTLAND	$9,108,218	1,966,185	38.00%	6.09%	8th
MA	BRISTOL	FALL RIVER	$1,348,898	252,701	26.66%	1.67%	69th
RI	NEWPORT	LITTLE COMPTON	$768,022	145,012	25.26%	5.21%	98th
MA	BARNSTABLE	CHATHAM	$3,368,519	621,526	23.15%	7.40%	36th
RI	WASHINGTON	POINT JUDITH	$8,417,621	1,609,982	22.91%	4.51%	10th
MA	ESSEX	GLOUCESTER	$9,971,471	2,001,331	21.29%	2.22%	5th
MA	SUFFOLK	BOSTON	$2,525,594	506,079	20.06%	5.99%	41st
NJ	OCEAN	POINT PLEASANT	$2,271,733	384,764	9.99%	1.65%	48th
NY	SUFFOLK	MONTAUK	$1,208,908	202,767	6.81%	1.89%	72nd
MA	BRISTOL	NEW BEDFORD	$5,901,537	1,159,697	2.21%	0.86%	15th
NJ	CAPE MAY	CAPE MAY	$748,991	118,191	1.42%	0.18%	91st
NY	SUFFOLK	HAMPTON BAYS	$37,819	5,774	0.62%	0.12%	183rd

In terms of permit homeport and town of owner's residence, when looking at all profiled towns for this amendment, only two (in bold) have more than 5% of all lobster permits. These are Gloucester and New Bedford, MA. An additional nine have between 1-4% of homeport and/or owner's residence for all lobster permits. These are (in italics) Portland, ME, Cape May, NJ, Montauk, NY, Chatham, MA, Boston, MA, Newport, RI, Barnegat Light/Long Beach, NJ, Belford/Middletown, NJ, and Point Judith/Narragansett, RI. It should again be noted that Portland lobstermen do not currently use skate for bait.

Table 77. Northeast Lobster Permit Homeport and Owner's Residence Listings for 2007 Among Profiled Skate Ports

ST	CITY	HOMEPORT	RESIDENCE	% HOMEPRT of ALL LOB Permits	% RESIDENCE OF ALL LOB Permits
MA	***Gloucester***	***338***	***246***	***8.16%***	***5.94%***
MA	***New Bedford***	***255***	***187***	***6.16%***	***4.51%***
ME	*Portland*	*128*	*42*	*3.09%*	*1.01%*
NJ	*Cape May*	*92*	*50*	*2.22%*	*1.21%*
NY	*Montauk*	*88*	*63*	*2.13%*	*1.52%*
MA	*Chatham*	*81*	*35*	*1.96%*	*0.85%*
MA	*Boston*	*71*	*6*	*1.71%*	*0.14%*
RI	*Newport*	*64*	*27*	*1.55%*	*0.65%*
NJ	*Barnegat Light/Long Beach*	*57*	*34*	*1.38%*	*0.82%*
NJ	*Belford/Middletown*	*43*	*34*	*1.04%*	*0.82%*
NJ	Point Pleasant/Point Pleasant Beach	38	8	0.92%	0.19%
NY	Hampton Bays/Shinnecock	37	16	0.89%	0.39%
MA	Provincetown	32	19	0.77%	0.46%
RI	*Point Judith/Narragansett*	*18*	*54*	*0.43%*	*1.30%*
CT	Stonington	15	9	0.36%	0.22%
RI	Tiverton	14	12	0.34%	0.29%
VA	Hampton	13	14	0.31%	0.34%
NJ	Sea Isle City	12	2	0.29%	0.05%
MD	Ocean City/West Ocean City	11	2	0.27%	0.05%
RI	Little Compton	7	18	0.17%	0.43%
MA	Fall River	3	4	0.07%	0.10%

7.7 Glossary of Terms and Acronyms

ABC – "Acceptable biological catch" means a level of a stock or stock complex's annual catch that accunts for the scientific uncertainty in the estimate of OFL.

ACL – "Annual catch limit" is the level of annual catch of a stock or stock complex that serves as the basis for invoking accountability measures (AMs).

ACT – "Annual catch target" is an amount of annual catch of a stock or stock complex that is the management target of the fishery.

Adult stage – One of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

Adverse effect – Any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific of habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

Aggregation – A group of animals or plants occurring together in a particular location or region.

AMs – "Accountability measures" are management controls that prevents ACLs or sector ACLs from being exceeded, where possible, and correct or mitigate overages if they occur.

Amendment – a formal change to a fishery management plan (FMP). The Council prepares amendments and submits them to the Secretary of Commerce for review and approval. The Council may also change FMPs through a "framework adjustment procedure".

Availability – refers to the distribution of fish of different ages or sizes relative to that taken in the fishery.

Benthic community – Benthic means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. Benthic community refers to those organisms that live in and on the bottom.

Biological Reference Points – specific values for the variables that describe the state of a fishery system which are used to evaluate its status. Reference points are most often specified in terms of fishing mortality rate and/or spawning stock biomass.

Biomass – The total mass of living matter in a given unit area or the weight of a fish stock or portion thereof. Biomass can be listed for beginning of year (Jan-1), Mid-Year, or mean (average during the entire year). In addition, biomass can be listed by age group (numbers at age * average weight at age) or summarized by groupings (e.g., age 1+, ages 4+ 5, etc). See also spawning stock biomass, exploitable biomass, and mean biomass.

Biota – All the plant and animal life of a particular region.

Bivalve – A class of mollusks having a soft body with platelike gills enclosed within two shells hinged together; e.g., clams, mussels.

Bottom tending mobile gear – All fishing gear that operates on or near the ocean bottom that is actively worked in order to capture fish or other marine species. Some examples of bottom tending mobile gear are otter trawls and dredges.

Bottom tending static gear – All fishing gear that operates on or near the ocean bottom that is not actively worked; instead, the effectiveness of this gear depends on species moving to the gear which is set in a particular manner by a vessel, and later retrieved. Some examples of bottom tending static gear are gillnets, traps, and pots.

B_{MSY} – the stock biomass that would produce maximum sustainable yield (MSY) when fished at a level equal to F_{MSY}. For most stocks, B_{MSY} is about ½ of the carrying capacity.

B_{target} – A desirable biomass to maintain fishery stocks. This is usually synonymous with BMSY or its proxy, and was set in the original Monkfish FMP as the median of the 3-yr. running average of the 1965-1981 autumn trawl survey biomass index.

$B_{threshold}$ – 1) A limit reference point for biomass that defines an unacceptably low biomass i.e., puts a stock at high risk (recruitment failure, depensation, collapse, reduced long term yields, etc). 2) A biomass threshold that the SFA requires for defining when a stock is overfished. A stock is overfished if its biomass is below Bthreshold. A determination of overfished triggers the SFA requirement for a rebuilding plan to achieve Btarget as soon as possible, usually not to exceed 10 years except certain requirements are met. For monkfish, Bthreshold was specified in Framework 2 as 1/2BTarget (see below).

Bycatch – (v.) the capture of nontarget species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

Capacity – the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch – The sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards, and incidental deaths.

Coarse sediment – Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

Continental shelf waters – The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Council – New England Fishery Management Council (NEFMC).

CPUE – Catch per unit effort. This measure includes landings and discards (live and dead), often expressed per hour of fishing time, per day fished, or per day-at-sea.

DAS – A day-at-sea is an allocation of time that a vessel may be at-sea on a fishing trip. For vessels with VMS equipment, it is the cumulative time that a vessel is seaward of the VMS demarcation line. For vessels without VMS equipment, it is the cumulative time between when a fisherman calls in to leave port to the time that the fisherman calls in to report that the vessel has returned to port.

Days absent – an estimate by port agents of trip length. This data was collected as part of the NMFS weighout system prior to May 1, 1994.

Demersal species – Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Discards – animals returned to sea after being caught; see Bycatch (n.)

Environmental Impact Statement (EIS) – an analysis of the expected impacts of a fishery management plan (or some other proposed federal action) on the environment and on people, initially prepared as a "Draft" (DEIS) for public comment. The Final EIS is referred to as the Final Environmental Impact Statement (FEIS).

Essential Fish Habitat (EFH) – Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The EFH designation for most managed species in this region is based on a legal text definition and geographical area that are described in the Habitat Omnibus Amendment (1998).

Exclusive Economic Zone (EEZ) – for the purposes of the Magnuson-Stevens Fishery Conservation and Management Act, the area from the seaward boundary of each of the coastal states to 200 nautical miles from the baseline.

Exempted fisheries – Any fishery determined by the Regional Director to have less than 5 percent regulated species as a bycatch (by weight) of total catch according to 50 CFR 648.80(a)(7).

Exploitation Rate – the percentage of catchable fish killed by fishing every year. If a fish stock has 1,000,000 fish large enough to be caught by fishing gear and 550,000 are killed by fishing during the year, the annual exploitation rate is 55%.

Fathom – A measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

Fishing effort – the amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

Fishing Mortality (F) – (see also exploitation rate) a measurement of the rate of removal of fish from a population by fishing. F is that rate at which fish are harvested at any given point in time. ("Exploitation rate" is an annual rate of removal, "F" is an instantaneous rate.)

$F_{0.1}$ – F at which the increase in yield-per-recruit in weight for an increase in a unit-of effort is only 10% of that produced in an unexploited stock; usually considered a conservative target fishing mortality rate.

F_{MSY} – a fishing mortality rate that would produce the maximum sustainable yield from a stock when the stock biomass is at a level capable of producing MSY on a continuing basis.

F_{MAX} – the fishing mortality rate that produces the maximum level of yield per recruit. This is the point beyond which growth overfishing begins.

F_{target} – the fishing mortality that management measures are designed to achieve.

FMP (Fishery Management Plan) – a document that describes a fishery and establishes measures to manage it. This document forms the basis for federal regulations for fisheries managed under the regional Fishery Management Councils. The New England Fishery Management Council prepares FMPs and submits them to the Secretary of Commerce for approval and implementation.

Framework adjustments: adjustments within a range of measures previously specified in a fishery management plan (FMP). A change usually can be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

$F_{threshold}$ – 1) The maximum fishing mortality rate allowed on a stock and used to define overfishing for status determination. 2) The maximum fishing mortality rate allowed for a given biomass as defined by a control rule.

Growth Overfishing – the situation existing when the rate of fishing mortality is above F_{MAX} and then the loss in fish weight due to mortality exceeds the gain in fish weight due to growth.

ICL – Interim catch limit is the maximum amount of skate catch, including landings and dead discards, that has been chosen to promote skate rebuilding. This limit has been calculated as the product of the median catch/biomass index for the time series and the latest 3 year moving average of the applicable survey biomass (spring survey for little skate; fall survey for all other managed skates).

Individual Fishing Quota (IFQ) – A Federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by an individual person or entity

Landings – The portion of the catch that is harvested for personal use or sold.

Larvae (or Larval) stage – One of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the egg for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

Limited Access – a management system that limits the number of participants in a fishery. Usually, qualification for this system is based on historic participation, and the participants remain constant over time (with the exception of attrition).

Limited-access permit – A permit issued to vessels that met certain qualification criteria by a specified date (the "control date").

LPUE – Landings per unit effort. This measure is the same as CPUE, but excludes discards.

Maximum Sustainable Yield (MSY) – the largest average catch that can be taken from a stock under existing environmental conditions.

Mesh selectivity (ogive) – A mathematical model used to describe the selectivity of a mesh size (proportion of fish at a specific length retained by mesh) for the entire population. L25 is the length where 25% of the fish encountered are retained by the mesh. L50 is the length where 50% of the fish encountered are retained by the mesh.

Meter – A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the north pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton – A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,204.6 lbs. A thousand metric tons is equivalent to 2.204 million lbs.

Minimum Biomass Level – the minimum stock size (or biomass) below which there is a significantly lower chance that the stock will produce enough new fish to sustain itself over the long-term.

Mortality – Noun, either referring to fishing mortality (F) or total mortality (Z).

Multispecies – the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

Natural Mortality (M) – a measurement of the rate of fish deaths from all causes other than fishing such as predation, cannibalism, disease, starvation, and pollution; the rate of natural mortality may vary from species to species

Northeast Shelf Ecosystem – The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream.

Observer – Any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under this Act

OFL – "Overfishing limit" means the annual amount of catch that corresponds to the estimate of the maximum fishing mortality threshold applied to a stock or stock complex's abundance and is expressed in terms of numbers or weight of fish.

Open access – Describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Optimum Yield (OY) – the amount of fish which-
(a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
(b) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and
(c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Overfished – A conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing – A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

PDT (Plan Development Team) – a group of technical experts responsible for developing and analyzing management measures under the direction of the Council; the Council has a Skate PDT that meets to discuss the development of this FMP.

Proposed Rule – a federal regulation is often published in the Federal Register as a proposed rule with a time period for public comment. After the comment period closes, the proposed regulation may be changed or withdrawn before it is published as a final rule, along with its date of implementation and response to comments.

Rebuilding Plan – a plan designed to increase stock biomass to the B_{MSY} level within no more than ten years (or 10 years plus one mean generation period) when a stock has been declared overfished.

Recruitment overfishing – fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

Recruitment – the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in one year would be the recruitment to the fishery. "Recruitment" also refers to new year classes entering the population (prior to recruiting to the fishery).

Regulated groundfish species – cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish. These species are usually targeted with large-mesh net gear.

Relative exploitation – an index of exploitation derived by dividing landings by trawl survey biomass. This variable does not provide an estimate of the proportion of removals from the stock due to fishing, but allows for general statements about trends in exploitation.

Sediment – Material deposited by water, wind, or glaciers.

Spawning stock biomass (SSB) – the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Status Determination Criteria – objective and measurable criteria used to determine if overfishing is occurring or if a stock is in an overfished condition according to the National Standard Guidelines.

Stock assessment – An analysis for determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

Stock – A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

Surplus production models – A family of analytical models used to describe stock dynamics based on catch in weight and CPUE time series (fishery dependent or survey) to construct stock biomass history. These models do not require catch at age information. Model outputs may include trends in stock biomass, biomass weighted fishing mortality rates, MSY, FMSY, BMSY, K, (maximum population biomass where stock growth and natural deaths are balanced) and r (intrinsic rate of increase).

Surplus production – Production of new stock biomass defined by recruitment plus somatic growth minus biomass loss due to natural deaths. The rate of surplus production is directly proportional to stock biomass and its relative distance from the maximum stock size at carrying capacity (K). BMSY is often defined as the biomass that maximizes surplus production rate.

Survival rate (S) – Rate of survival expressed as the fraction of a cohort surviving the a period compared to number alive at the beginning of the period (# survivors at the end of the year / numbers alive at the beginning of the year). Pessimists convert survival rates into annual total mortality rate using the relationship A=1-S.

Survival ratio (R/SSB) – an index of the survivability from egg to age-of-recruitment. Declining ratios suggest that the survival rate from egg to age-of-recruitment is declining.

TAC – Total allowable catch is equivalent to the ICL.

TAL – Total allowable landings, which for skate management is equivalent to 75% of the TAC minus the dead discard rate.

Ten-minute- "squares" of latitude and longitude (TMS) – A measure of geographic space. The actual size of a ten-minute-square varies depending on where it is on the surface of the earth, but in general each square is approximately 70-80 square nautical miles at 40° of latitude. This is the spatial area that EFH designations, biomass data, and some of the effort data have been classified or grouped for analysis.

TL – Total length of a fish, measured from the tip of the 'nose' to the most posterior point of the tail, often recorded in centimeters (cm).

Total mortality – The rate of mortality from all sources (fishing, natural, pollution) Total mortality can be expressed as an instantaneous rate (called Z and equal to F + M) or Annual rate (called A and calculated as the ratio of total deaths in a year divided by number alive at the beginning of the year)

Yearclass (or cohort) – Fish that were spawned in the same year. By convention, the "birth date" is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

Yield-per-recruit (YPR) – the expected yield (weight) of individual fish calculated for a given fishing mortality rate and exploitation pattern and incorporating the growth characteristics and natural mortality.

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8.0 ENVIRONMENTAL CONSEQUENCES – ANALYSIS OF IMPACTS

8.1 Cumulative Effects Analysis

The purpose of this section is to summarize the incremental impact of the proposed action on the environment resulting when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes them.

8.1.1 Background

The National Environmental Policy Act (NEPA) requires that cumulative effects of "past, present, and reasonably foreseeable future actions" (40 CFR § 1508.7) be evaluated along with the direct effects and indirect effects of each proposed alternative. Cumulative impacts result from the combined effect of the proposed action's impacts and the impacts of other past, present, and reasonably foreseeable future actions. These impacts can result from individually minor but collectively significant actions taking place over a period of time. The Council on Environmental Quality (CEQ) directs federal agencies to determine the significance of cumulative effects by comparing likely changes to the environmental baseline. On a more practical note, the CEQ (1997) states that the range of alternatives considered must include the "no-action alternative as a baseline against which to evaluate cumulative effects." Therefore, the analyses in this document, referenced in the following cumulative impacts discussion, compare the likely effects of the proposed actions to the effects of the no-action alternative45.

CEQ Guidelines state that cumulative effects include the effects of all actions taken, no matter who (federal, non-federal or private) has taken the actions, but that the analysis should focus on those effects that are truly meaningful in terms of the specific resource, ecosystem and human community being affected. Thus, this section will contain a summary of relevant past, present and reasonably foreseeable future actions to which the proposed alternatives may have a cumulative effect. This analysis has taken into account, to the extent possible, the relationship between historical (both pre- and post-FMP) and present condition of the skate population and fishery, although significantly less is known about the population and the fishery prior to the implementation of the FMP and other management actions affecting the fishery (particularly Multispecies Amendments 5 and 7 and Sea Scallop Amendment 4). The time frame for this analysis, therefore, is primarily the 1980's and 1990's for historical information, although trawl survey data extending to the 1960's is considered, and approximately 5-10 years for reasonably foreseeable future actions affecting the fishery. The geographic scope of the analysis is the range of the skate fishery in the EEZ and adjacent fishing communities, from the U.S.-Canada border to, and including North Carolina.

45 In the case of this amendment, there are no default actions that would cause No Action to differ from Status Quo. Therefore for the purposes of this Cumulative Effects analysis, No Action and Status Quo (Section 5.2.8.1) are equivalent.

The cumulative effects analysis focuses on five Valued Ecosystem Components (VEC's) listed below. The non-fishing activities also include past, present, and reasonably foreseeable future actions.

1. Target species (skates)
2. Non-target species (incidental catch and bycatch)
3. Protected species
4. Habitat, and
5. Communities.

The cumulative effects determination on these VEC's is based on the following analyses: (1) the discussion in this section of non-fishing actions occurring outside the scope of this FMP; (2) the analysis of direct and indirect impacts contained in the Environmental Consequences section of this DEIS (Sections 8.3 to 8.8) and summarized in this section (Sections 8.1.4 and 8.1.5); (3) the summary of past, present and future actions affecting the skate fishery; and (4) the cumulative effects of the alternatives provided in Section 8.1.2.

NOAA Fisheries staff determined that the 5 VECs (target species, non-target species, protected species, habitat and communities) are appropriate for the purpose of evaluating cumulative effects of the proposed action based on the environmental components that have historically been impacted by fishing, and statutory requirements to complete assessments of these factors under the Magnuson-Stevens Act, Endangered Species Act, Marine Mammal Protection Act, Regulatory Flexibility Act, and several Executive Orders. The VECs are intentionally broad (for example, there is one devoted to protected species, rather than just marine mammals, and one on habitat, rather than Essential Fish Habitat) to allow for flexibility in assessing all potential environmental factors that are likely to be impacted by the action. While subsistence fishing would ordinarily fall under the "communities" VEC, no subsistence fishing or Indian treaty fishing take place in the area managed under this FMP.

The vessels participating in the skate fishery must comply with all federal air quality (engine emissions) and marine pollution regulations, and, therefore, do not significantly affect air or marine water quality. Consequently, the management measures contained in Amendment 3 would not likely result in any additional impact to air or marine water quality.

8.1.2 Summary of the proposed action measures

This amendment is designed to achieve a number of goals and objectives as outlined in Section 3.0, consistent with the skate stock-rebuilding goals established by the FMP, adopted in 2002. The purpose and need for this amendment is summarized in Section 3.0. The proposed action (final alternative) and alternatives considered but not adopted are outlined in Section 5.1, and the direct and indirect impacts on the environment are analyzed and discussed in Sections 8.2 to 8.8.

This amendment also addresses problems and issues raised the public during the amendment scoping process. In addition, some proposals address NMFS strategic objectives of streamlining the management process and reducing administrative burdens on the agency and public.

The final alternative is a combination of Alternative 3B applied to the wing fishery and Alternative 4 applied to the bait fishery. Measures include wing, bait, and incidental possession limits, a seasonal quota for the skate bait fishery, monitoring and accountability measures, and an annual review and a biennial specification process. The measures are described in detail within Section 5.1 and the biological impacts on the skate resource in Section 8.3.

In summary, as stated in the Goals and Objectives, the proposed actions are primarily designed to address new management problems and issues that have arisen since implementation of the FMP, and to comply with applicable laws such as NEPA and the Magnuson-Stevens Act. Recent changes in stock conditions have changed the status determinations for smooth and thorny skates, which were classified as overfished and required this action. As a result, the Magnuson-Stevens Act requires the Council to develop an amendment and NMFS to implement measures to redress the conditions and initiate rebuilding of overfished stocks. Winter skate was also classified as overfished when this action was initiated in 2007, but the status determination will changed to “not overfished” when the updated biological reference points are applied and the survey was updated with 2008 data. Nonetheless, the Council is concerned that with rising landings of wing skates, winter skate could still experience overfishing and biomass would decline. So with respect to winter skate, the emphasis of the catch controls and proposed measures has changed from rebuilding an overfished stock to preventing overfishing.

During the final stages of developing this amendment, after publication of the DEIS and public hearings, the Northeast Fisheries Science Center held a Data Poor Assessment Workshop (DPWS) that included an assessment of the seven skate species. While new analytical models were deemed to be unreliable for management at this time, the assessment developed new discard estimates and catch data, and also recommended that the skate biological reference points should be updated to include the entire survey time series through 2007 (2008 for little skate).

The Council considered and re-analyzed the effect that the new catch data had on ABCs, ACLs, and TALs and also accepted the recommendation to update the biological reference points. The new catch data reduced the ABC to 30,643 mt, using the same maximum catch threshold based on the median catch/biomass exploitation ratio. More importantly, the new discard estimates were much higher than previously estimated, which cause the Council to reduce the TAL. This change makes it more likely that directed skate fishing for wings and bait would be curtailed earlier in the season. And as a result, other species that vessels target on a Multispecies, Scallop, or Monkfish DAS may experience more fishing effort than under the No Action alternative.

The proposed update of the biological reference points also will change the status of smooth and winter skates and these species will not be classified as overfished. Thorny skate would remain overfished and overfishing was occurring in 2007. Barndoor skate reference points will not change and would remain in a rebuilding status, not yet reaching the biomass target after having being overfished.

Since the current biomass of winter and smooth skates would still be close to the minimum biomass threshold, the Council’s SSC recommended using the median catch/biomass ratio as a means to avoid overfishing and to prevent smooth, winter, and other skates from becoming overfished. It would also promote rebuilding of thorny skate, if the measures helped to minimize discards[46].

To achieve this objective, the final alternative includes an ACL (equal to the ABC) at the catch/biomass median value. The management measures are set at levels that would curtail skate fishing before landings and discards approached the threshold, and the final alternative includes accountability measures to reduce the ACL buffers and TAL triggers if catch and landings continue to exceed the maximum levels.

Thus, this amendment primarily focuses on alternatives to reduce skate catches to levels that have more frequently than not allowed biomass to increase. In addition, it also would comply with new Magnuson-Stevens Act requirements to establish annual catch limits and targets, with accountability measures if the actual catches exceed the limits.

[46] Along with barndoor skate, thorny skate landings have been prohibited since 2003.

8.1.3 Summary of non-fishing actions and their effect

Following is an assessment of non-fishing impacts on fish habitat and fishery resources. For fish habitat, non-fishing effects have been reviewed in the Essential Fish Habitat Amendment for Skate prepared by the NEMFC (Amendment 2 to the Skate FMP). Table 78, taken from that document, represents the review of the EFH Technical Team of the potential effects of numerous chemical, biological and physical effects to riverine, inshore and offshore fish habitats. Table 78 exhibits twelve representative classes of chemicals, three categories of biological and nineteen types of physical threats, which are categorized as low, moderate or high threats to habitat, based on their geographic location—riverine, inshore and offshore. In general, the closer the proximity to the coast, i.e., close to pollution sources and habitat alternations, the greater the potential for impact.

Riverine and inshore habitats were generally categorized as moderate to high threats whereas the offshore areas were low to moderate. For the offshore area, with the exception of events such as oil spills and algae blooms, which can spread over large areas, moderate effects were generally localized to a well-defined and relatively small impact area such as oil/gas mining and dredged material disposal. Thus, only small portions of fish stocks would potentially use these sparsely located areas and would be adversely affected. For example, dredged material disposal sites, usually about 1 nm^2 in size, are managed by the U.S. Army Corps of Engineers and the U.S. EPA to minimize physical effect to the defined disposal area and allow no chemical effects at the site based on stringent sediment testing.

For fishery resources, there are several non-fishing threats that could have a direct and/or indirect impact on skate stocks. Several of the items identified as non-fishing threats to fish habitat, identified in Table 78 could also pose a threat, such as the oil spills, pesticides, and radioactive wastes. Generally the closer the proximity of skate stocks to the coast, the greater the potential for impact (although predation, a non-fishing impact, would be one threat that would occur everywhere). Skate reside or migrate through both inshore and offshore areas at different stages of their lives and during different seasons throughout the year. In the offshore areas, effects of non-fishing activities would likely be low because the localized nature of the effects would minimize exposure to organisms in the immediate area. However, new exploration and drilling in offshore areas for oil and gas could have adverse effects on skates, depending on the nature of the disturbance.

An additional inshore threat of note would be the effect on fishery resources presented by power plants. The operations of power plants are thought to be especially of consequence to fish eggs, larvae and juveniles. Entrainment, or intake of cooling seawater for the purposes of cooling power plant reactors, is known to draw in eggs and larvae and, therefore, could have a negative impact on some fishery resources that spawn in areas in close proximity to active power plants. An additional threat associated with power plants is the discharge of warm water. This thermal discharge is believed to have a negative impact on reproduction capability and recruitment of affected fishery resources. Since skate spawning and larval stages occur primarily in the offshore environment, this threat is not as significant as it is for other fish stocks, such as winter flounder. Little skate however reside and spawn in shallow coastal waters and like other skates produce demersal egg sacs, which may be susceptible to entrainment and coastal dredging.

Table 78- Potential non-fishing threats to fish habitat in the New England region prioritized within regions (H = high; M = moderate; L = low)2

THREATS		RIVERINE	INSHORE	OFFSHORE
Chemical				
	oil	M	M	M
	heavy metals	M	M	M
	nutrients	H	H	L
	pesticides	M	M	L
	herbicides / fungicide	M	M	L
	acid	H	M	
	chlorine	M	M	
	thermal	M	M	
	metabolic & food wastes	M	M	
	suspended particles	M	M	L
	radioactive wastes	L	M	M
	greenhouse gases	M	M	M
Biological				
	nonindigenous / reared species	M	M	M
	nuisance / toxic algae	M	H	M
	pathogens	M	M	M
Physical				
	channel dredge	M	H	
	dredge and fill	H	H	
	marina / dock construction	M	H	
	vessel activity	M	H	L
	erosion control			
	bulkheads	M	M	
	seawalls		M	
	jetties		M	
	groins		M	
	tidal restriction	M	H	
	dam construction / operation	H	M	
	water diversion			
	water withdrawal	H	M	
	irrigation	M	M	
	deforestation	H	M	
	mining			
	gravel/mineral mining	M	M	M
	oil/gas mining	L	M	M
	peat mining	L		
	debris	M	M	M
	dredged material disposal	L	M	M
	artificial reefs	L	M	M

[1] From NEFMC (1998)

[2] Prioritization developed by compilation of *EFH Technical Team* survey

Other future non-fishing threats to fishery resources could include global warming and siting of wind farms in the coastal or offshore environment. The effects of global warming and rising sea temperature on the life cycles and distribution of fishery stocks are uncertain and, therefore, could not be incorporated into this assessment. The possibility of windmill construction in marine waters for the purposes of harnessing alternative means of energy could also have an impact on fishery resources, especially as it relates to disruption of habitat. It is notable that the MA DMF survey captures considerable numbers of little skate year around and winter skate in the spring. These skate species are likely to inhabit in Nantucket Sound, but it is not known to what extent little and winter skate rely on the area. Windfarm siting is the subject of a forthcoming EIS being prepared by the Army Corps of Engineers. The impacts of this project to the fisheries have been analyzed in the draft environmental impact statement for the Cape Windfarm Project.

8.1.4 Summary of fishing gear effects on fish habitat

A gear effects and adverse impacts determination analysis was conducted by NMFS, based on the results of the Councils' Gear Effects Workshop (available at http://www.nefsc.noaa.gov/publications/crd/crd0201/crd02-01.pdf) and information provided by the NEFMC Habitat Technical Team, as well as a report from the National Research Council on the "Effects of Trawling and Dredging on Seafloor Habitat" (available at http://books.google.com/books?id=orSv2JlXPykC&pg=PA19&lpg=PA19&dq=Effects+of+Trawling+and+Dredging+on+Seafloor+Habitat&source=web&ots=Dbb2thYahm&sig=ij4CAEKP1LveldPqpBF5BNLhsdg&hl=en&sa=X&oi=book_result&resnum=3&ct=result#PPP1,M1 or http://books.nap.edu/catalog.php?record_id=10323). This latter study determined that repeated use of trawls/dredges reduce the bottom habitat complexity by the loss of erect and sessile epifauna, smoothing sedimentary bedforms and bottom roughness. Such activity, when repeated over a long term also results in discernable changes in benthic communities, which involve a shift from larger bodied long-lived benthic organisms for smaller shorter-lived ones. This shift also can result in loss of benthic productivity and thus biomass available for fish predators.

Thus, such changes in bottom structure and loss of productivity can reduce the value of the bottom habitat for demersal fish. These effects varied with sediment type with lower level of impact to sandy communities, where there is a high natural dynamic nature to these bedforms, to a high degree of impact to hard bottom areas such as bedrock, cobble and coarse gravel, where the substrate and attached epifauna are more stable. Fishermen in most areas report that their skate effort is predominantly directed in sandy and mud/sand bottomed areas, which are often categorized as a high energy environment that is less affected by fishing activities than other substrates.

Use of trawls and gillnets are common in inshore and offshore areas and much less common in riverine areas. In the Northeast, otter trawls are used to prosecute most managed fisheries including: Northeast Multispecies; Sea Scallops; Skate; Mackerel, squid and butterfish; Summer flounder, scup and black seabass; Bluefish; and Spiny dogfish. Scallop dredges are used in the sea scallop fishery and hydraulic clam dredges are used in the surf clam and ocean quahogs fisheries. Smaller trawls are used in inshore areas and lower estuaries, which are managed by states and not subject to the Magnuson-Stevens Act. In addition, some states allow smaller dredges are used for harvesting oysters, bay scallops, sea urchins, quahogs, and mussels. It is assumed for this analysis that the effects of gear are generally moderate to high in the riverine, inshore and offshore areas, depending upon the type of bottom and the frequency of fishing.

8.1.5 Summary of existing threats to protected resources

Six large whale species (right, humpback, fin, sei, blue and sperm whales) and three sea turtles (leatherback, Kemp's ridley and green turtles) found in the region are listed as "endangered" under the Endangered Species Act. The loggerhead turtle is listed as threatened and thorny skate has been petitioned for listing under the Endangered Species Act. The remaining mammal species are protected under the Marine Mammal Protection Act. The right whale continues to be at the highest risk for extinction because of its low numbers and low reproductive status. Table 79 summarizes the past and current threats for the whale species that have a special status because of threats to their continued sustainability.

Ship strikes and fishing gear entanglement continue to be the most likely sources of injury or mortality for the right, humpback, fin and minke whales. Gear entanglement occurs in the vertical buoy lines of sink gillnet and pot/trap gear, the groundlines of pot/trap gear, and also in the net panels of gillnet gear. Sei, blue and sperm whales are also vulnerable, but fewer ship strikes or entanglements have been recorded. Mobile bottom trawls are less of a concern for the large whale species. Other marine mammals, such as harbor porpoise, dolphins and seals, are also at risk to be entangled in net gear (including seines, gillnets and drift nets). Turtles have been entangled in shrimp trawls, pound nets, bottom trawls sink gillnets, and scallop dredges. Shrimp and summer flounder[47] trawls are required to use turtle excluder devices. Scallop dredges are required to have turtle-deflection chains in areas and seasons where sea turtle capture has been observed.

Protected species are also affected by habitat alteration or destruction. Species such as turtles may be more prone to such impacts because their nests are particularly vulnerable to disturbance or predation. The impacts of pelagic habitat alteration on protected species are less known. Water quality in coastal areas is particularly vulnerable to coastal pollution from nutrients, which can alter the phytoplankton and the food of species such as the right whale. Toxic contaminants, such as PCBs and DDT which are suspected of causing reproductive failure in many vertebrates including marine mammals (Reijinders and Aguilar, 2002), can also accumulate through the prey species and cause adverse effects to a predator that is higher in the food web. The potential impact of pollution is more likely problematic in nearshore areas closer to the source, such as agricultural and urban runoff and sewer outfalls. Nutrients can also promote toxic phytoplankton blooms, which have been known or suspected in killing whales and other marine mammals (Geraci, et al., 1990; Harwood, 2002).

Low frequency sonar may pose an additional threat, although the extent of its continued use by the U.S. military is unclear at this writing. A successful lawsuit brought by environmental groups limited the use of such sonar following a number of marine mammal deaths in the vicinity of naval exercises in several places around the world. Federal legislation being debated in Congress at this time could override the lawsuit settlement agreement and exempt the military from the "harassment" provisions of the MMPA, easing the restrictions on the limited deployment of low frequency sonar.

The factors discussed above, and other factors, potentially have had cumulative adverse effects on all protected species to varying degrees. Because of a lack of cause-effect data, little is known about the magnitude and scope of these factors and how they have contributed to the species' special listing. The direct and indirect effects of the alternatives in this amendment are discussed in Section 8.0. Section 8.1 summarizes the cumulative effects of the alternatives in the context of the discussion above.

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[47] Final rule, FR 61:1846, 24 January 1996.

Table 79- Summary of past and present threats for whales that have special status because of threats to their continued sustainability.

Species	Status	Threats			
		Ship Strikes	Gear Entanglement	Habitat	Other
Right whale	Endang Highest risk	High Potential	High potential due sink gillnets, pots, traps	Unknown: Water Quality: Nutrients; Toxic contaminants; Biotoxins; Noise	Unknown: Low Genetic diversity; Low reproductive rates; Reduction/ Competition of prey; Harassment
Humpback whale	Endang	High Potential	High potential	Unknown: Water Quality: Nutrients; Toxic contaminants; Biotoxins; Noise	Unknown: Reduction/ Competition of prey; Harassment
Fin whale	Endang	High Potential Mortality Less Certain	High potential Mortality Less Certain	Unknown: Water Quality: Nutrients; Toxic contaminants; Biotoxins; Noise	Unknown: Reduction/ Competition of prey; Harassment
Sei whale	Endang	Potential but few recorded instances	Potential but no recorded instances	Offshore Species Less likely but still vulnerable to Offshore Development	Unknown: Reduction/ Competition of prey; Harassment
Blue whale	Endang	Potential but few recorded instances	Potential but few recorded instances	Offshore Species Less likely but still vulnerable to Offshore Development	Unknown (no data): Ice entrapment
Sperm whale	Endang	Potential but few recorded instances	Potential but few recorded instances	Offshore Species Less likely but still vulnerable to Offshore Development	Unknown: Reduction/ Competition of prey; Harassment
Minke whale	Protected under MMPA	Potential but few recorded instances	Sink Gillnets known threat; Pot/Trap Gear	Unknown: Water Quality: Nutrients; Toxic contaminants; Biotoxins; Noise	Aboriginal subsistence whaling on West Greenland stock (non-U.S. stock)
Green turtle	ESA threatened	Some potential	Entangled in gillnets and pound nets Capture by trawls and dredges without TEDs or	Marine debris; global warming; loss or gegradation of nesting sites; beach renourishment and artificial coastal lighting; non-native	Disease, particularly fibropapillomatosis infections of green turtles Harassment
Kemp's ridley turtle	Endang				

Species	Status	Threats			
		Ship Strikes	Gear Entanglement	Habitat	Other
Leatherback turle	Endang		turtle-deflecting chains	vegetation; coastal runoff; aquaculture	Poaching
Loggerhead turtle	ESA threatened				

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8.1.6 Summary of past, present and future actions affecting the skate fishery

8.1.6.1 Past and present actions

The current condition of the skate fishery (in the context of the five VECs) is the result of the cumulative effect of the Skate FMP, implemented in 2003, and regulations under other FMPs in the region that impact vessels catching skate as well as measures adopted under other laws, particularly the Endangered Species Act and the Marine Mammal Protection Act. The status of the fishery, its stocks, human component and the biological and physical environment, is discussed in the Affected Environment section of this document, Section 7.0. This section contain a discussion of past actions that have cumulatively, and in most cases positively affected the VECs of the skate fishery, including regulatory and judicial actions.

In summary, the directed skate fishery is relatively young, having emerged over the past two decades and coming under regulation only in 2003 with the adoption of the FMP. The Councils developed the FMP in response to concerns that skate fishing was causing biomass to decline, threatening the existence of species that are targeted to supply the wing market, particularly barndoor skate which was petitioned for listing under the Endangered Species Act.

Since the FMP was implemented in 2003, the results have been mixed to unfavorable. An increase in barndoor skate biomass was already underway by the time the FMP was developed and implemented. Since then, barndoor skate biomass has stabilized above the threshold, but below the target (see Section 7.2.3, for more information on biomass trends). Once deemed overfished because biomass was below the threshold, barndoor skate is in a rebuilding program because its biomass has not yet achieved the target. Thorny skate was also deemed overfished when the FMP was implemented, i.e. its biomass was below the threshold. Since then, biomass has declined and is well below the threshold. At the time, a rebuilding period for thorny skate could not be estimated due to missing life history data. Since then, the PDT has estimated that thorny skate cannot be rebuilt in 10 years and this amendment adopts a 25 year rebuilding schedule beginning in 2003.

Smooth skate is now deemed overfished, because its biomass index has now slipped below the threshold. Since 2003, however, biomass has not changed significantly, and the recent changes are probably within the margin of sampling error, but is still way below the target. Clearnose skate biomass has remained relatively stable and is well above the target. Rosette skate biomass increased, but the survey samples the edge of rosette skate distribution and the changes are probably not significant.

The two skates that are targeted by the fishery and landed, little and winter skates, have however seen substantial declines in biomass since FMP implementation in 2003. Little skate biomass has declined from a 6.72 kg/tow average to a 3.67 kg/tow average. Although not overfished and not experiencing overfishing, the 2007 survey biomass is only slightly above the 3.27 kg/tow threshold. Unaudited 2008 spring survey data shows a substantial increase in biomass, so little skate is unlikely to become overfished soon. Winter skate biomass however has declined below the 3.23 kg/tow threshold and is therefore overfished. Biomass declined from 4.29 kg/tow in 2003, became overfished in 2006 and biomass continued to decline to 2.93 kg/tow in 2007. Winter skate biomass has however rebounded in 2008 and is unlikely to become overfished in the near term, but this biomass increase is mainly based on only one year of survey data.

The three FMP's that have had the greatest impact on skate fishery VECs, other than the Skate FMP, are the Sea Scallop, Monkfish, and Northeast Multispecies FMP's because of the spatial overlap of the fisheries, the relatively high level of incidental catch of skate in those fisheries, and the fact that more than 90 percent of the skate permit holders are also permitted in one or the other of those three fisheries (mostly in the Multispecies fishery). Both Multispecies and Sea Scallop fisheries have undergone a series of major actions since 1994 to reduce fishing effort and rebuild overfished stocks. These include Multispecies Amendments 5 –15 and 43 framework adjustments, Monkfish Amendments 1-3 (with one pending) and 5 framework adjustments (with one pending), and Sea Scallop Amendments 4-13 (with two pending to address EFH and ACL/AMs) and 20 framework adjustments (with one pending). These actions have reduced overall fishing effort significantly since 1994, and have imposed other restrictions such as year-round and seasonal closed areas, and gear restrictions that have affected both the directed and incidental catch skate fishery. Cumulatively, these actions have likely had a positive effect on skate, contributing to the increasing stock abundance observed over the past five years.

Additional action in all three FMP's is pending, and will be discussed below (Section 8.1.6.2). Other FMPs that likely have had an impact on the fishery VECs include those managing other demersal species in the region, such as the Skate Spiny Dogfish FMP (implemented 2000), and the Summer Flounder, Scup, Black Sea Bass FMP (1996 and amendments). To varying degrees, these management plans, as well as others in the region, have directly or indirectly affected the skate fishery by causing effort to shift among fisheries and by changes to the levels of incidental catch of skate. It is not possible within this document to analyze all of the inter-relationships of these management plans with the skate fishery because in most cases these relationships are not well understood and vary widely for individual vessels and areas.

Standard Bycatch Reporting Methodology (SBRM)

The SBRM Amendment was an omnibus amendment to all 13 FMPs developed by the New England and Mid-Atlantic Fishery Management Councils. The actions considered in the SBRM Amendment focused solely on the administrative processes through which data and information on bycatch occurring in Northeast Region fisheries are collected, analyzed, and reported to fishery scientists and managers. This amendment did not address bycatch reduction or other issues related to the management measures utilized in Northeast Region fisheries.

The SBRM Amendment formalized and expanded the administrative mechanisms used previously in the Northeast Region to collect information and data on fisheries bycatch and to analyze bycatch data in order to effectively determine appropriate observer coverage levels and allocate observer effort across the many Northeast Region fisheries. The action did not result in any changes to fishing operations in areas covered by the subject FMPs. There were no incremental impacts to any fishing areas or living marine resources associated with the SBRM Amendment. The new SBRM elements —implementation of an importance filter to establish and allocated target observer coverage levels, establishment of an SBRM performance standard, the requirement to conduct periodic evaluations and prepare a periodic SBRM report, the prioritization process, and the framework adjustment provisions—are purely administrative features intended to improve the effectiveness and the transparency of the Northeast Region SBRM. None of these additional components are associated with impacts to any fishing areas or living marine resources within the Northeast Region.

8.1.6.2 Reasonably foreseeable future actions

Future actions considered in this section include actions taken under this FMP, actions taken under other FMPs that affect vessels catching skate, and actions taken to protect marine mammals or threatened and endangered species. Given that skate fishing occurs in relative isolation from other (than fishing) spatially co-occurring activities (for example, shipping and recreational boating), it is unlikely that any regulatory action or other changes in those activities will have an impact on the fishery, or vice versa.

Other activities that could potentially have an impact on skate fishing, such as development of offshore energy facilities or offshore aquaculture projects, would require a thorough analysis of the potential environmental impacts including those on skates. Although a few offshore aquaculture proposals have been developed in the past, and feasibility studies are currently underway, these projects face a number of technical and environmental obstacles that reduce the likelihood these projects will actually become commercially viable within the next five to seven years.

Included in the reasonably foreseeable future actions that may have an impact on the skate fishery are other FMP amendments in various stages of development or implementation, the most notably Multispecies Framework Adjustment 43 and Sea Scallop Amendment 11 and Framework Adjustments 18-20. Both Framework Adjustment 43 and Amendment 11 will have direct and indirect impacts on skate vessels since most skate vessels are also permitted in one of those other fisheries and are directly affected by the cumulative effect of the proposed action and those other amendments.

Scallops

In terms of the scallop fishery, several actions have been implemented recently or are currently under consideration for the Scallop FMP that could impact skates since skate discards and incidental catch are a significant component of the total skate catch. Skates are caught in both the scallop dredge and trawl fisheries. Framework 19 and Amendment 11 are two actions that have recently been approved and implemented under the Scallop FMP. In addition, Amendment 15 is currently being considered and is expected to be implemented in 2011. Overall, these actions are expected to have neutral to positive impacts on skate mortality.

The Council worked on Amendment 11 for several years and it became effective on June 1, 2008. Amendment 11 established a new management program for the general category scallop fishery, including a limited access program with individual fishing quotas (IFQs) for qualified general category vessels, a specific allocation for general category fisheries, and other measures to improve management of the general category scallop fishery. The number of general category vessels in this fishery is expected to decline as a result of this action, and the total fishing effort of this fleet will be limited by an overall TAC, 5% of the annual scallop catch. In general, this action is expected to reduce general category scallop fishing compared to overall fishing levels in recent years. Thus this action may have positive impacts on skate mortality since general category effort levels are expected to decrease as a result of this action and will have an overall limit based on the sum of IFQ available. In addition, this action implemented a limited entry program for general category fishing in the northern Gulf of Maine (NGOM). Only qualifying vessels can participate in this fishery and it is limited to an overall TAC as well; once that amount is harvested, no general category vessels can fish in the NGOM. This measure may have positive impacts on skate mortality for species within the GOM.

Framework 19 to the Scallop FMP also became effective on June 1, 2008. It sets fishery specifications for FY2008 and FY2009 as well as other measures. Overall, this action allocated fewer DAS than previous years. Full-time limited access scallop vessels received 35 open area DAS in 2008 and 42 DAS in 2009, compared to 51DAS in 2007 and 52 DAS in 2006. IN addition, more effort was allocated in "scallop access areas" in 2008 and 2009 compared to earlier years. This is important when considering potential impacts on non-target species like skates. Scallop catch per unit of effort is much higher in access areas compared to open areas. If scallop gear is on the ocean bottom for less time to harvest the same amount of scallop catch, then impacts on non-target species are expected to decline. Under FW19, estimates of projected area swept by scallop gear are lower compared to previous years.

Lastly, the Council is currently developing Amendment 15 to the Scallop FMP. This action is expected to be implemented in 2011. The primary need for this action is to bring the Scallop FMP in compliance with the re-authorized Magnuson-Stevens Fishery Conservation and Management Act (MSA). The Act was reauthorized in 2007 and included several new legal requirements. Foremost, the Act requires that each fishery use annual catch limits (ACLs) to prevent overfishing, including measures to ensure accountability. This action is also considering measures that reduce capacity in the limited access scallop fishery as well as several other adjustments to the overall program. This action is very early in development, but it will likely have neutral impacts on skate mortality since it is not expected to directly affect fishing effort levels.

The cumulative effect of scallop fishing regulations on skates depends largely on the resulting distribution of scallop fishing effort. More scallop fishing effort in the Closed Area I access area and along the northern edge of Georges Bank is more likely to increase catch and discards, particularly of little, winter, thorny and smooth skates.

Monkfish

The next management action to regulate the monkfish fishery under the Monkfish FMP will be an amendment to comply with new Magnuson-Steven Act mandates, primarily establishment of annual catch limits (ACL) and accountability measures (AM). This action could have an important effect on the skate resource and fishery, because at least some monkfish trips also target skate or land incidental amounts. In particular, a mixed skate/monkfish fishery appears to exist in the offshore waters south of RI and off the northern NJ coastline. Changes in Monkfish DAS or other related regulations could increase or decrease fishing activity on trips landing or discarding skates.

Monkfish are presently considered rebuilt and current fishing mortality estimates are below the MSY threshold. So the catch limits and targets associated with ACLs and AMs could be set at levels above current amounts. In this case, the monkfish regulations may become more liberal and monkfish DAS allocations could increase, allowing more fishing on trips landing and/or discarding skates. On the other hand, a new assessment may take place before the next Monkfish FMP action is planned which could change this outlook. Also, the Council will be required to build in precautionary limits and thresholds to account for scientific and management uncertainty. At this point, it is not known whether future monkfish fishing effort will increase or decrease due to the combination of influencing factors, assessments, and management considerations (especially the development of ACLs and AMs and an updated assessment that will likely incorporate another cooperative survey and information gathered in recent and ongoing cooperative research projects).

Multispecies

The Northeast Multispecies FMP manages nineteen stocks of groundfish. Thirteen of these stocks are overfished and are (or will be) subject to formal rebuilding plans. The NEFMC is currently developing Amendment 16 to the FMP to address rebuilding requirements. Preliminary stock status information suggests that fishing mortality for many stocks will need to be reduced on the order of thirty to fifty percent in order to meet rebuilding objectives, and for some stocks larger reductions are needed. The

Council is considering additional effort control restrictions in Amendment 16 to achieve these reductions. Options under consideration include reductions in days-at-sea (DAS), area closures, and large restricted gear areas. While an eighteen percent DAS reduction is planned for May 1, 2009, the new measures will probably be implemented in November, 2009. The measures are likely to apply throughout the Gulf of Maine, Georges Bank, and Southern New England, though restrictions in Southern New England may be more stringent than in the other area because of the poor status of Southern New England yellowtail flounder and Southern New England winter flounder.

The following alternatives under consideration in Multispecies Amendment 16 are not expected to directly affect the skate fishery:

- Revisions to status determination criteria and formal rebuilding programs
- Annual Catch Limits: Option 2 takes into account the catch of groundfish species in other fisheries. This action does not propose a specific ACL for the summer flounder fishery but it is possible a specific ACL may be considered in the future.
- Addition of Atlantic Wolffish to the Management Init
- Sector administration provisions: these options will not have direct impacts on the skate fishery, but the formation of additional sectors may and will be discussed below.
- Reporting requirements
- Allocation of groundfish to the commercial and recreational groundfish fisheries
- Changes to the DAS transfer and leasing programs
- Special management programs
- Periodic Adjustment Process
- Possession of a limited access multispecies permit and a limited access scallop permit by the same vessel
- Recreational Management measures
- Atlantic halibut minimum size
- Prohibition on retention of Atlantic wolffish
- Accountability measures

There are four primary management options (including the No Action alternative) being considered to reduce fishing mortality that results from vessels that choose not to join groundfish sectors. All four options reduce the number of Category A DAS available to fish for groundfish, with the No Action option and Option 2A reducing DAS by 18 percent, Option 3A by 50 percent, and Option 4 by 40 percent. In addition, two options either extend differential DAS counting areas or modify the ways DAS are counted. Both of these options further reduce groundfish fishing opportunities. Since at present much skate fishing is required to use either a scallop, monkfish, or scallop DAS, all of these options would reduce the number of groundfish DAS available to use while fishing for skates. This would be expected to reduce skate landings. A side effect of reduced opportunities to fish for skates while using groundfish DAS might be that vessels choose to participate more frequently in the skate exempted fisheries programs.

In addition to additional effort control restrictions that would take effect in 2009, the amendment may authorize the operation of seventeen additional groundfish sectors beginning in fishing year 2010. These sectors would not be subject to effort controls, but would have their catch limited by hard quotas with a concomitant increase in monitoring of landings and discards. The impact of sector formation is likely to result in reduced fishing effort of at least the same order of magnitude as the proposed effort control reductions. Since sector vessels are not subject to DAS limits, trip limits, and some other effort controls, fishing operations will probably be more efficient and less time on the water will be necessary to harvest the resources.

Under both scenarios – additional effort control restrictions and an increase in sectors- the bycatch of skate species on directed groundfish trips would be expected to decrease as a result of lower levels of fishing activity. It is possible that these changes might shift some effort onto skates that can take place outside of the groundfish DAS program – for example, in state waters or in an exempted fishery. Since sector vessels will not need to use groundfish DAS to target groundfish, they may use those DAS to target skates.

Several multispecies rebuilding plans are supposed to end in 2014. Should they be successful, fishing effort may be allowed to increase above rebuilding levels, but not to current levels.

Since much of the analysis in this document relies on 2007 data, it implicitly includes the effects of these recently implemented actions on the skate fishery. In general, Framework 43 made groundfish regulations more restrictive and reduced the incentive to use Category A and B DAS to target regulated groundfish. As a result of this action and rising skate wing prices, more Multispecies DAS have been used by permitted vessels to fish for skates, landing the wings for an export food market. On the other hand, reducing effort from trips fishing for groundfish probably resulted in a decline in associated skate discards and incidental landings, but discard estimates for 2007 are not yet available. A large increase in the use of Category B DAS by vessels fishing for skates with gillnets occurred in 2007. Skate landings on Category B DAS rose from negligible amounts to nearly 2 million pounds in 2007. A prohibition on the use of Category B DAS in this amendment would reverse this cumulative effect on skates, but may have an adverse effect on multispecies if the B DAS are used to target other species, or a favorable effect on groundfish if vessels use a greater fraction of A DAS to target skates.

Also, since publication of the Skate DEIS, two important changes to the Multispecies FMP fishery regulations have taken place. Recently, a lawsuit challenging the Multispecies Framework 42 regulations was heard and the court ordered that some of the regulations should be suspended pending an analysis of the mixed stock exception. Although the suspension may be temporary, it lifted certain regulations including 2:1 DAS counting. This action effectively increased the amount of DAS available to fish for multispecies, skates, and other species. If the court finds in favor of the plaintiffs and sets the Framework 42 regulations aside, it could allow landings and discards of skates to increase, potentially causing overfishing because the Skate FMP relies on DAS limits in other FMPs to limit fishing effort.

At nearly the same time, the NMFS took interim action to reduce mortality in the multispecies fishery, because the Council was unable to submit Amendment 16 in time to be implemented by May 1, 2009 (the start of the multispecies fishing year). This action has a drastic impact on skate fishing, particularly in Southern New England. The interim action includes a large area closure from the Great South Channel westward to NJ. This closure affects skate fishing vessels because most vessels utilize Multispecies DAS to fish for skates, except for vessels with state permits fishing for skates in state waters. The interim action is likely to substantially curtail fishing for bait skates in Southern New England. It appears that it will also have an effect on vessels using trawls to target skates for the wing market. Many of these vessels fish in the southern part of the Great South Channel that will be affected by the proposed Interim Action. Fishing effort is likely to shift north, to areas east of Cape Cod where vessels using gillnets target skates. This effort shift may reduce skate catches for vessels fishing in the area that would remain open and possibly increase the potential for gear conflicts.

<u>Other related actions</u>

Even vessels not directly impacted by virtue of having a scallop, monkfish, or multispecies permit could be affected by the displacement of effort resulting from restrictions imposed on those fisheries, and by any measures, such as area closures to protect EFH, that restrict the operation of all fishing with specific gear types. EFH closures were in effect during much of the period when the data used to analyze impacts of this amendment were collected. Other than in areas where there is an overlap in the EFH closed areas and the groundfish closed areas (which have been closed to skate fishing since 1994), very little fishing for skates has occurred. Therefore the cumulative effect of EFH closed areas on skates is likely to be small.

Other potential future actions whose effects would be cumulative to the proposed action include actions taken to protect marine mammals, endangered and threatened species. Current measures in effect are discussed in Section 8.5. These could be modified in the future under either a fishery management plan, marine mammal take-reduction plan, or regulation promulgated under authority of the Endangered Species Act. Specifically, known or anticipated future actions include: short-term closures to sink gillnets under the Atlantic Large Whale Take Reduction Plan Dynamic Area Management (DAM) system; changes to the Harbor Porpoise Take Reduction Plan; and measures adopted under the NMFS final rule implementing large-mesh gillnet closures off the North Carolina/Virginia coast to protect sea turtles. Since the specific nature of those potential changes is not known at this time, their effect on the skate VECs cannot be determined at this time.

In the more distant future, two other actions outside the fisheries arena could potentially affect the skate fishery VEC's due to their geographic overlap: offshore windfarms and offshore oil and gas exploration/drilling. In the case of the windfarm project, the current proposal under consideration would site the facility in Nantucket Sound, which could have an effect on little and winter skate because these skates occur in shallow, inshore waters surrounding MA. It is not known, but probably unlikely, that a windfarm project in Nantucket Sound will have a significant environmental effect on skates. Little and winter skates occur over a broad area of the coastline and a localized project individually would have a minor effect on the total population of these skates. However, siting of many windfarms over a broad area of the coastline could have a significant cumulative effect, as could other wide-spread human activities in shallow coastal waters.

The Nantucket Sound windfarm proposal is controversial, however, and the Army Corps of Engineers has prepared an Environmental Impact Statement that includes other site alternatives that may also impact skates. In that case, there is a potential, but unknown impact on the skate fishery, depending on the exact location and other parameters of the project. In the case of offshore oil and gas exploration, a current federal moratorium is preventing any such activities. According the recent media reports, discussions have begun in Washington on reconsidering the moratorium, in which case the potential exists for such activities to have an effect on the skate fishery VEC's, since one of the primary areas of interest is Georges Bank. As with the windfarm proposal, however, insufficient detail is available to determine the potential effects of such activities with any reasonable certainty or specificity.

With advances in fishing technology and ongoing restrictions in traditional fisheries, some vessels may begin to develop deepwater fisheries, much like what occurred in Europe over the past two decades. Not much is known at this time about the potential for such fisheries in the northwest Atlantic, nor about how such fisheries would interact, directly or indirectly, with deepwater components of the skate fishery or its essential fish habitat. Furthermore, such fisheries would likely have an impact on deepwater coral habitat whose role in the life stages of skate and other deepwater species currently being harvested, such as red crab, is not well known. The deepwater fisheries do not have management plans in place at this time, although such plans would likely be implemented if such fisheries were to begin. The cumulative effect of the development of deepwater fisheries and the associated FMP's is not ascertainable at this time.

8.1.7 Cumulative effects of the proposed action

Table 80 summarizes the anticipated cumulative effects of the proposed action on each of the five VECs compared to taking no action. The cumulative effects determination is based on the preceding analysis of non-fishing activities, fishing gear effects, direct and indirect impacts in the context of the past, present and reasonably foreseeable future actions discussed in the preceding section, as well as the analysis of the direct and indirect impacts in Sections 8.2 to 8.8.

In summary, the proposed measures viewed together, are not likely to have a significant cumulative effect on the environment. As a whole, these measures are likely to have a slightly positive effect on communities, since they address a number of issues identified by the affected public, such as regulatory discards and the inability to profitably conduct a traditional offshore fishery. The measures proposed to minimize impacts of the fishery on EFH (SFMA roller restriction and canyon closures) are also positive, but since they are effectively preventative, rather than restrictive on current fishing activities, the impacts are also not significant. The impact of the proposals on the other VECs is essentially neutral compared to no action.

Table 80. Cumulative effects on valued ecosystem components (VECs) compared to no action.

Measure	**Valued Ecosystem Components**				
	Target Species	**Non-target Species**	**Protected Species**	**Habitat**	**Communities**
Incidental Catch – 50 lbs./day, 150 max.	No Impact. Incidental catch accounted for in calculation of annual trip limits/DAS for directed fishery. Reduces bycatch of small skate. Improved catch data.	No Impact. Incidental catch accounted for in calculation of annual trip limits/DAS for directed fishery. Reduces bycatch of small skate. Improved catch data.	No Impact. Incidental catch accounted for in calculation of annual trip limits/DAS for directed fishery. Reduces bycatch of small skate. Improved catch data.	No Impact. Incidental catch accounted for in calculation of annual trip limits/DAS for directed fishery. Reduces bycatch of small skate. Improved catch data.	Slightly positive due to reduced discards and improved profitability.
Interim catch limits and accountability measures (All alternatives)	Substantially positive impact. Catch limits and accountability measures promote rebuilding of skate biomass by keeping catch from exceeding appropriate levels.	Somewhat negative impact. Vessels may use DAS and fish for other species if they cannot land skates.	No or unknown impact. Closure of the skate fishery is unlikely to cause vessels to switch gears or fish in different areas or seasons. Skate fishing may intensify early in the year, but the impact on protected species is unknown.	No impact. Closure of the skate fishery is unlikely to cause vessels to switch gears or fish in different areas.	Impacts are equivocal. Early closure of the skate fishery may deprive the lobster fishery with bait and ports with a steady supply of skate landings. On the other hand, rebuilding skate biomass would allow for higher landings.
Annual review, SAFE Report, and specification setting procedure (All alternatives)	Positive impact. Measures would allow for more timely recognition of problems and potential action to correct new problems.	Neutral impact. Adjustments could increase or decrease skate fishing effort, which could have positive or negative effects on landings and discards of other species.	Neutral impact. Adjustments could increase or decrease skate fishing effort, change fishing methods, or change seasonality of fishing.	Neutral impact. Adjustments could increase or decrease skate fishing effort, change fishing methods, or change seasonality of fishing.	Positive impact. More timely changes in specifications and/or mitigation could avert the need for more drastic changes later.

Measure	Valued Ecosystem Components				
	Target Species	Non-target Species	Protected Species	Habitat	Communities
Trip declaration and monitoring of landings (All alternatives)	Positive impact. Allows for better compliance and monitoring.	Positive impact. Allows for better compliance and monitoring.	No impact. Unlikely to affect gear use or cause changes in seasonality of fishing.	No impact. Unlikely to cause vessels to change fishing methods.	Positive impact. Allows for better compliance and monitoring, but reporting costs would increase slightly.
Incidental skate possession limit (All alternatives)	Positive impact. Allows for better compliance and monitoring.	No impact. Allows for trips fishing for other species to continue, without causing large amounts of additional skate discards.	No impact. Unlikely to affect gear use or cause changes in seasonality of fishing. Unlikely to change the amount of fishing effort.	No impact. Unlikely to cause vessels to change fishing methods.	Slight negative impact. Could reduce skate landings and revenue on trips targeting other species.
Time/area management (Alternatives 1a, 1b, and 4)	Positive impact. Measure intended to reduce skate catch to levels consistent with rebuilding biomass.	Neutral impact. Could increase catches of species that are more abundant in areas that remain open to skate fishing, and vice versa.	No or unknown impact. Unlikely to cause large shifts in effort to areas where protected species are more abundant.	No impact. Effort shifts are likely to be localized where habitat is not substantially different. Changes in gear use are unlikely.	Negative impact in some communities. Skate landings in some communities near the skate management areas, like Chatham, MA are likely to be substantially lower.
Skate possession limits (All alternatives)	Positive impact. Measure intended to reduce skate catch to levels consistent with rebuilding biomass.	Slight negative impact. Lower skate possession limits could cause vessels to take more frequent (but shorter) trips subject to DAS restrictions or target other species during all or part of a trip.	No or unknown impact. Unlikely to cause large shifts in effort to areas where protected species are more abundant.	Unknown impact. Vessels may take more frequent (but shorter) trips closer to port, where habitat may be more or less sensitive than in traditional skate fishing areas. Area fished is unlikely to change in the skate bait fishery.	Slight negative impact. Measure is intended to reduce skate landings, thus revenue and economic activity from skate fishing.
Skate bait fishery quota (Alternative 4)	Positive impact. Measure intended to reduce skate catch to levels consistent with rebuilding biomass and preventing overfishing of little skate.	Slight negative impact. Vessels may use DAS to target other species when the skate bait fishery closes. Vessel may also target species not managed by DAS, such as black sea bass, scup, summer flounder, or squid if the vessel has or can obtain a federal fishing permit.	Unknown impact. Vessels may target other species, but it is not known when and where this might occur.	Possible negative impact. Vessels that fish inshore in the bait fishery may seek alternatives in offshore areas which may or may not be more vulnerable to habitat disturbance.	Neutral impact. Closure of the skate bait fishery may temporarily deprive the lobster fishery of bait, but other higher cost supplies exist. On shore processors may explore ways to freeze or salt skates to sell when the skate bait fishery is closed, increasing on-shore economic activity.

Measure	Valued Ecosystem Components				
	Target Species	Non-target Species	Protected Species	Habitat	Communities
Status quo	Negative impact. Catch is likely to exceed a level that would promote rebuilding and possibly cause overfishing, particularly if skate prices continue to rise or other fishing regulations become more restrictive.	Positive impact. The opportunity to fish for skates could reduce the incentive to fish for other species, some of which are also overfished.	No impact. Fishing gear use, seasonality, and effort distributions are unlikely to change.	No impact. Fishing gear use and effort distributions are unlikely to change.	Negative impact. Skate fishing could become less profitable if skate biomass continues to decline.
Alternative 1A – Hard TAC with skate possession limits and time/area management	Positive impact. Measure intended to reduce skate catch to levels consistent with rebuilding biomass.	Slight negative impact. Lower skate possession limits and area closures could cause vessels to take more frequent (but shorter) trips subject to DAS restrictions or target other species during all or part of a trip.	No or unknown impact. Unlikely to cause large shifts in effort to areas where protected species are more abundant.	Unknown impact. Vessels may take more frequent (but shorter) trips closer to port, where habitat may be more or less sensitive than in traditional skate fishing areas. Area fished is unlikely to change in the skate bait fishery.	Slight negative impact. Measure is intended to reduce skate landings, thus revenue and economic activity from skate fishing. Skate landings in some communities near the skate management areas, like Chatham, MA are likely to be substantially lower.
Alternative 1B – Target TAC with skate possession limits and time/area management	Same as above.	Same as above.	Same as above.	Same as above.	Same as above.
Alternative 2 – Target TAC with skate possession limits and time/area management only as an accountability measure	Same as above.	Same as above.	Same as above.	Same as above.	Slight negative impact. Measure is intended to reduce skate landings, thus revenue and economic activity from skate fishing.
Alternative 3A – Hard TAC with skate possession limits	Same as above.	Same as above.	Same as above.	Same as above.	Same as above
Alternative 3B – Target TAC with skate possession limits	Same as above.	Same as above.	Same as above.	Same as above.	Same as above

Measure	Valued Ecosystem Components				
	Target Species	**Non-target Species**	**Protected Species**	**Habitat**	**Communities**
Alternative 4 – Target TAC with skate possession limits for the wing fishery, and a seasonal quota for the skate bait fishery	Same as above.	Slight negative impact. Vessels may use DAS to target other species when the skate bait fishery closes. Vessel may also target species not managed by DAS, such as black sea bass, scup, summer flounder, or squid if the vessel has or can obtain a federal fishing permit.	Unknown impact. .	Same as above.	Slight negative impact. Measure is intended to reduce skate landings, thus revenue and economic activity from skate fishing. Skate landings in some communities near the skate management areas, like Chatham, MA are likely to be substantially lower. Also a temporary closure of the skate bait fishery could have localized effects, positive or negative.
Final Alternative and Proposed Action	Positive impact. Measure intended to reduce skate catch to levels consistent with rebuilding biomass.	Slight negative impact. Lower skate possession limits could cause vessels to take more frequent (but shorter) trips subject to DAS restrictions or target other species during all or part of a trip.	No or unknown impact. Unlikely to cause large shifts in effort to areas where protected species are more abundant.	Unknown impact. Vessels may take more frequent (but shorter) trips closer to port, where habitat may be more or less sensitive than in traditional skate fishing areas. Area fished is unlikely to change in the skate bait fishery.	Slight negative impact. Measure is intended to reduce skate landings, thus revenue and economic activity from skate fishing.

8.2 Impact on Stellwagen Bank National Marine Sanctuary

The Gerry Studds Stellwagen Bank National Marine Sanctuary (SWBMS), established in 1992, is the only such area in the northeast to be so designated under the Marine Protection, Research and Sanctuaries Act (Map 24). The designation does not prohibit fishing, although it prohibits mining of sand and gravel and the transfer of petroleum products in the area, and it protects cultural resources (shipwrecks), and requires federal agencies considering any action in the vicinity of the Sanctuary to consult with the Secretary of Commerce.

A relatively small amount of fishing effort on trips landing skate wings occurs in the central and southeastern sections of the SBNMS (Map 24). During 2006, fishing by gillnet trips landing skate wings occurred on the western edge of the Western Gulf of Maine closed area and into the center of the SBNMS, while the trawl trips landing skates and skate wings were somewhat more dispersed. Although some fishing effort within the SBNMS may target skates, most of the fishing activity appears to be a mixed trawl fishery focusing on flounders and other groundfish species.

Somewhat more skate fishing effort occurred nearby, along the outer part of Cape Cod, where the depth breaks to deeper water. This area was dominated by trips fishing with gillnets and landing skate wings. These trips appear to be targeting skates for the wing market.

The alternatives under consideration are unlikely to have a significant effect on fishing within the SBNMS boundary, even if the proposed skate management areas close periodically to fishing for skates. The small amount of fishing effort on trips landing skates and fishing in Thorny Skate Area 4 to the north are likely to either fish just south of that area (commonly known as “The Curl”), where skate fishing already occurs, or keep skate landings below 500 lbs. Skate fishing along outer Cape Cod is likely to intensify if and when Winter Skate Area 3 (south of the boundary of Map 1) closes to skate fishing (Alternatives 1A, 1B, and 4). As a result, some localized depletion of skates in that area may occur and vessels may refocus effort further north, within the SBNMS boundaries. This potential effort shift however is not expected to be significant.

8.3 Impacts on Skates and the Skate Fishery (Biological Impacts)

8.3.1 Impacts from proposed measures

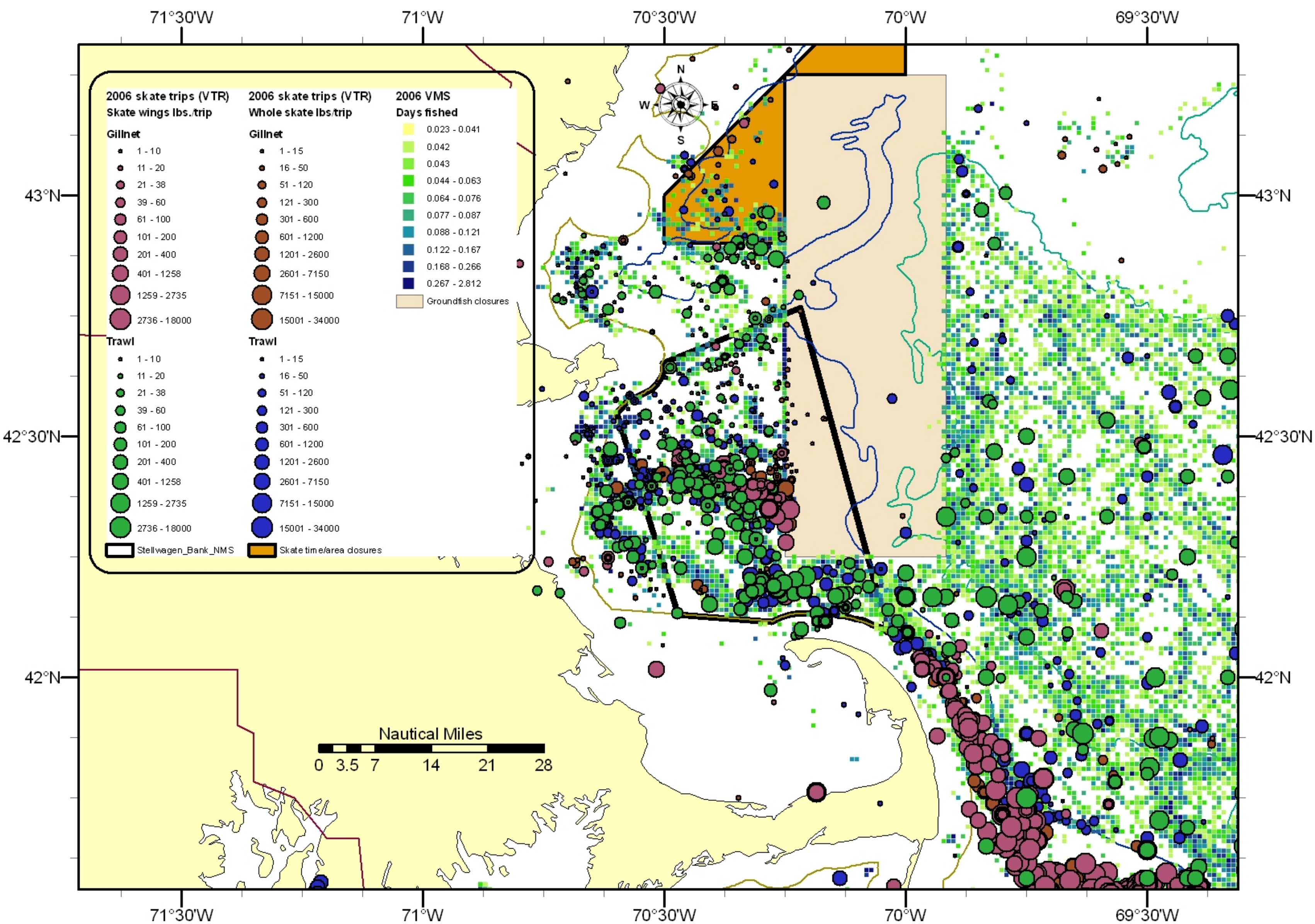
The following measures serve as components of the six Amendment 3 alternatives and are intended to limit landings to desirable levels. Some measures have withstood the test of time, while others have performed poorly.

When distributions of commercial quantities of species are well defined (i.e. not dispersed) or spawning occurs in well defined areas, time/area closures can be very effective in reducing fishing effort on the target species. When this is not true, fishermen simply shift to other areas nearby. Catch rates might be less in neighboring areas however and fishing costs may increase.

At reasonably high levels, possession limits may affect fishing effort targeting skates, but some fishermen taking multi-day trips could compensate by taking more frequent trips (causing fishing costs to rise) unless doing so is unprofitable or reduces DAS availability for more profitable fishing activity. When possession limits are too low, however, unacceptable discarding is a frequent outcome as fishermen target other species without changing fishing locations or effort.

Finally, quotas (whether it is for the skate bait fishery or disguised as a trigger on a very restrictive accountability measure) can effectively limit landings, but often have undesirable effects when there is an open access situation or a sufficiently large pool of limited access vessels that can increase fishing effort. Although quotas restrict landings (or sometimes catch), fishermen and markets may behave differently in reaction a pending fishing closure. Fishermen may change seasons when they normally fish for skates, accelerating skate trips and postponing trips when they would normally fish for other species (subject to the seasonal availability of those species, of course). As landings approach a quota or accountability measure trigger, fishermen may also fish as long as possible or take trips in adverse conditions before the fishery closes. Fish processors may also have difficulty handling the accelerated landings and markets may have difficulty absorbing the temporary surplus, which probably would depress prices paid to fishermen while the skate fishery is open. Quotas also would increase discards as fishermen target other species, although this effect can be mitigated by an incidental limit on skate landings after a fishery closes. Once closed to fishing, skate prices for incidental skate landing prices would probably rise, inviting more frequent retention by vessels that do not normally retain skates or cause fishing for skates under skate wing possession limits to fulfill bait market demand.

Map 24 Fishing locations reported on 2006 vessel trip reports (VTR) for trips that landed skates in the vicinity of the Stellwagen Bank National Marine Sanctuary, with fishing effort intensity derived from vessel monitoring system (VMS) data for trips landing skates in 2006.



The measures analyzed below were included in the alternatives taken to public hearing in the DEIS. Of these measures, the rebuilding analysis for smooth and thorny skate, the analysis of overfishing, the ABCs and accountability measures, the skate fishery allocations, the possession limit analysis, the incidental skate landings limit, the prohibition on using Multispecies Category B DAS to fish for skates, and the skate discard analysis apply to the proposed action. Time/area management and trip declaration requirements were dropped from the proposed action.

8.3.1.1 Rebuilding

The PDT developed the analysis in this section using data available before the DPWS. The basic response of skate biomass to exploitation (measured as catch/biomass) is about the same as in the final analysis, although the estimated ABC at the median catch/biomass ratio is somewhat lower than originally estimated. Also the estimated discards from the final catch series is considerably higher and therefore the wing and bait fishery TALs are lower than indicated in the analysis of draft alternatives. Since the ABC for all the alternatives are identical, the change in the final ABC and TAL values do not have an effect on the comparison between alternatives. This section is retained in the FEIS to document how the alternatives were evaluated in the DEIS. For the final analysis of the proposed action, the reader should refer to Section 8.3.2.1.

Also, this section was written to address rebuilding of smooth, thorny, and winter skates which were and are classified as overfished. If the current overfishing definition reference points are retained, the analysis in this section would be appropriate. The proposed action, however, would update the overfishing definition reference points for six of the seven managed skate stocks, which would reduce the minimum biomass threshold for smooth and winter skates. If approved, smooth and winter skates would not be classified as being overfished and a formal rebuilding program would become unnecessary. Nonetheless, the Council's SSC recommended using the newly estimated catch/biomass median as the basis for setting the skate ABC. In part, the SSC recommended this limit because smooth and winter skate biomass would only be slightly above the new minimum biomass threshold. From this perspective, it is desirable that the FMP promote increases in smooth and winter skate biomass to reduce the risk that they may become overfished and as such, evaluation of the frequency of increasing biomass at various catch levels remains appropriate and vital to this amendment.

The main purpose of the alternatives being considered in this amendment is to reduce and maintain catch below levels that will rebuild overfished skates (thorny skate), achieve the target biomass for species in a rebuilding program (barndoor skate), and prevent overfishing (thorny). Insufficient information about skate population dynamics is presently known to relate future catch levels with predicted fishing mortality rates and biomass changes. Catch history can however serve as a guide to identify levels that are likely to enhance the probability of rebuilding overfished species, particularly when catch is expressed as a ratio to exploitable biomass.

The Council does not have scientific information and analyses to predict when or the rate at which winter, thorny, and smooth skates would rebuild. Since the intrinsic rate of population growth for winter skates (see Document 7 in Appendix I) was estimated to be greater than an annual rate of increase to achieve the biomass target in 10 years (see Document 4 In Appendix I), the Council adopted a 10 year rebuilding plan for winter skate. Conversely, the rate of growth needed to rebuild thorny skate to its biomass target in 10 years substantially exceeded the intrinsic rate of population growth. The Council therefore adopted a 25 year rebuilding schedule for thorny skate, calculated as 10 years plus one generation which was estimated from updated biological parameters. Since thorny skate was overfished in 2003 when the FMP was approved, there will be 19 years left to rebuild assuming this amendment is approved and implemented in 2009.

The PDT attempted to estimate rebuilding via a demographic model (see Document 7 in Appendix I), which associated a rate of rebuilding with various fishing mortality rates. The model estimated a fishing mortality level where the stock was not expected to change under equilibrium conditions. The PDT proposed to associate this mortality rate with the catch levels that were reported when skate biomass varied without trend, but the Council's Scientific and Statistical Committee (SSC) rejected this proposal, since those conditions were unlikely to be in equilibrium (a necessary condition to apply the demographic model estimates). The SSC found that the application of the demographic model to non-equilibrium conditions was not justified and that catch levels consistent with rebuilding could not be estimated using the demographic model.

In place of this proposed method using the demographic model or an analytical (MSY-based) assessment of skate population biology, the PDT evaluated the historic pattern of biomass change with respect to various catch levels (see Document 4 in Appendix I). For some species, including smooth, winter and thorny skate, the PDT found that biomass more frequently increased, and by greater amounts, when the skate catch [expressed as a ratio to the stratified mean survey biomass, averaged over the most recent three years to reduce the influence of sampling error (noise)] was below the median. For other species, there was either no relationship or the relationship was counter-intuitive (see bottom chart in Figure 29).

Biomass increases tended to be more frequent and higher when catches were historically below the median value for winter and thorny skate. For winter skate, biomass increased 7 of 11 times, for an average increase of 34% when the catch was below the median (Figure 30). When the skate catch was below 75% of the median value (i.e. below the target), biomass increased 4 out of 6 times, with an average annual increase of 30%.

Most (17 of 22 years) of the annual biomass changes for the thorny skate were declines, but the declines were less frequent and biomass was marginally higher (4 of 11 years, +7% average biomass change) when catches were below the median. The relationship with changes in biomass was about the same (3 out of 7, +11% average biomass change) when catches were below the target (75% of the median value). When catches were above the median, declines in biomass were more frequent (10 of 11 years) and with an average 29% annual decline.

The relationship between catch and changes in biomass exhibited a similar pattern for smooth skate (Figure 32), as it did for winter and thorny skates. When skate catch was below the median, smooth skate biomass increased 8 of the 11 years in the time series, with an average 37% annual increase in biomass. The increase in biomass was a little more frequent (5 of 6 years) when catch was below 75% of the median value (i.e. below the target), but the annual increase in biomass was about the same.

For the other four skate species, there was either no relationship between the level of catch and changes in biomass, or counter intuitively the largest catches had the largest increases in biomass. This lack of relationship for four of the seven skate species may be due to uncertainties about species composition of landings and discards, or due to poorly understood population dynamics.

Thus, although the rebuilding estimates cannot be estimated from current conditions, biomass historically increased when catches were below the median catch/biomass ratio for winter skate, and declined less when catches were below the median catch/biomass ratio for thorny skate48. Future conditions may however be different than they were historically and the stocks may or may not respond as expected. This amendment includes a review and specification setting process to allow for changes in the TAC to respond to changes in biomass. Moreover, the Council has adopted a risk-adverse policy of setting the target TAC using 75% of the median catch/biomass index. Assuming that skate biomass responds to low catch levels (defined as a catch/biomass exploitation ratio) as it had in the past, this policy should ensure that rebuilding takes place.

8.3.1.2 Overfishing

The PDT developed the analysis in this section using data available before the DPWS. The basic response of skate biomass to exploitation (measured as catch/biomass) is about the same as in the final analysis, although the estimated ABC at the median catch/biomass ratio is somewhat lower than originally estimated. Also the estimated discards from the final catch series is considerably higher and therefore the wing and bait fishery TALs are lower than indicated in the analysis of draft alternatives. Since the ABC for all the alternatives are identical, the change in the final ABC and TAL values do not have an effect on the comparison between alternatives. This section is retained in the FEIS to document how the alternatives were evaluated in the DEIS. For the final analysis of the proposed action, the reader should refer to Section 8.3.2 and Appendix I, Document 16.

Skate overfishing is defined as a maximum decline in the three year moving average for survey biomass. Each skate species has a different threshold, chosen based on historical patterns in survey data that indicated when exploitation might be too high. An analytical assessment of skate population dynamics does not exist to associate fishing mortality (and catch levels) with excessive declines in skate biomass. Furthermore, these excessive declines in skate biomass were seen relatively frequently and in an unpredictable sequence during the survey time series (Document 4 in Appendix I).

Nonetheless, keeping skate catches below the median catch/biomass index is likely to reduce the frequency of survey biomass decline and therefore reduce the potential for overfishing as it is currently defined. The Council notes that NMFS has scheduled a skate assessment during the “Data Poor Stock Assessment Workshop” in December 2008. This workshop may result in recommendations for MSY-based reference points using recently available skate biological parameters.

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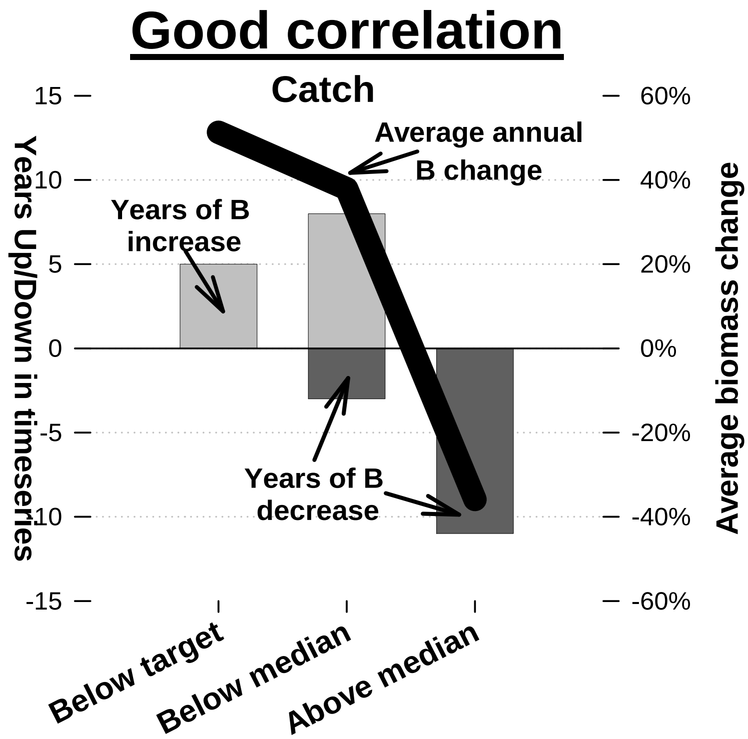
48 Thorny skate biomass declined during 17 of 22 years in the biomass index time series, so there is little contrast between changes in thorny skate biomass at various catch levels with which to evaluate rebuilding potential.

Figure 29. Schematic examples of positive (top) and negative (bottom) relationships between catch and changes in biomass. Patterns that are consistent with the top figure are consistent with rebuilding via catch limits.



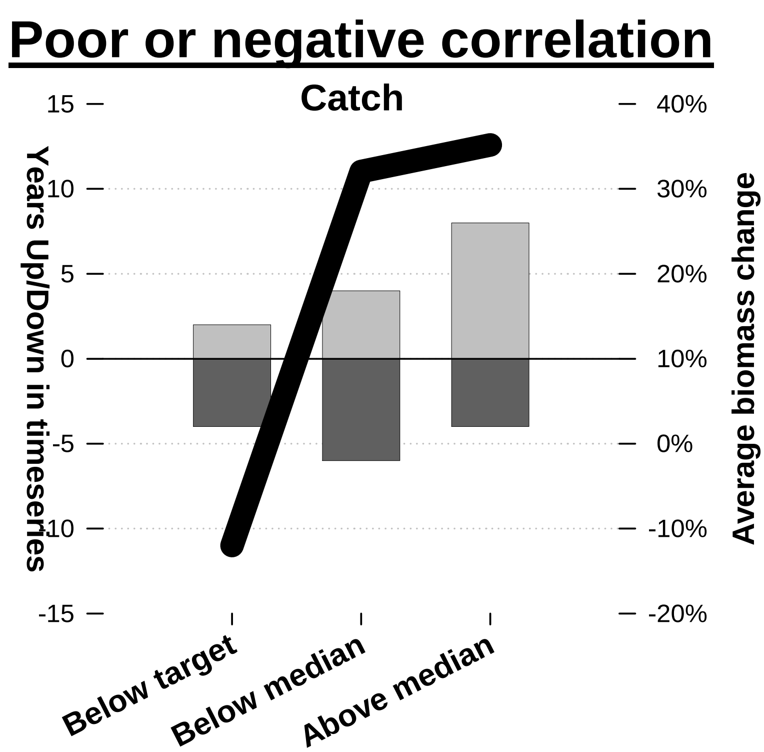


Figure 30. Historic relationship between catch and exploitable biomass for winter (fall survey), thorny (fall survey), and little skates (spring survey). The ‘target catch’ was set at 75% of the median value, taking into consideration scientific uncertainty and variation.

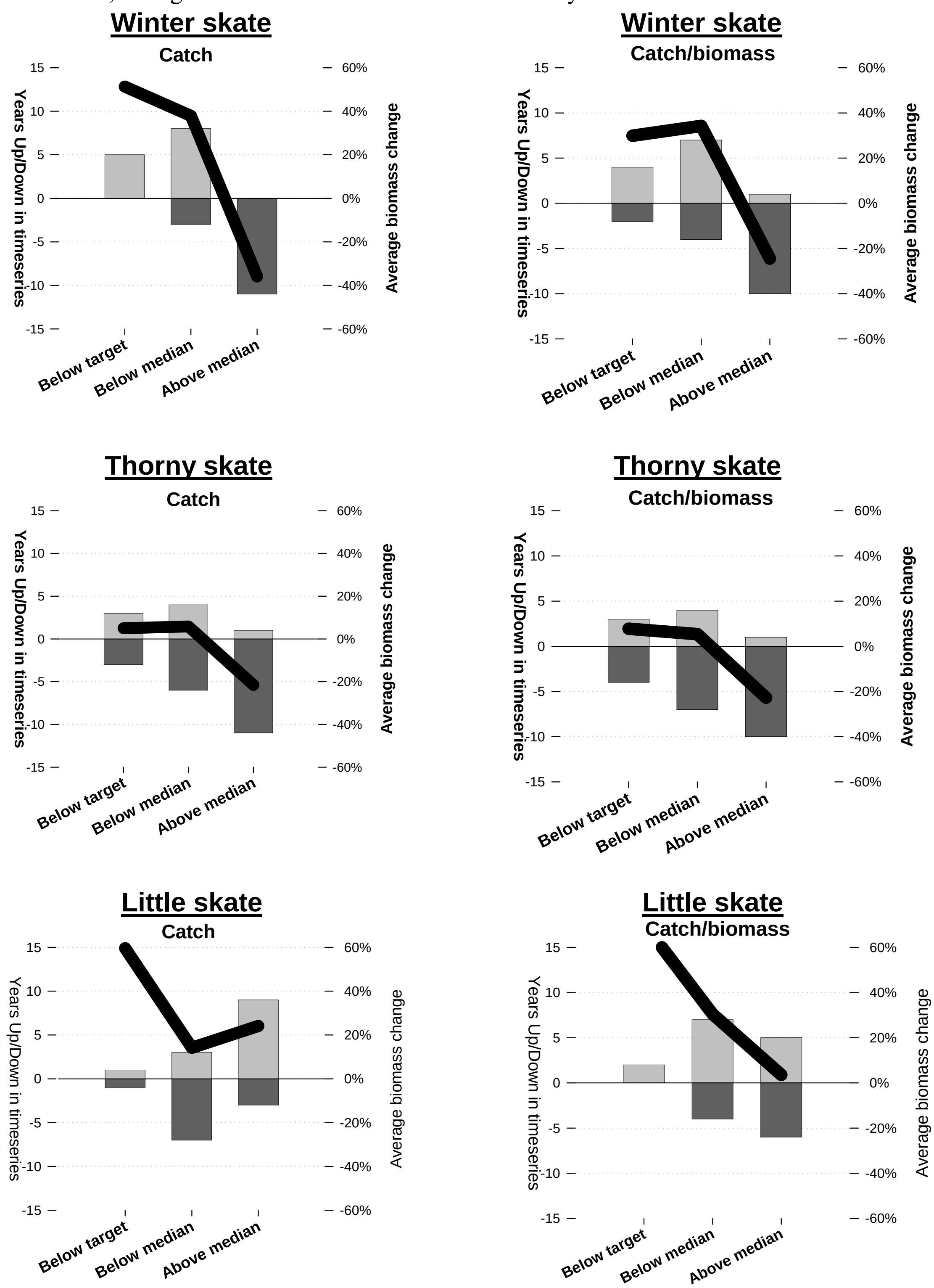


Figure 31. Historic relationship between catch and exploitable biomass in the fall survey for barndoor, clearnose, and rosette skates. The 'target catch' was set at 75% of the median value, taking into consideration scientific uncertainty and variation.

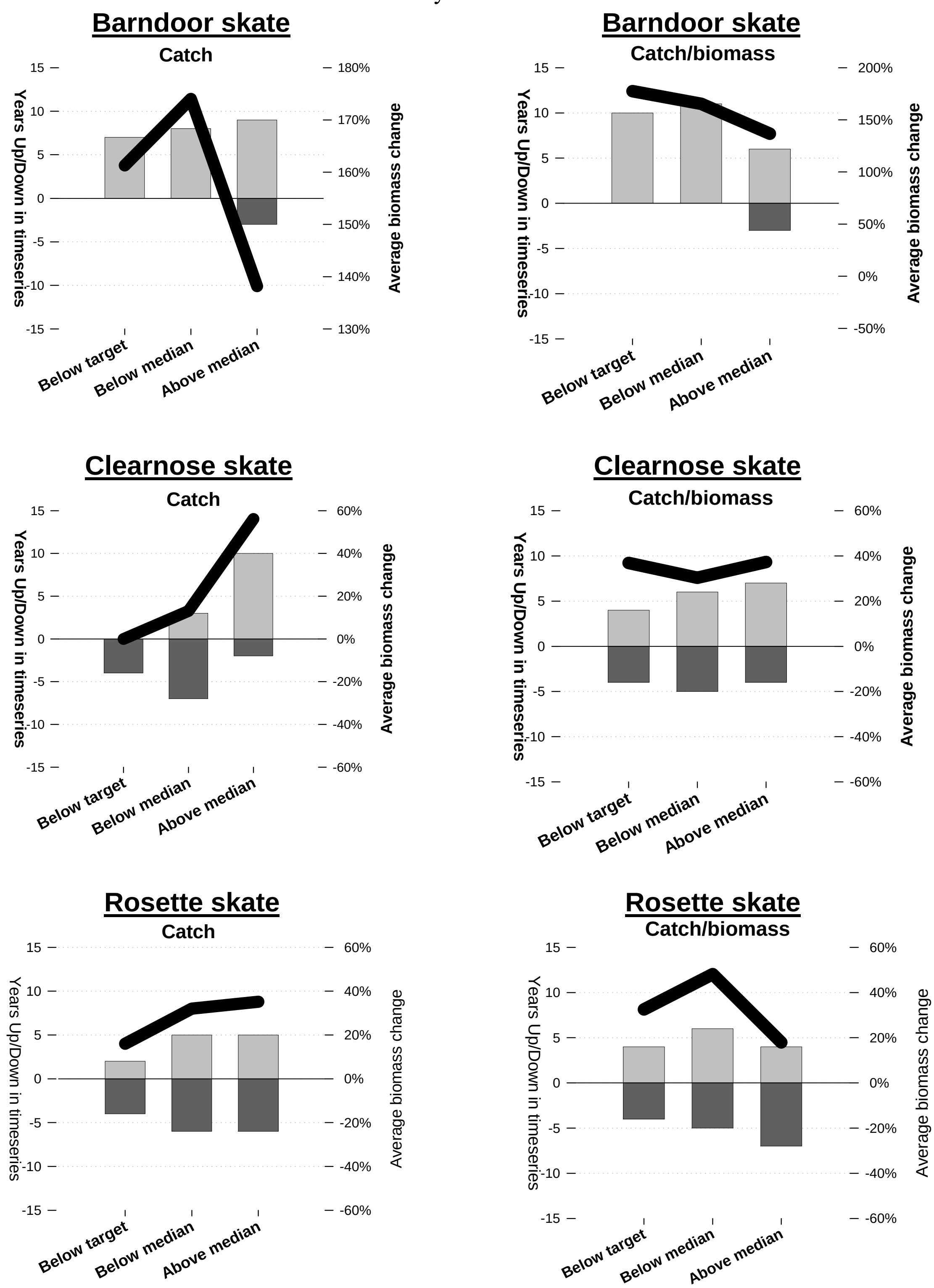
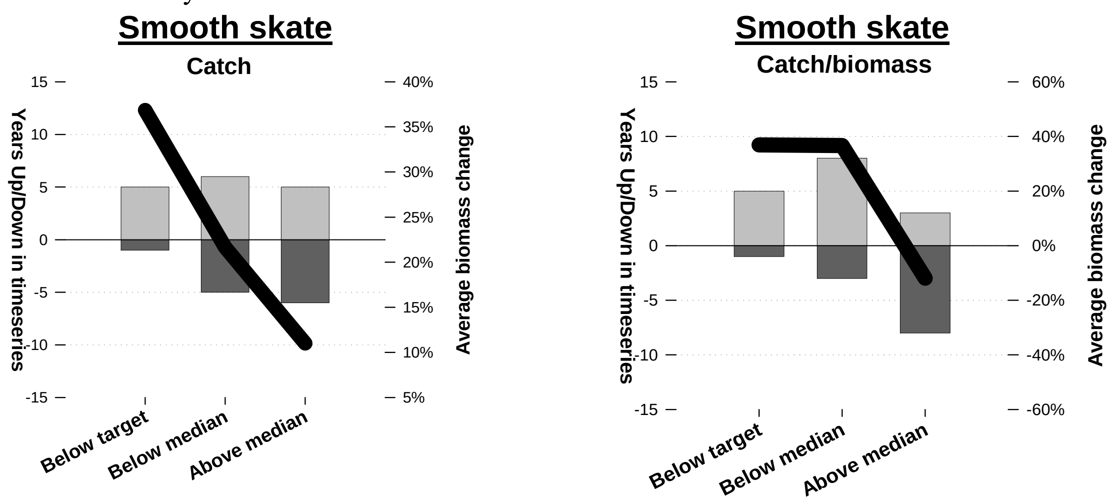


Figure 32. Historic relationship between catch and exploitable biomass in the fall survey for smooth. The ‘target catch’ was set at 75% of the median value, taking into consideration scientific uncertainty and variation.



8.3.1.3 Allowable biological catch (ABC/TAC), total allowable landings (TAL), and overfishing level (OFL)

The basic ACL framework described in this section is the same as the one in the proposed action. The ABC/ACL would use the median catch/biomass exploitation ratio and the current skate biomass estimates to derive an ABC. The target, or ACT, would also be set at 75% of the ABC/ACL and the discard rate averaged over the last three years would be deducted to set a wing and bait fishery TAL. For the final estimates of the ABC, ACT, and TALs, please refer to Section 8.3.2.1.

The Council proposes the following catch limits, targets, and total allowable catch to enhance the prospects for rebuilding skate biomass and meeting the Magnuson-Stevens Act mandate to establish catch limits. While the revised National Standard 1 guidelines are proposed and not yet finalized, the proposed catch limits and targets are sufficient to address the guidelines and satisfy the mandates. The Council is proposing a catch limit which if exceeded will trigger accountability measures as proposed in Section 5.2.1.1, either as an in-season trigger to reduce the likelihood that the catch will exceed the limit (a 'target TAC' approach), or as a future reduction of the TAC/ABC in future allocations (a 'hard TAC' approach). Amendment 3 also proposes a catch target (ACT) and total allowable landings (TAL) to account for uncertainty and discards. Since the ABC is consistent with rebuilding and the target (or ACT) is meant to take into account both scientific and management uncertainty, the Council proposes that ACL=ABC and ACT = 0.75 x ACL.

To set catch limits, catch targets, and total allowable landings, the median catch/biomass ratios were applied to the survey biomass three year moving average for each skate species and summed, taking into account the 2005-2007 discard rate (59% of total catch), the assumed discard mortality rate (50%), and a 90% assumed effectiveness of the landings prohibitions on barndoor, smooth, and thorny skates. These specifications and analysis were presented to the SSC in April 2008 (see document 5 In Appendix I) based on the 2004-2006 survey values, giving an ABC of 30,897 mt (Table 81), an ACT (using 75% of the median catch/biomass ratio to account for scientific and management uncertainty) of 23,172 mt, and a TAL of 12,245 mt accounting for the discard rate estimated for 2004-2006.

After the DEIS had been published and public hearings were held, the DPWS re-estimated the landings and discards for the time series. These data were incorporated into the PDT models and the median catch/biomass ratios were re-estimated. The higher discard estimates were used to deduct expected discards from the ACT to set new TALs for the wing and bait skate fisheries. And the ABC was re-estimated using the 2006-2008 spring survey data for little skate and the 2005-2007 fall survey data for the other skates, which was peer reviewed during the DPWS and made available to the SSC in February 2009. The new estimates for the ABC, ACT, and TAL are 30,643 mt, 22,982 mt, and 9,427 mt, respectively (Table 81). If the median catch/biomass ratio is applied to prior years using the three year skate biomass moving averages, the catch limits compared with estimated skate landings and discards are shown in Figure 33.

Although quantitative estimates of scientific and management uncertainty do not exist, the Council believes that a 25% reduction in catch from one associated with a limit suitable for rebuilding is sufficient to account for both sources of uncertainty. Additionally, the TAL is set by reducing the catch by the average discard rate from 2005-2007. As a risk-adverse approach, this management policy could also help enhance the probability of future biomass rebuilding for thorny and smooth skates.

The overfishing level (OFL) has not been defined using mortality rate that is consistent with MSY, because F_{MSY} cannot be derived with existing stock assessment information. Skate overfishing is defined as a maximum decrease in the biomass three year moving average, but is not associated with a specific mortality rate. Using history as a guide, setting the catch limit with a median catch/biomass ratio is likely to cause increases in skate biomass which by definition is highly unlikely to allow overfishing to occur. Therefore the ACL is almost certainly less than the OFL.

The method for setting ACL can also be used as a lower bound on MSY, when skate stocks have rebuilt to the target biomass. Following this logic and assuming that the discard rate does not change from that observed during 2005-2007[49], the catch limit when all skates are at the revised biomass targets would be 60,527 mt (Table 81), which the Council proposes as a provisional numeric estimate of MSY. Allowing for uncertainty, the annual catch target when skate stocks are at the target biomass level would be 45,388 mt and accounting for skate discards (from fisheries targeting skates and other species), the total allowable landings (TAL) would be 18,618 mt. The Council believes that this approach would also address the FMP's social and economic objectives, and proposes the 18,618 mt target as a provisional numeric estimate of OY.

Looking retrospectively at the relationship between the proposed ABC (had the median catch/biomass rates been applied to survey biomass values to set a catch limit), the actual catches generally exceeded the ABC from 1989 to 1998. During this period, aggregate skate biomass declined (Since the catch/biomass ratios applied in Figure 33 are a constant, the ABC is proportional to total skate biomass). While landings gradually increased, discards declined and total catch was below the catch/biomass median from 1999 to 2004. Although skate biomass increased from 1997 to 2000, biomass again declined from 2001 to 2007.

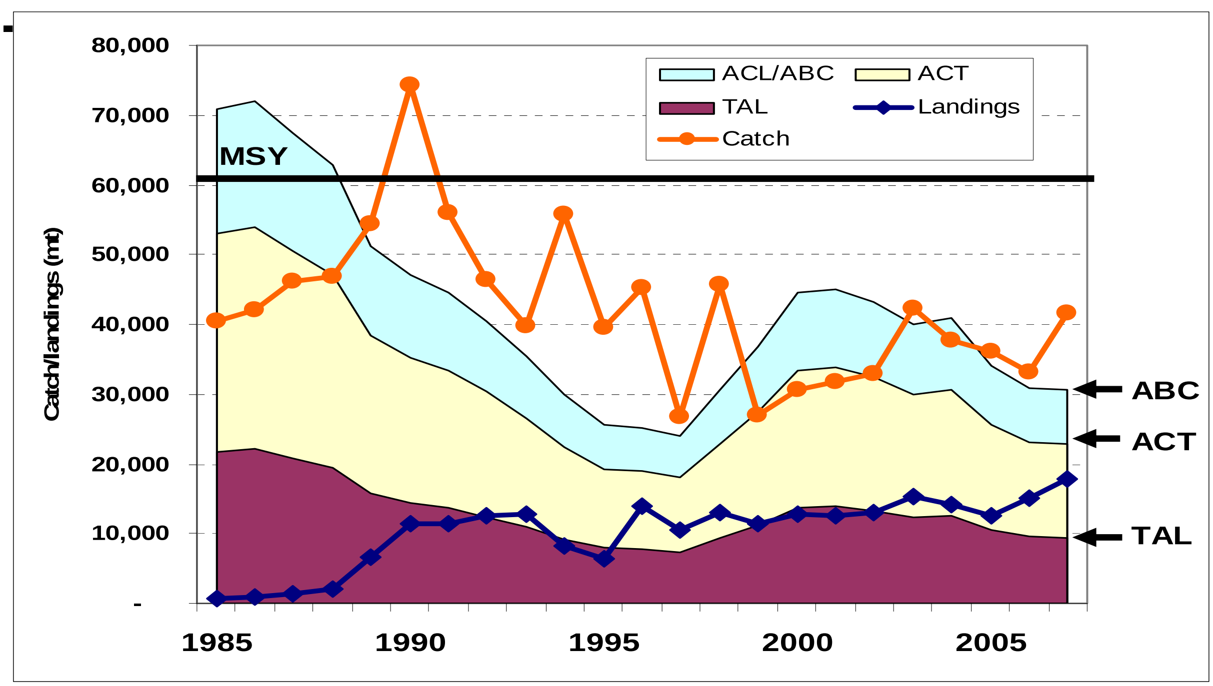
In 2006, the catch was slightly above the catch target, but landings rose above the TAL (Figure 33). This upward trend in estimated discards and landings continued in 2007, when the total skate catch at 41,000 mt was well above the median catch/biomass exploitation ratio and the landings were approximately double the proposed TAL.

[49] Using the new DPWS discard estimates.

Table 81. Median catch/biomass indices, stratified mean survey weight per tow, and proposed catch limits. These results include the DPWS estimates of landings and discards, which were used to determine the median catch/biomass exploitation ratio. The 2010-2011 ACL/ABC uses the 2005-2007 survey biomass[50] average in column 5 to determine the catch limits.

Species	Catch/biomass index (thousand mt catch/kg per tow) Median	75% of median	Stratified mean survey weight (kg/tow) 2004-2006	2005-2007	Old MSY Target	New MSY target
Barndoor	3.23	2.42	1.17	1.00	1.62	1.62
Clearnose	2.44	1.83	0.59	0.63	0.56	0.77
Little	2.39	1.79	4.59	5.04	6.54	7.03
Rosette	2.19	1.65	0.06	0.06	0.03	0.05
Smooth	1.69	1.27	0.19	0.14	0.31	0.29
Thorny	3.14	2.36	0.55	0.42	4.41	4.12
Winter	4.12	3.09	3.04	2.93	6.46	5.60
Annual catch limit (ACL/ABC)			30,897	30,643	63,240	60,527
Annual catch target (ACT)			23,172	22,982	47,462	45,388
Total allowable landings (TAL)			12,745	9,427	19,469	18,618

Figure 33. Estimated catch and reported skate landings compared to proposed catch limits applied to three year moving average of survey mean weight per tow since 1985. The MSY level is the landings (TAL) that would be allowed if the skate biomass survey indices were all at the target and landings of all skates were permitted. ABC/ACT/TAL correspond to the proposed catch and landings limits for fishing years 2010 and 2011, which apply the median catch/biomass exploitation ratio to the 2005-2007 average survey skate biomass.



[50] The biomass index value of 5.04 for little skate uses the 2006-2008 spring survey, data which were peer reviewed by the DPWS and available to the SSC in February 2009 when it approved the ABC.

8.3.1.4 Accountability measures

The effects of the proposed accountability measures are impossible to quantify and difficult to predict. They depend largely on effective monitoring of landings or catch and timely implementation of the measures. The hard TAC (Alternatives 1A and 3A) and target TAC (Alternatives 1B, 2, 3B, and 4) approaches both reduce skate possession limit to the incidental skate landings limit or zero when the monitored catch or landings reach the TAC. As such, vessels may accelerate their skate trips and skate discards may increase. This effect on skate discards could be mitigated in the hard TAC approach, because it includes time/area closures to skate fishing.

With the hard TAC approach, the ABC/ACL becomes essentially a concrete limit on catch with a makeup provision that could reduce the ABC/ACL and TAL in a future year. However, it also requires real time estimation of discards [which has some built in error (as much as 20-30%) caused by sub-sampling of trips catching skates] to invoke the accountability measures. In this case, skate landings might increase above an acceptable amount if the discards are underestimated, and vice versa.

For the target TAC approach, in-season accountability measures (essentially more restrictive regulations as a backstop) would be invoked based on landings, which are monitored much more accurately than discards can be estimated. There is no make up provision if catches exceed the ABC/ACL, other than the effect that excessive catches would have on future skate biomass, which would be reflected in future ABC/ACL and TAL specifications.

Both approaches have merit, but it is difficult to predict and quantify the effect they would have on the skate resource and other related stocks.

8.3.1.5 Skate Fishery Allocation of TAL and mortality reductions from reducing skate landings

Amendment 3 proposes two options for allocating the skate TAL by fishery. The two fisheries are somewhat distinct in how they target skates and which vessels participate in each fishery, but there is considerable overlap where the two fisheries occur. The wing fishery is prosecuted by vessels using trawls and gillnets, but targets larger skates that are more easily processed and marketed for export and food. The bait fishery is more frequently prosecuted by vessels fishing with trawls, which target smaller skates that are used as bait in the lobster fishery. These two fisheries are described in more detail in the SAFE Report, Section 7.0.

More recently, fishing effort and landings have increased in the wing fishery in response to higher prices and more restrictive regulations in other related fisheries. Amendment 3 proposes two options for allocating the TAL amongst the two fisheries. These landings targets relative to 2007 reports defined how much landings need to be reduced from a combination of time/area closures and skate possession limits.

From 2005-2007, the landings of skate wings accounted for 73% of the total skate landings, which when applied to an 11,544 mt TAL would allow for skate wing landings in 2008 of 8,426 mt. This is a 40.2% reduction in landings compared to the 2007 wing landings (Table 82). The remainder or 3,118 mt for the bait fishery is a 34.7% reduction relative to the 2007 bait landings. Similarly, the average proportion of wing to total skate landings during 1995-2006 was 66.5%. Applying this proportion to the 11,544 mt TAL would give a 7,677 mt target for the wing fishery, or a 45.5% reduction in 2007 landings. The remainder or 3,867 mt would be available as bait landings, which is a 19% reduction relative to 2007 bait landings.

The effects on the two skate fisheries from time/area closures (see Section 8.3.1.6) is expected to reduce skate wing landings by 15.1% but increase bait landings by 4.6% as vessels fish for skates in different areas. Thus the target mortality reduction for the wing fishery in Alternatives 1a, 1b, and 4 which include time area closures would be 25.1% for the more recent allocation (Option 1) and 30.4% for Option 2. For the bait fishery, the mortality reduction targets would be 39.3 and 23.6% respectively.

Table 82. Skate fishery landings targets in comparison with 2007 reported landings.

Fishery	Wing		Whole/bait	
Historic fishery allocation basis	2005-2007	1995-2006	2005-2007	1995-2006
Target TAL (mt)	8,426[51]	7,677[52]	3,118[53]	3,867[54]
Target change in landed mortality, no closures	-40.2%	-45.5%	-34.7%	-19.0%
Mortality reduction from time/area closures (Two-bin model)	-15.1%	-15.1%	4.6%	4.6%
Target change in landed mortality, after applying closure effects	-25.1%	-30.4%	-39.3%	-23.6%

Although the final TAL is 9,427 mt, the proportional allocations and relative effects on the respective skate fisheries would have the same ranking and relative impacts. Greater mortality reductions compared to those indicated above are needed to achieve the updated (i.e. lower) TAL. And correspondingly it would take lower possession limits to achieve those objectives, but the Council decided that lower skate possession limits were infeasible and any reductions in landings would be achieved by the in-season accountability measures in lieu of other more restrictive measures.

[51] Updated to 6,882 mt.
[52] Updated to 6,269 mt
[53] Updated to 2,545 mt
[54] Updated to 3,063 mt

The discussion in Section 8.3, therefore retains the values that were in the DEIS because they relate to the mortality reduction objectives of the measures in the proposed alternative and in the various management alternatives. The Council did not adjust the possession limit specifications in the proposed action from those estimated for Alternative 3B. Thus the following analysis applies to the proposed action, even though the TALs were reduced from 11,544 mt in the DEIS to 9,427 mt in the FEIS.

8.3.1.6 Time/Area management (Alternatives 1a, 1b, and 4)

The Skate PDT evaluated fishing activity, landings and discards on observed trips, and survey data to identify areas with high catches of winter and thorny skates. The methods and results are described in Document 9 in Appendix I. Using data from 2004-2006, the PDT analysis identified five areas (described in Section 5.2.5) that had high skate catches per day or per tow, during certain seasons, which could either be closed to vessels using gears capable of catching skates (to reduce discards) or to vessels targeting skates (to reduce landings and total catch). These candidate areas were modified slightly to be contiguous with existing management boundaries to improve compliance and enforceability.

For Alternatives 1a, 1b, and 4, the Council determined that these potential area closures should apply to vessel fishing for skates, defined as any vessel landing more than 220 lbs. of skate wings or 500 lbs. of whole skates (Section 5.2.4). The effects on the entire fishery were then evaluated using 2007 VTR data and a two-bin model approach, described in Documents 10 and 11 in Appendix I.

Basically, the model assumes that all trips within the proposed closed areas will fish elsewhere, having the same average landings and catches per day fished as other vessels with skate landings exceeding 500 lbs. and fishing in the remaining open areas within a region (Gulf of Maine for Thorny Skate Areas 4 and 5; Georges Bank and Southern New England for Winter Skate Areas 1 – 3). Other than assigning different landings to displaced trips, the model does not allow for changes in fishing behavior to target other species or using different fishing gear, changes in trip length to compensate for (presumably) lower catches, or changes in the number of trips taken (in response to fishing becoming uneconomic for some proportion of the trips formerly taken to the closed skate areas). The effects of these factors are hard to predict and require a far more complicated model and more information than is currently available.

The net changes in landings predicted by the two-bin model applied to 2007 VTR data are shown in the table below. The two-bin model predicts that due to marginal changes in CPUE by vessels fishing for skates, skate wing landings would decline by 1.0 million pounds (2.3 million pounds live weight), or 15.1% of total skate wing landings, while whole skate landings (landed primarily in the bait fishery) would increase by 937,000 lbs., or 4.6%. Estimating skate discards by applying the average discard to kept ratio on observed skate trips indicates that skate discards could increase by 2.6%. Landings of winter flounder could decline by 7.9 percent, while windowpane flounder landings could increase by 12.1%, compared to the landings of these species on trips also landing skates. Predicted cod landings declined by 620,000 lbs., or 4.6%, while predicted monkfish landings increased by 700,000 lbs, or 5.1%.

These results from the two-bin model analysis make some sense, since the proposed areas were chosen to reduce mortality on primarily winter skate and secondarily thorny skate. The bait fishery, which targets little skate, would be largely unaffected by the proposed time/area closures and some vessels may fish more frequently in areas where little skate are more abundant. If the vessels in the wing fishery have access to the bait market, they could land more whole skates as the model suggests.

Alternatively, vessels that took trips in the time/area closures might adjust the timing of their trips to fish a few weeks before or after the closure, or fish around the periphery of the closure areas. The two-bin model was not designed to take this fine scale reaction into account. If it did, these reactions would mitigate the predicted effect on the whole skate landings for the bait market and winter skate landings for the wing market. From this perspective, the two-bin may overestimate the effects. From another perspective, the two-bin model may underestimate the effects on landings of skates and other species if fishermen reduce the number of trips taken or target species in other regions.

Most of the affected effort and landings in 2007 occurred in winter area 3, which would be closed to skate fishing from July to December (Table 13). Overall, 7.2 percent of trips landing skates would be affected by the proposed closures. These 966 trips were taken by 84 vessels, or 13.4% of vessels landing skates, which landed 2.6 million pounds of skate wings (37.7% of total skate wing landings) and 4.4 million pounds of whole skates (20.9% of total whole skate landings). These areas also accounted for 18.8 percent of gadid landings (cod, haddock, pollock), 15.3% of flounder landings, 5.8% of yellowtail flounder landings, and 6.6% of monkfish landings on trips that also landed skates. Winter Area 1, would also affect 156,000 lbs. of monkfish landings, as it appears that some of the trips in the spring near this area target both skates and monkfish.

Table 83. **Net change in skate and other landings from time/area closures predicted by a two-bin model.**

	Large mesh trawl	Small mesh trawl	Large mesh gillnet	Dredge	Net change for trips fishing for skates	Change from status quo
Total days absent	1,328	36	446	22	1,833	3.5%
Total landings, lbs.	2,326,334	38,150	-2,447,544	64,086	-18,974	0.0%
Whole skates, lb.s	2,844,292	46,728	-1,967,455	14,016	937,581	4.6%
Skate wings, lbs.	-101,854	-7,936	-905,049	0	-1,014,839	-15.1%
Skate discards, lbs.	803,784	13,777	-296,373	6,337	527,525	2.6%
Cod, lbs.	-580,973	-21,524	-17,364	102	-619,760	-4.6%
Haddock, lbs.	-186,044	4,051	-407	102	-182,297	-2.8%
Winter flounder, lbs.	-411,351	-5,198	9,430	14,785	-392,334	-7.9%
American plaice, lbs.	69,717	321	0	11,186	81,224	4.1%
Witch flounder, lbs.	121,445	740	-8	4,513	126,689	5.7%
Windowpane flounder, lbs.	34,928	7	0	6,392	41,327	12.1%
Yellowtail flounder, lbs.	308,448	-2,745	85	37,009	342,797	9.5%
Pollock, lbs.	-11,690	134	-2,290	0	-13,846	-0.1%
Redfish, lbs.	7,909	0	0	0	7,909	0.5%
White Hake, lbs.	7,681	22	1,097	0	8,801	0.5%
Small mesh groundfish species, lbs.	2,058	1,377	-13	0	3,422	0.0%
Monkfish, lbs.	194,705	5,503	486,045	13,523	699,776	5.1%
Scallop meats, lbs.	8,621	249	24	-25,900	-17,006	-0.1%

Most of the trips affected by the proposed time/area closures land fish in Massachusetts (Table 86). During 2007, 78 vessels landed 10,754,890 lbs. of fish in MA on 952 trips landing more than 500 lbs. of whole skates, or 220 lbs. of skate wings.

Although few trips fishing for skates during 2007 were taken in the Thorny Skate Areas during the proposed closures (Table 13), the areas had high survey catches per tow for thorny skate. According to the VTR data, most of the landings on these trips were cod and yellowtail flounder, with a smaller amount of skate landings. Nonetheless, the proposed Thorny Skate Area closures could inhibit fishing on trips targeting multiple species, including skates, thereby reducing skate bycatch. These areas, however, would be more effective and useful as gear restricted areas, closed to fishing by gears capable of catching skates (i.e. trawls, gillnets, dredges, and hook gear), because the primary skates catches (and discards) in these areas would be thorny skate.

Table 84. **Total vessels, trips, and landings fishing in the proposed skate time/area closures, on trips landing more than 500 lbs. of skates, whole weight, based on 2007 VTR data.**

Area	Thorny Area 4	Winter Area 1	Winter Area 2	Winter Area 3	Total	Percent of total
Vessels	Confidential	25	11	74	84	13.4%
Number of trips		81	36	849	966	7.2%
Skate wings, landed weight, lbs		282,530	116,910	2,240,461	2,639,901	37.7%
Skate, bait, whole, lbs		923,500	251,080	3,242,151	4,416,731	20.9%
Gadids, lbs		-	14	2,199,822	2,199,836	18.8%
Flounders, lbs		11,600	2,500	1,070,527	1,084,627	15.3%
Yellowtail flounder, lbs		480	-	151,176	151,656	5.8%
Monkfish, lbs		156,269	48,060	264,352	468,681	6.6%
Dogfish, lbs		-	200	43,043	43,243	6.7%
Other groundfish, lbs		3	-	38,534	38,537	3.1%
Other species, lbs		1,175	-	132,627	133,802	4.9%
Total landings, lbs		1,376,089	419,134	9,387,489	11,182,712	18.1%

Table 85. **Vessels, trips, and landings by state which would be affected by skate time/area closures, based on 2007 VTR data.**

Port	New Hampshire	Massachusetts	Rhode Island	Total	Percent of total
Vessels	Confidential	78	4	82	13.2%
Number of trips		952	8	960	7.1%
Skate wings, landed weight, lbs		2,636,201	2,500	2,638,701	37.7%
Skate, bait, whole, lbs		4,211,131	200,500	4,411,631	20.9%
Gadids, lbs		2,075,936	300	2,076,236	17.7%
Flounders, lbs		1,009,935	9,600	1,019,535	14.4%
Yellowtail flounder, lbs		148,506	-	148,506	5.6%
Monkfish, lbs		463,831	1,050	464,881	6.5%
Dogfish, lbs		43,243	-	43,243	6.7%
Other groundfish, lbs		26,897	-	26,897	2.1%
Other species, lbs		133,537	-	133,537	4.9%
Total landings, lbs		10,754,890	213,975	10,968,865	17.8%

Ranked by skate revenue, Chatham MA would experience the most effects from the proposed time/area closures (Table 86), followed by New Bedford MA and Boston MA. New Bedford MA would have more non-skate revenue affected by the proposed closures than other ports, apparently from landings of other species like monkfish and yellowtail flounder.

Table 86. **Trips and amount of skate wing landings (live weight), skate revenue, and non-skate revenue from the proposed time/area closure areas for trips landing more than 500 lbs. of whole skates (220 lbs of skate wings) at the 10 most affected ports, based on 2007 VTR data.**

Port	State	Number of trips	Average trip length (DA)	Total skate landings, lbs live weight	Skate revenue	Non-skate revenue
CHATHAM	MA	506	0.6	4,487,068	$1,026,160	$499,443
NEW BEDFORD	MA	268	5.4	4,300,747	$821,009	$3,807,248
BOSTON	MA	11	7.1	87,997	$18,335	$248,644
TIVERTON	RI	5	2.2	200,500	$8,092	$29,034
NANTUCKET	MA	5	3.2	36,470	$6,325	$33,252
SANDWICH	MA	Confidential				
HARWICHPORT	MA					
PLYMOUTH	MA					
NEWPORT	RI					
PORTLAND	ME	3	7.4	5,424	$550	$108,378
Total		802	2.3	9,143,629	$1,886,404	$4,738,703

Spatial effects on fishing

Although focusing on conservation of winter and thorny skates, the time/area closures will affect both the skate wing and whole/bait skate fisheries. This is because in some ways the two fisheries overlap in time and space, with the whole/bait skate fishery fishing in areas where winter skate are found, but retaining smaller skates for the bait market. In other instances, the whole skates are landed incidentally on trips targeting non-skate species, such as monkfish and yellowtail flounder.

In response to the time/area closures, there are at least three choices that fishermen may make in response to the proposed closures. Vessels fishing for skates could fish in surrounding or other areas where they may target skates. They may also change the timing of the skate trips to fish in the area before or after the semi-annual closure occurs. Lastly, vessels that target skates and other species may choose not to declare a skate trip, target and land other species, land no more than 500 lbs. of skates, and discard the excess skates that are caught.

January to March

Using data from 2006 VTRs, winter skate areas 1 and 2 (these areas are west and south of the Nantucket Lightship Area and would close from January to June) would affect trips that land skate wings and trips that land whole skates for the bait market. In the January to March quarter of 2006, vessels using trawls landed skate wings on trips that fish in winter skate area 1 (Figure 34), west of the Nantucket Lightship Area. Vessels using trawls also fished for whole/bait skates in winter skate area 2, and to the west of it. There was also a considerable number of trips fishing for skates and landing skate wings further inshore, just south of RI in the vicinity of Block Island. A third concentration of trips is observable south of Closed Area I and southwest of Closed Area II. These trips are known to be fishing for yellowtail flounder on a groundfish DAS.

Trips taken by vessels using trawls in winter skate areas 1 and 2 are likely to shift effort to other areas, possibly targeting other species. Many of these trips are made by vessels with landings in New Bedford. If they cannot fish in the skate management areas during this period, they are likely to shift effort to an open area SW of the Nantucket Lightship Area, to an open area around Block Island (which is presently fished by vessels from Point Judith), or re-direct effort onto yellowtail flounder in the Georges Bank management area.

Gillnet trips during this quarter fished mainly to the west and southwest of the Nantucket Lightship Area, landing skate wings (Figure 35). Some trips occurred within winter skate areas 1 and 2, but many occurred in areas that would remain open to fishing. It is likely that if vessels are not allowed to fish for skates in these areas, vessels using gillnets are likely to continue fishing in adjacent areas that remain open.

April to June

Very few trips by vessels using trawls and landing skates fished in winter skate areas 1 and 2, during the second quarter of 2006 (Figure 34). Vessels using gillnets to land skate wings, however, fished extensively in winter skate area 1, but mostly to the west of winter skate area 2 (Figure 35). It is therefore likely that the time/area closures would have minimal effect on vessels using trawls to land skates and vessels using gillnets to target skates would fish in adjacent areas that remain open to skate fishing. A mixed monkfish and skate gillnet fishery is observable off northern NJ during the fall, winter, and spring, but fishing trips displaced from the skate management areas would be unlikely to fish off NJ in response to the proposed time/area closures.

July to September, October to December

Fishing effort patterns during these two quarters were very similar to one another in 2006, so are evaluated together in the following analysis.

Much more effort landing skates occurred in the South Channel area, southeast of Cape Cod, MA during the third quarter of 2006. For vessels using trawls (Figure 34), most of the trips landing skates fished in three areas: an area inside of winter skate area 3, on the northern edge of Georges Bank, and south of RI near Block Island and east of Long Island. Trawl trips that fished in winter skate area 3 and on Georges Bank are probably targeting a mixture of groundfish and skates. Some vessels may shift fishing effort to the northern edge of Georges Bank, if not allowed to fish in winter skate area 3.

Vessels fishing with gillnets (Figure 35) also appear to target and land skate when fishing in winter skate area 3. There is however a significant amount of skate fishing effort north of this area, directly east of Cape Cod. Many of these trips originate from and land skate wings in Chatham, MA. There also appear to be some vessels using gillnets to target skates southwest of Martha's Vineyard, MA and also on Little Georges, east of Closed Area I. The first area is probably fished by vessel landing skates in New Bedford, while the latter area is probably fished by vessels landing skates in Chatham. Most trips displaced from winter skate area 3 are likely to fish further north, off Cape Cod, possibly causing crowding and a localized depletion of skates. Other vessels may explore fishing off Martha's Vineyard or on Little Georges if the possession limits (and recently higher gas and diesel prices) are not so low to make it uneconomic to fish further from port.

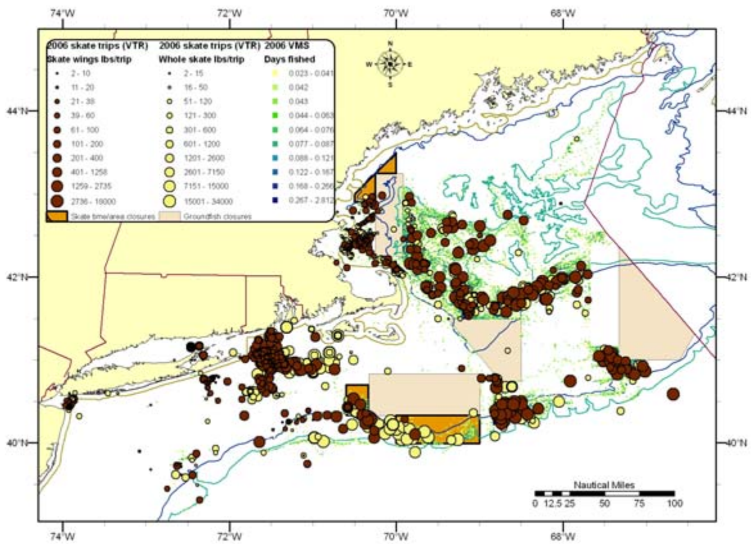
Conclusion

Except for winter skate area 3, there appears to be sufficient alternative areas for trips that normally would fish in the skate management areas. It is likely that closures of the skate management areas to vessels fishing for skates (i.e. those landing 500 or more lbs. of skates) would either shift to adjacent areas to fish for skates, or continue to fish for other species and discard skates in excess of 500 lbs.

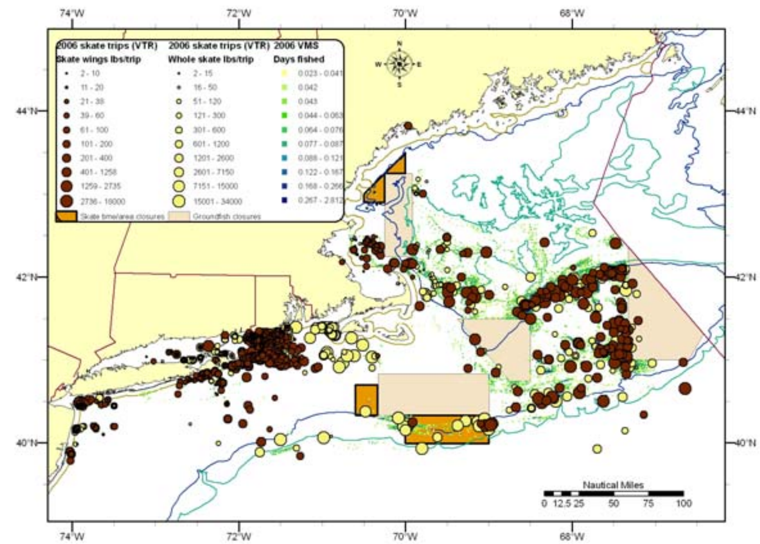
If the vessels shift fishing effort to other areas where catch per unit effort is less, it may still reduce skate landings and mortality because most of the trips would be fishing under one of the DAS programs, and DAS are limited. Also, the shift in effort may reduce skate discards to the extent that the ratio of discards to kept skates is lower in the areas that remain open to skate fishing compared to the ratio in the skate management areas. This latter consideration was the basis for the PDT's identification of these areas to begin with.

Figure 34. **Skate wing and whole skate fishery landings (larger circles represent higher landings; dark red circles are wing landings and light yellow circles are whole skate landings) reported on 2007 VTRs by vessels using <u>trawls</u>. The VTR data are positioned using the reported location fished, but the VTR data are layered over the total VMS inter-polling duration when the implied speed was less than 4 knots (which has been shown to be related to fishing activity, Applegate and Nies ms).**

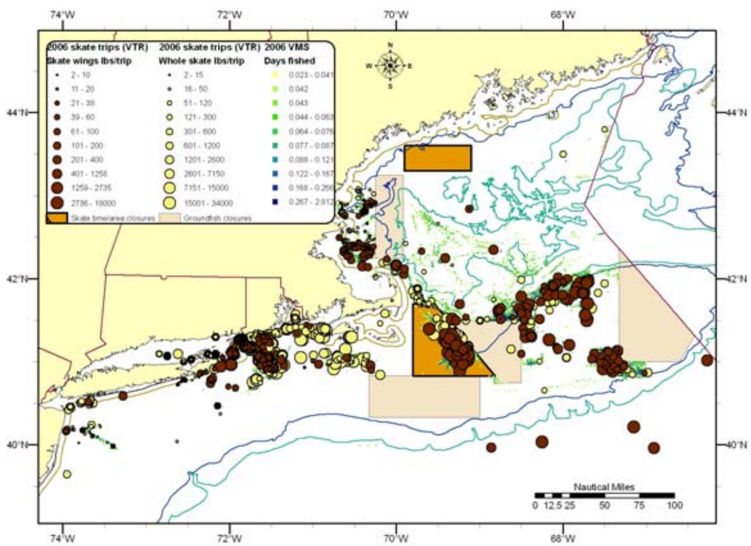
<u>Jan – Mar 2006</u>



<u>Apr – Jun 2006</u>



<u>Jul – Sep 2006</u>



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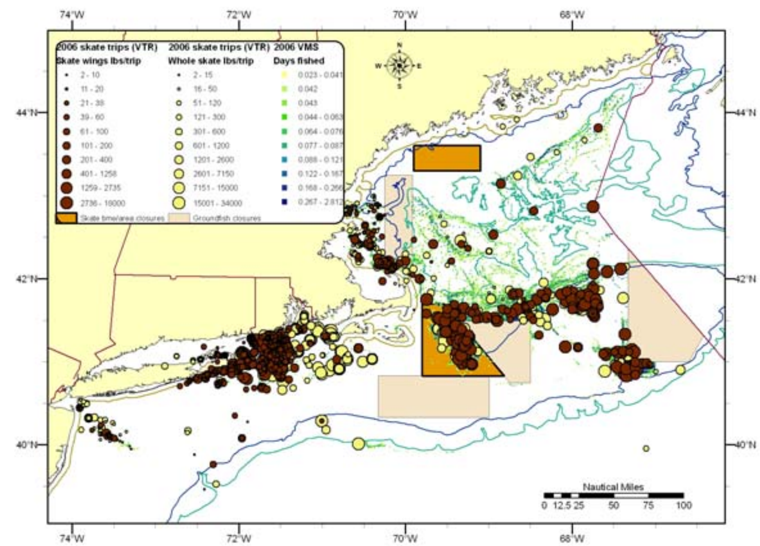
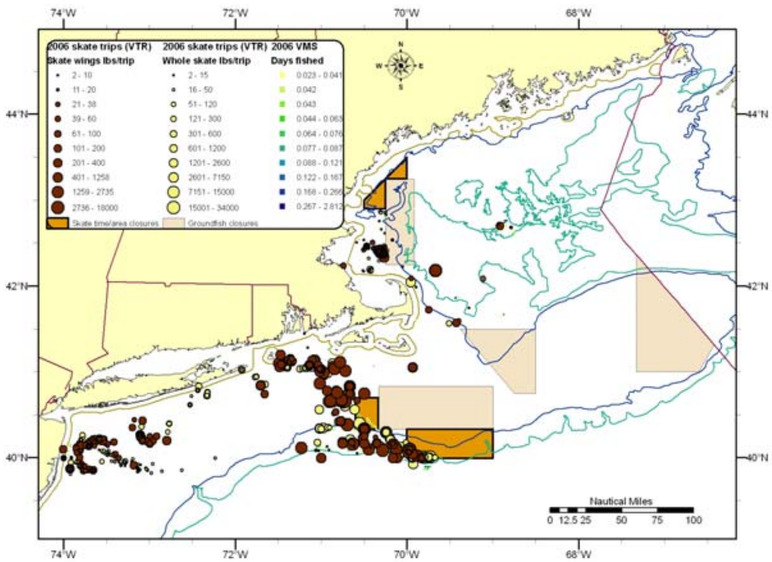


Figure 35. **Skate wing and whole skate fishery landings (larger circles represent higher landings; dark red circles are wing landings and light yellow circles are whole skate landings) reported on 2007 VTRs by vessels using <u>gillnets</u>. The VTR data are positioned using the reported location fished, but the VTR data are layered over the total VMS inter-polling duration when the implied speed was less than 4 knots.**

<u>Jan – Mar 2006</u>



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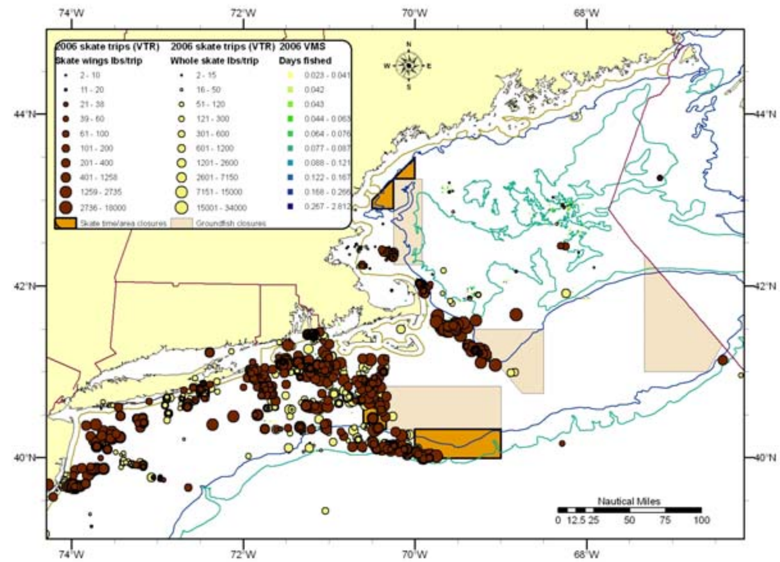

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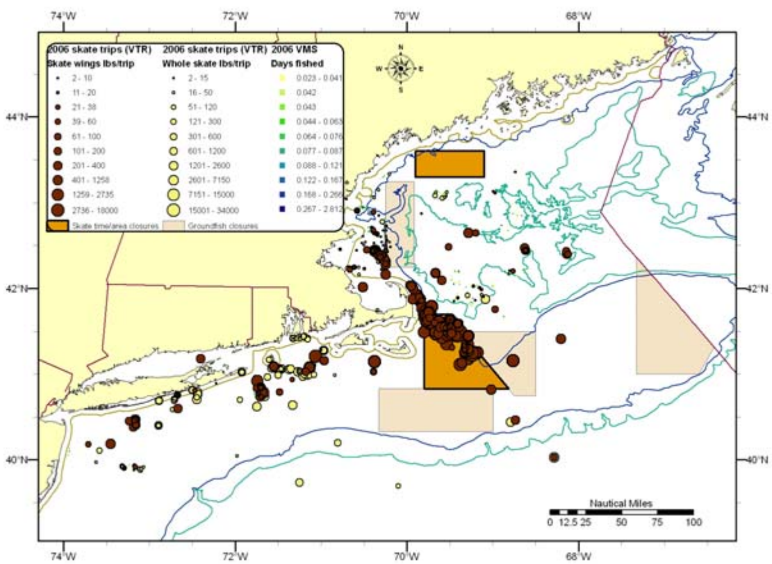
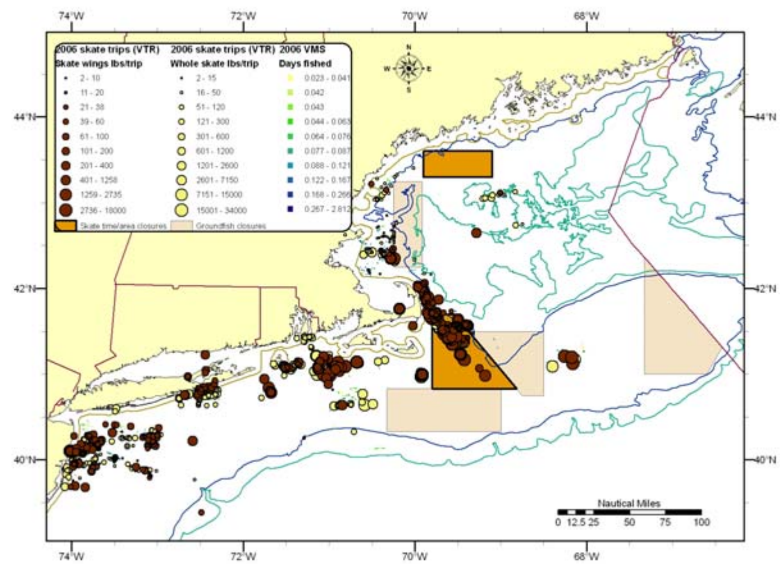


<u>Oct – Dec 2006</u>



8.3.1.7 Possession limits

The effect of various skate possession limits on the fishery were estimated using a cost/revenue economic model, applied to fishing activity and landings reported on 2007 VTRs. Each trip was matched to permit data to estimate daily fishing costs, as described in Document 12 in Appendix I. These equations were re-estimated using 2007 sea sampling data when they became available and a dummy variable representing year was added to account for the recent rapid increases in fuel prices. A $100 per day opportunity cost was also applied for each crew person reported to be on the trip55. Prices were associated with the landings for each trip by species, month, and state of landing to estimate total daily revenue for skate and non-skate species.

The model assumes that trips where the total revenue derived from landing non-skate species exceeds the daily fishing cost for the vessel, it would continue fishing for species other than skates when it reaches the possession limit. Excess skates that were landed in 2007 were assumed to be discarded, 50% of which were assumed to survive and represent a reduction in skate mortality. An example for trips landing skates in RI is shown in Figure 36, each vertical bar representing the skate landings of an individual trip (there are 466 trips that exceed the example possession limit shown in this figure). The 'Adjusted landings' are the skate landings that would occur with the skate possession limit in place. Trips in this category have 'Discards' shown as a medium gray in Figure 6, which is equivalent to 50% of the excess landings that had occurred on the trip. The remaining portion of the skates on each trip were assumed to survive discarding and contribute to mortality reduction. Landings of other species were assumed to be unchanged from the original trip.

Trips that required skate landings to be profitable were assumed to end when the daily catch of skate landings equaled the possession limit. The difference between what this type of trip (i.e. a 'skate' trip that would not otherwise be profitable on a daily basis without retaining skates) actually landed in 2007 and what it would be able to land under a skate possession limit is assumed to not be caught. Landings on these trips were assumed to equal the skate possession limit and no additional discarding of skates would occur. All of the excess landings would contribute to skate mortality reduction (shaded light gray in Figure 36). Trip duration, fishing costs, and the landings and revenue of other species were assumed to decline proportionally to the ratio of the possession limit to the amount of skates landed on the original trip.

Effect on discards by skate possession limits

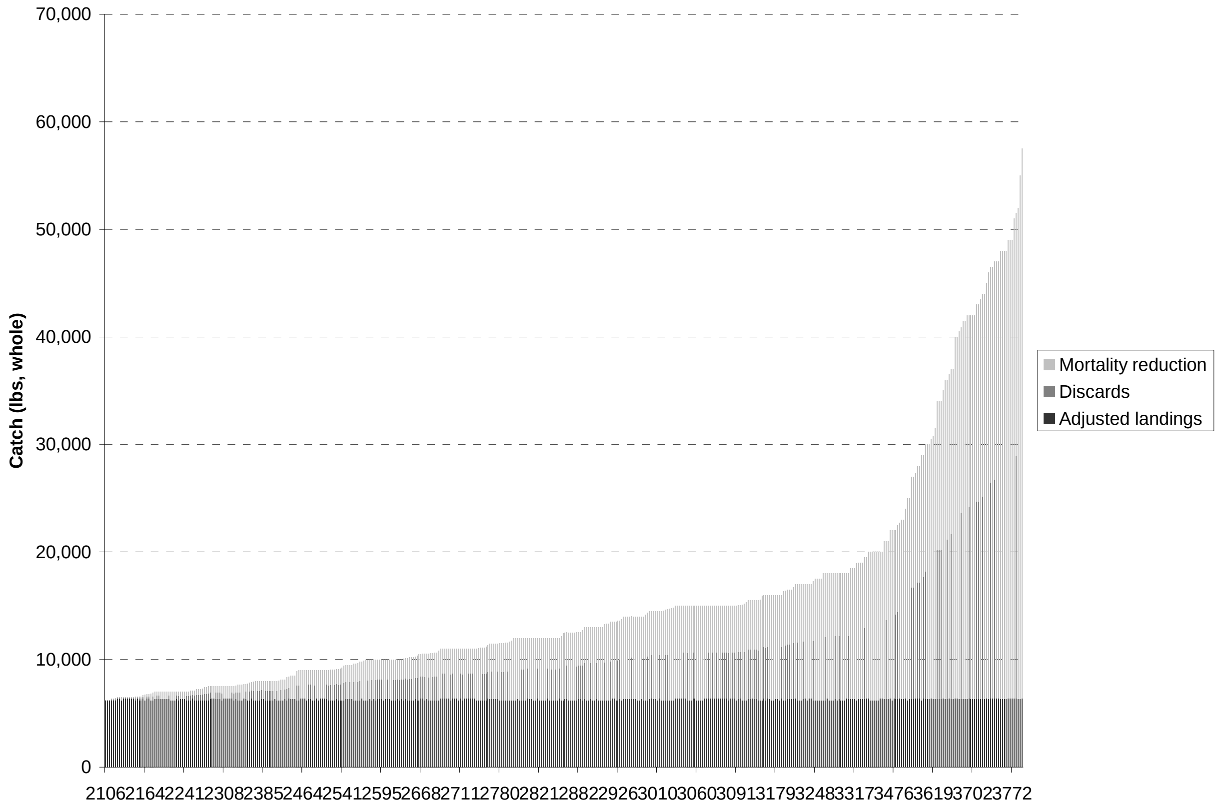
Two outcomes are possible, one increasing discards and the other decreasing discards. Trips that would continue fishing for other species would discard skates once its landings reach the skate possession limit. Although reducing skate mortality through survival of discards, vessels fishing for other species would increase skate discards.

Another set of vessels, or trips, that require skate landings to be profitable are less likely to continue fishing once the skate landings reach the possession limit. Some may change their fishing method or location to target other species. Other vessels may return to port on shorter trips. In this latter case, the vessel presumably will have skate discards associated with its catch, from both undersized (or oversized

55 An opportunity cost in this case represents a potential wage that might be earned by a crew person if that person was not fishing. Another way of looking at this factor is it represents a minimum 'wage' that a crew person expects to earn by continuing to fish.

in the case of the bait fishery which has a maximum size limit) and from prohibited species (barndoor skate, smooth, and thorny skates). If as a result of the possession limit, the vessel reduces the amount of fishing effort targeting skates, skate discards is likely to decline.

Figure 36. **Possession limit model results by trip, derived from 2007 VTR data for trips using trawls and landing skates in RI. The adjusted landings represent a proposed trip limit.**



Although the model estimates the amount of surviving skate discards at various possession limits, there is not sufficient information currently available to estimate the discard reduction caused by less skate fishing. There are many difficult-to-predict factors that will come into play as the fishermen change the way they fish in response to a skate possession limit.

The net effect on discards can however be generalized with respect to various potential possession limits. Higher possession limits are least likely to affect trips that are targeting other species and would continue fishing after the skate landings equal the possession limit. Modest decreases in skate discards could be expected from vessels that fish less for skates as a result of the possession limit.

As the skate possession limit becomes more restrictive, however, it would more frequently affect trips that are relying less on skate landings to be profitable. In this case, skate discards would be expected to increase, but some mortality reduction would be expected through surviving discards.

<u>Wing and bait fishery skate possession limits</u>

Due to the unique characteristics of the wing and skate bait fisheries, it requires a different possession limit in the two fisheries to achieve an equivalent amount of skate mortality reduction. In general, the possession limit model indicates that skate mortality reductions from 10 to 40% are possible at a reasonable range of possession limits (4,000 to 10,000 lbs. for the wing fishery; 7,000 to 14,000 lbs. for the bait fishery; Figure 37).

As skate possession limits become more restrictive, they would affect the landings of a greater number of trips and achieve greater mortality reduction. At the limit (no skate possession allowed), the mortality reduction would reach a maximum representing the loss of landings from trips that target skates plus the survival of skate discards on trips that target other species. Within the analyzed range, the effect of different assumptions about discard mortality is small (Figure 38).

Figure 37. **Skate mortality reduction predicted by the Two-Bin model over a range of potential skate possession limits, by fishery.**

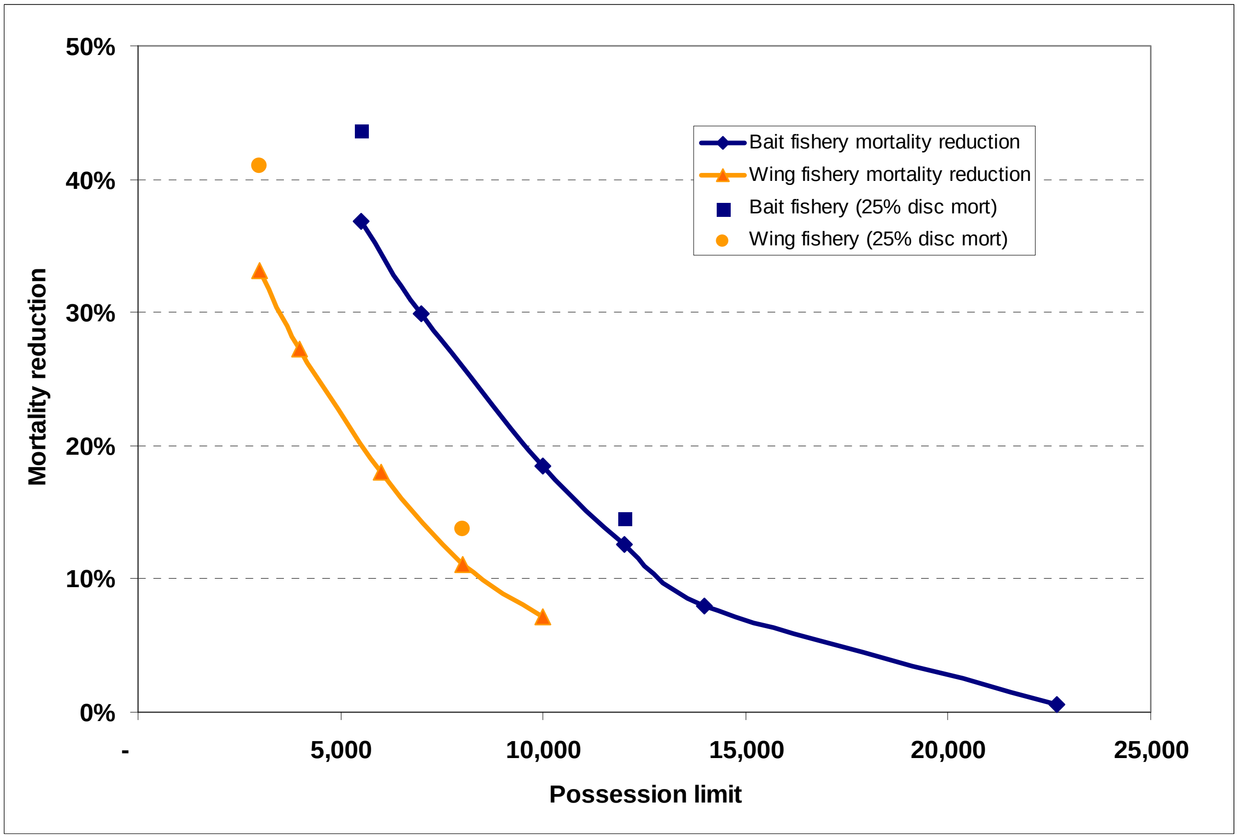
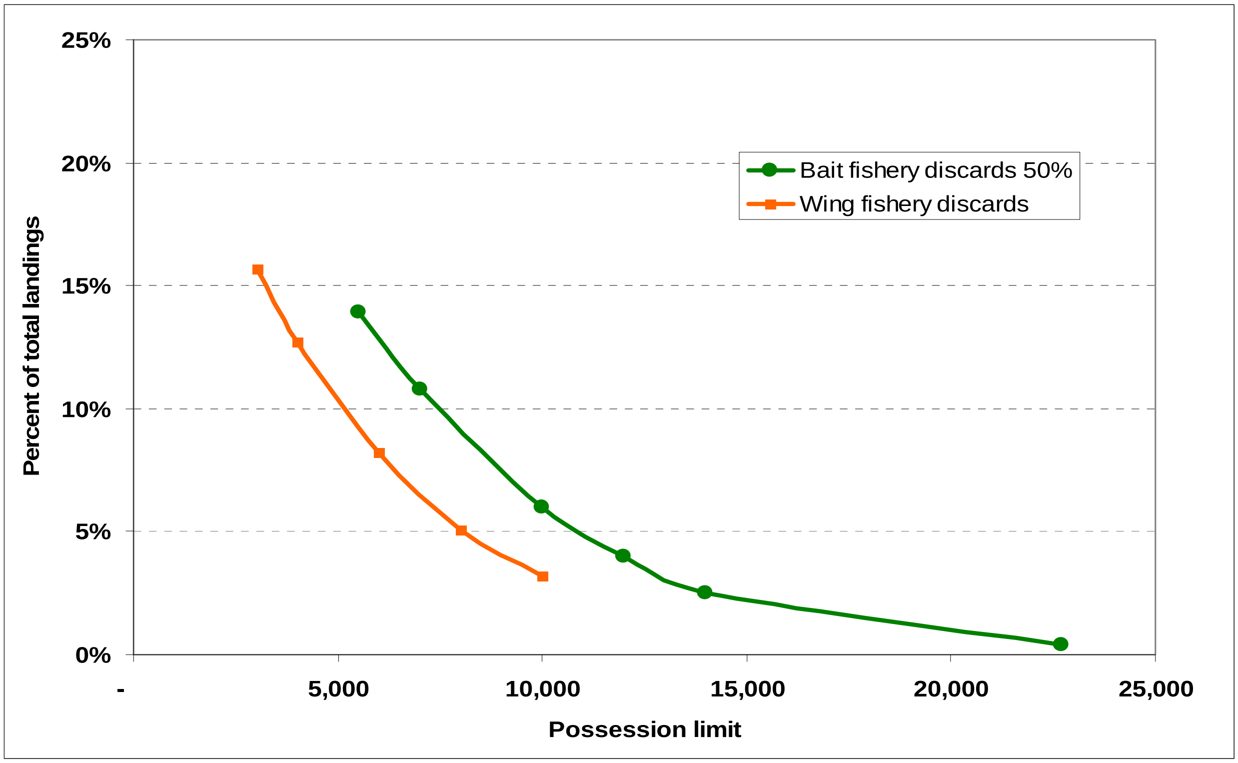


Figure 38. Additional skate discards as a fraction of original landings by fishery vs. a skate possession limit, assuming 50% skate discard mortality. The model assumes that trips do not re-direct on other species or take compensatory trips.



Skate possession limits to reduce landings to the TAL were estimated independently in the possession limit model for each skate fishery via iterative trial and error. The target mortality reductions, relative to actual landings in 2007, are shown in Table 87, with and without the estimated effects of time/area closures on the wing and whole/bait fishery. These mortality reduction values served as the objective function to identify possession limits for each alternative and TAL allocation option, which are listed in Table 88.

Including the effect of possession limits on discarding, the skate possession limits in Table 88 are estimated to achieve the mortality reductions (Table 87) that reduce 2007 landings to the proposed TALs. As long as skate discards in fisheries targeting other species do not rise from the average proportion observed during 2004-2006, the possession limits are expected to keep skate catches from exceeding the ABC/ACL.

Table 87. **Target reductions in mortality from skate landings and estimated effect of time/area closures. The reported 2007 landings were 14,081 mt (31.04 million pounds) of wings (whole weight equivalent) and 4,773 mt (10.52 million pounds) of whole skates.**

Fishery	Wing		Whole/bait	
Historic fishery allocation basis	2005-2007	1995-2006	2005-2007	1995-2006
Target TAL (mt), 2005-2007 survey index	8,426	7,677	3,118	3,867
Landings targets relative to 2007 reported landings				
Target change in landed mortality, no closures	-40.2%	-45.5%	-34.7%	-19.0%
Mortality reduction from time/area closures (Two-bin model)	-15.1%	-15.1%	4.6%	4.6%
Target change in landed mortality, after applying closure effects	-25.1%	-30.4%	-39.3%	-23.6%

Table 88. **Proposed skate possession limits (in pounds) for vessels on declared skate trips.**

	Skate wing fishery trips		Skate bait fishery trips	
TAL allocation option and limit	2005-2007 basis 8,426 mt	1995-2006 basis 7,677 mt	2005-2007 basis 3,118 mt	1995-2006 basis 3,867 mt
Landings disposition	Wings (whole)	Wings (whole)	Whole	Whole
Alternatives 1a and 1b (with time/area closures)	4,800 (10,896)	3,800 (8,626)	6,800	12,100

Alternatives 2, 3a, and 3b	**2,500 (5,675)**	**1,900 (4,313)**	**8,200**	**14,200**
Alternative 4 (with time/area closures)	**4,800 (10,896)**	**3,800 (8,626)**	**Quota managed, no possession limit**	

Other effects

The skate possession limits will affect various numbers of vessels and trips; potentially reducing trip length, landings, and revenue for trips that rely on skate landings to be profitable. Vessels and ports that rely on trips targeting skates will of course be affected by the possession limits much more than vessels and ports that land skates from trips targeting other species. For vessels that target skates and end trips early due to a skate possession limit, revenue from skates and non-skate species will decline as well as total fishing costs due to changes in the consumption of fuel, ice, food and other variable expenses. Reductions in fishing costs from the predicted reduction in fishing activity are about 31% of lost revenue for the wing fishery and 26-29% of lost revenue for the whole/bait fishery.

The effects on the top ten ports in skate landings for the range of skate possession limits under consideration are shown in Table 89 to Table 92, ranked by the estimated change in total revenue from skate and non-skate landings. In some cases, the estimated change in revenue from the skate possession limit is greater than the total revenue from skate landings because of the effect that shortened trips would have on landings and revenue of other associated species.

At the lowest wing possession limit for any of the alternatives (Table 89), the top three ports affected by the skate possession limit would be New Bedford (48.3% of revenue from trips landing skates), Boston (25.4%), and Chatham (33.6%). Impacts on revenue at the rest of the ports landing skates is estimated to be less than 10% of total revenue on trips landing skates. At a the higher wing limit (
Table 89 has been redacted to maintain confidentiality of dealer supplied data.

Table 90), the ports with the most impacts would be New Bedford (24.5% of revenue from trips landing skates), Boston (12.1%), and Chatham (8.7%). The effects are relatively less at the higher possession limit in Chatham, because vessels there tend to take shorter trips when landing skates than at other ports.

The estimated effects of the skate possession limits are somewhat different for the whole/bait skate fishery than for the wing fishery, somewhat reflecting the geographical differences in the two skate fisheries. As with the wing fishery, New Bedford would experience the most effect on revenue (
Table 90 has been redacted to maintain confidentiality of dealer supplied data.

Table 91), but only 20.4% of total revenue for trips landing whole skates. Point Judith, RI is ranked second, but a 6,800 lb. skate possession limit would reduce revenue on trips landing skates by only 8.5%. This analysis may understate the effects in this area, because some vessels may be fishing in state waters and do not submit VTR reports. This is followed by Tiverton, RI (50.6%) and Chatham, MA (27.0%).

At the higher whole/bait skate possession limit (Table 92, associated with Alternative 2, 3A, and 3B), the impacts are greatest at New Bedford (6.9%), followed by Tiverton, RI (38.0%), and Chatham, MA (8.5%).

Table 89. **Trips, skate landings, and changes in revenue at the top 10 ports ranked by change in revenue from a 1,900 skate wing possession limit, based on 2007 VTR data for trips reporting skate landings.**

Table 89 has been redacted to maintain confidentiality of dealer supplied data.

Table 90. **Trips, skate landings, and changes in revenue at the top 10 ports ranked by change in revenue from a 4,800 skate wing possession limit, based on 2007 VTR data for trips reporting skate landings.**

Table 90 has been redacted to maintain confidentiality of dealer supplied data.

Table 91. **Trips, skate landings, and changes in revenue at the top ports ranked by change in revenue from a 6,800 skate bait possession limit, based on 2007 VTR data for trips reporting skate landings.**

Table 91 has been redacted to maintain confidentiality of dealer supplied data.

Table 92. **Trips, skate landings, and changes in revenue at the top ports ranked by change in revenue from a 14,200 skate bait possession limit, based on 2007 VTR data for trips reporting skate landings.**

Table 92 has been redacted to maintain confidentiality of dealer supplied data.

8.3.1.8 Incidental skate landings limit

The 500 lbs. incidental skate landings limit (220 lbs. for skate wings; Section 5.2.4) has no direct effect on skate catches, other than to focus the proposed measures on a narrower or wider sector of the fishery. With an incidental landings limit set too high, the measures that apply to vessels fishing for skates need to be more restrictive to meet the mortality goals. It also could invite vessels to make day trips targeting skates under an incidental limit (similar to what occurred in the general category scallop fishery). If set too low, the measures that apply to vessels fishing for skates could cause skate discards to increase because the vessels would continue fishing for other species but would be subject to the skate regulations. If set correctly, most of the vessels landings more than the incidental skate limit would be fishing for, or targeting, skates. Vessels fishing for other species or fishing in areas that catch and land clearnose skates would be unaffected by the proposed skate management measures. Since November 2006, a 500 lb. skate landings limit has applied to vessels using trawls while on a Multispecies B DAS, which although the program has a very narrow focus, there have been no issues with excessive skate discarding or targeting of skates while on a Multispecies B DAS by vessels using trawls.

Again, it is difficult to quantify how the incidental skate catch limit value will affect fishing behavior. The effects may need to be monitored and the limit adjusted if the regulations implemented in this amendment have unexpected results.

At 500 lbs., a skate trip declaration would have been required on 5219 trips made by 392 vessels in 2007 (Table 93). This represents 39% of the trips and 62% of vessels landing skates, but would also make 97% of whole skate and skate wing landings subject to the proposed measures meant to apply to vessels fishing for skates. These 5219 trips also contributed to 64% of the landings of cod, haddock, and pollock; 78% of the yellowtail flounder; and 47% of the monkfish landings on trips that also landed skates (Table 94). At a 1,000 and 2,000 lbs. incidental skate landings limit, skate trip declaration would be required on fewer trips made by fewer vessels and still apply to 94 and 91 percent of skate landings, respectively, but in certain alternatives, the incidental limit would exceed the proposed skate possession limits.

Table 93. Expected number of trips, landings, and vessels accounted for by declared skate trips whose skate landings are under an incidental skate possession limit ranging from 0 to 2000 lbs. whole weight, based on 2007 VTR data**.**

Incidental skate possession limit	Expected trips declared into skate fishery (%)	Wing landings, million lbs. (%)	Bait landings, million lbs. (%)	Vessels declaring one or more skate trips
0	13446 (100)	7.01 (100)	21.13 (100)	628 (100)
500	5219 (38.8)	6.77 (96.6)	20.53 (97.2)	392 (62.4)
1000	4009 (29.8)	6.58 (93.9)	20.05 (94.9)	319 (50.8)
1500	3425 (25.5)	6.41 (91.5)	19.71 (93.3)	281 (44.7)
2000	3090 (23.0)	6.30 (89.9)	19.36 (91.7)	253 (40.3)

Table 94. Proportion of vessels, trips, and landings that would be affected by regulations that apply to declared skate trips at various incidental skate landings limit options.

		Incidental skate landings limit options				
	All trips	100	250	500	1000	2000
Number of vessels	629	500	448	392	319	253
Number of trips	13446	8991	6797	5219	4009	3090
Sum of Skate wings, lbs.	7,007,577	6,972,491	6,885,934	6,767,005	6,579,834	6,301,144
Sum of Skate, whole, lbs	21,127,224	21,025,286	20,848,172	20,530,981	20,054,060	19,364,117
Sum of Gadids, lbs.	11,716,648	9,850,243	8,837,381	7,557,189	6,373,302	5,210,319
Sum of Flounders, lbs.	7,104,950	6,166,645	5,455,608	4,693,488	4,102,730	3,443,696
Sum of Yellowtail flounder, lbs.	2,641,364	2,447,476	2,310,502	2,062,447	1,856,050	1,532,008
Sum of Monkfish, lbs.	7,127,792	5,623,827	4,458,734	3,352,387	2,397,077	1,728,122
Sum of Dogfish, lbs.	646,258	498,059	385,796	216,120	163,155	130,835
Sum of Other groundfish, lbs.	1,261,322	876,280	657,911	501,434	346,609	207,079
Sum of Other species, lbs.	2,747,859	1,759,436	1,131,040	921,588	715,880	570,016
Sum of Total landings, lbs.	61,643,609	55,412,930	51,119,661	46,715,317	42,669,347	38,547,153

8.3.1.9 Trip declaration and prohibition against using Multispecies Category B DAS to fish for skates

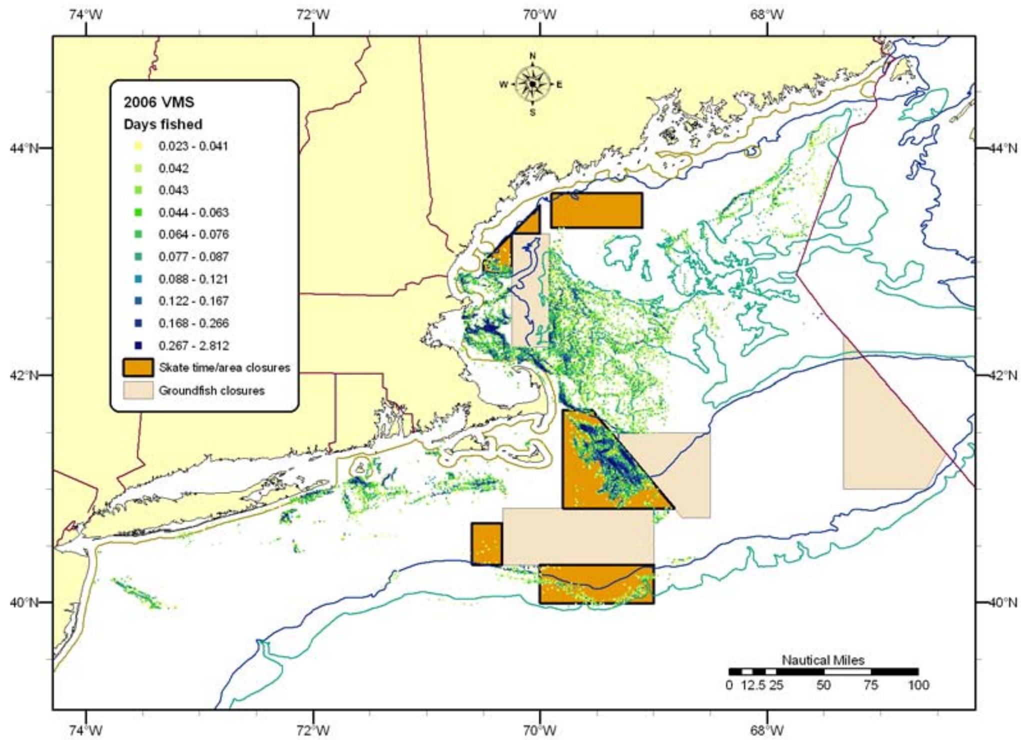
According to the Northeast Region Fisheries Statistics Office, skate landings on a Multispecies Category B DAS increased from negligible amounts to about 1.8 million pounds in 2007. Except for certain specific exemptions (See status quo in Section 5.2.8.1), vessels fishing for skates must be on a trip called in as either a Multispecies, Monkfish, or Scallop DAS. Multispecies Category B DAS are restricted for use by vessels to target 'healthy' stocks, which partially included skates in Framework 42 to the Multispecies FMP. Since vessels using gillnets had limited opportunity to use B DAS to target other species, apparently some vessels began using B DAS to target skates. Other vessels use Multispecies A DAS to target skates, particularly where they are fishing in areas where groundfish are less abundant or restrictions such as groundfish possession limits make skate fishing more lucrative.

Figure 39 - Figure 42 show the distribution of fishing effort derived from VMS pollings by gear, DAS program and category, on trips when skate landings were reported. For vessels using trawls, relatively few Multispecies B DAS were used in 2007 on trips where skates were landed (Figure 39). Most of the related fishing effort was on Multispecies A DAS and on trips fishing in the US/CA DAS program. Similarly, most of the fishing effort derived from VMS pollings were on Multispecies A DAS along the Great South Channel off Cape Cod, MA (Figure 41). A small amount of fishing effort was associated with Multispecies B DAS, according to the VMS data, near the Cultivator Shoals, east of groundfish Closed Area I. It is possible that some gillnet vessels declared a Category B DAS trip via the call in system for vessels that did not have VMS equipment.

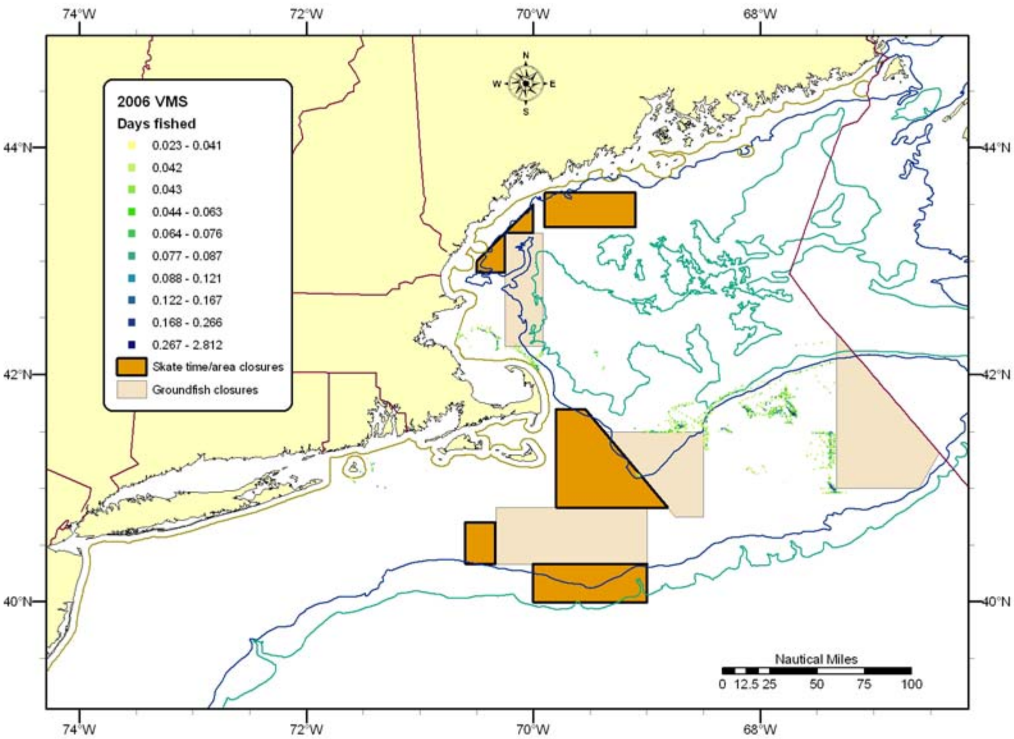
Some vessels will continue fishing for skates during a Category A DAS trips, instead of taking a Category B DAS trips as occurred in 2007. It is difficult to quantify the effect, but this measure may reduce the amount of effort targeting skates, or it may shift the effort to the Category A DAS program. Either way, it would reduce the amount of DAS available to target either groundfish or skates and make the use of Category B DAS consistent with their original intent, for fishing for 'healthy' species.

Figure 39. **2006 VMS fishing effort (0-4 knots) distribution by DAS management program on trips using** <u>trawls</u> **and reporting skate landings on VTRs.**

Multispecies A DAS



Multispecies B DAS



Multispecies US/CA DAS

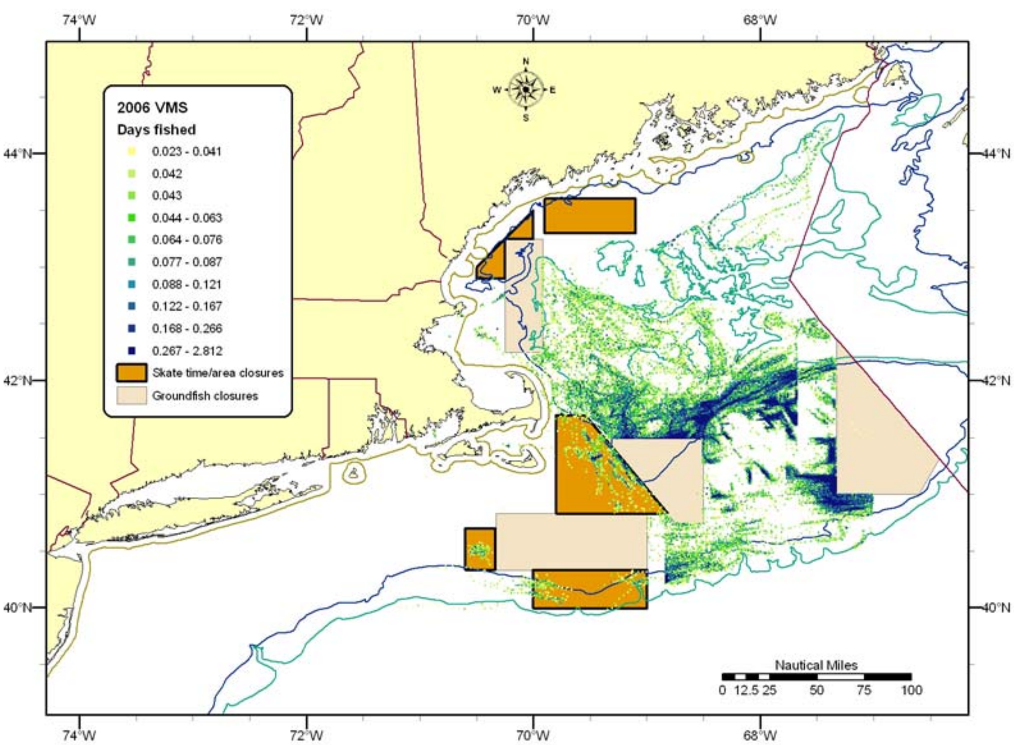
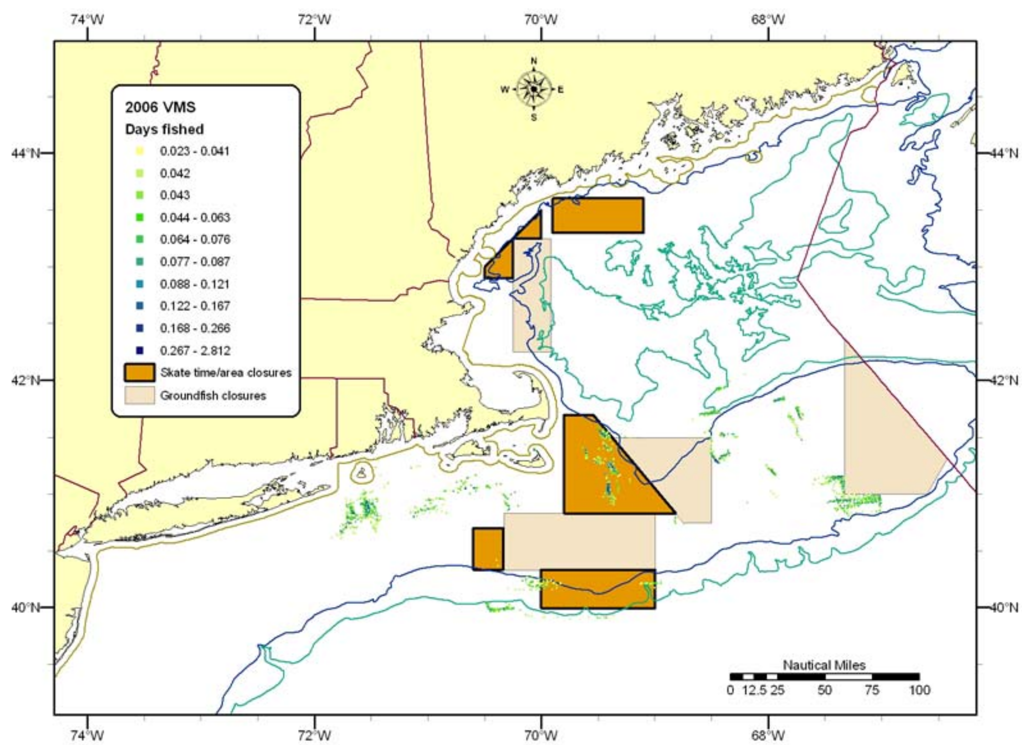
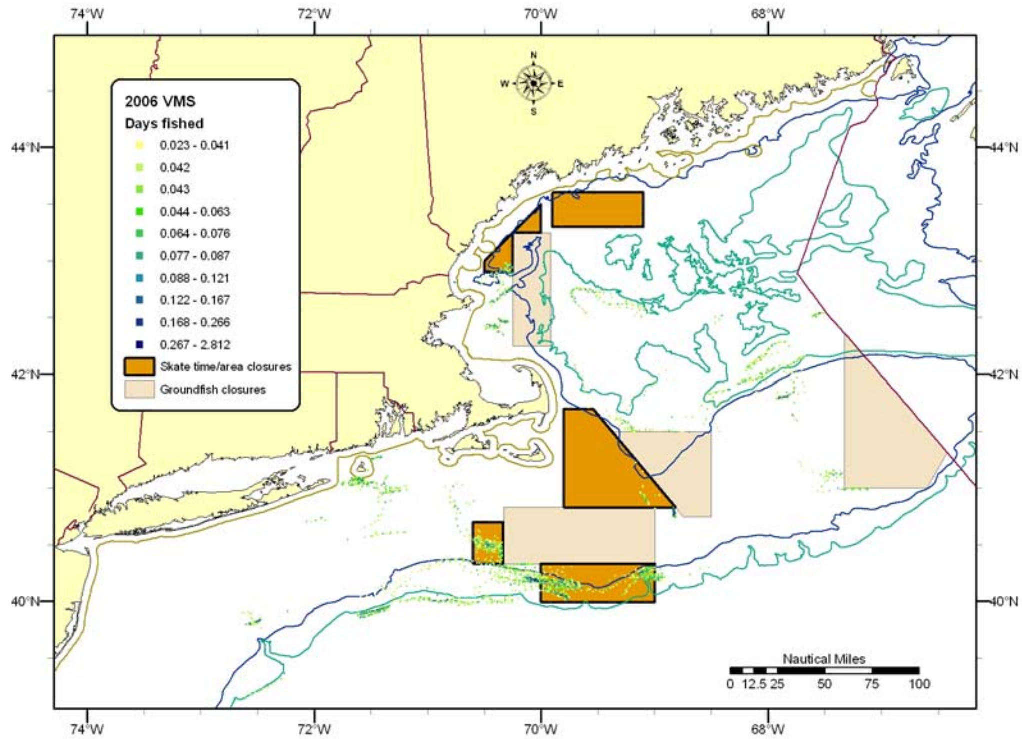


Figure 40. **2006 VMS fishing effort (0-4 knots) distribution by DAS management program on trips using** trawls **and reporting skate landings on VTRs.**

Monkfish DAS



Monkfish/Multispecies DAS



Monkfish US/CA DAS

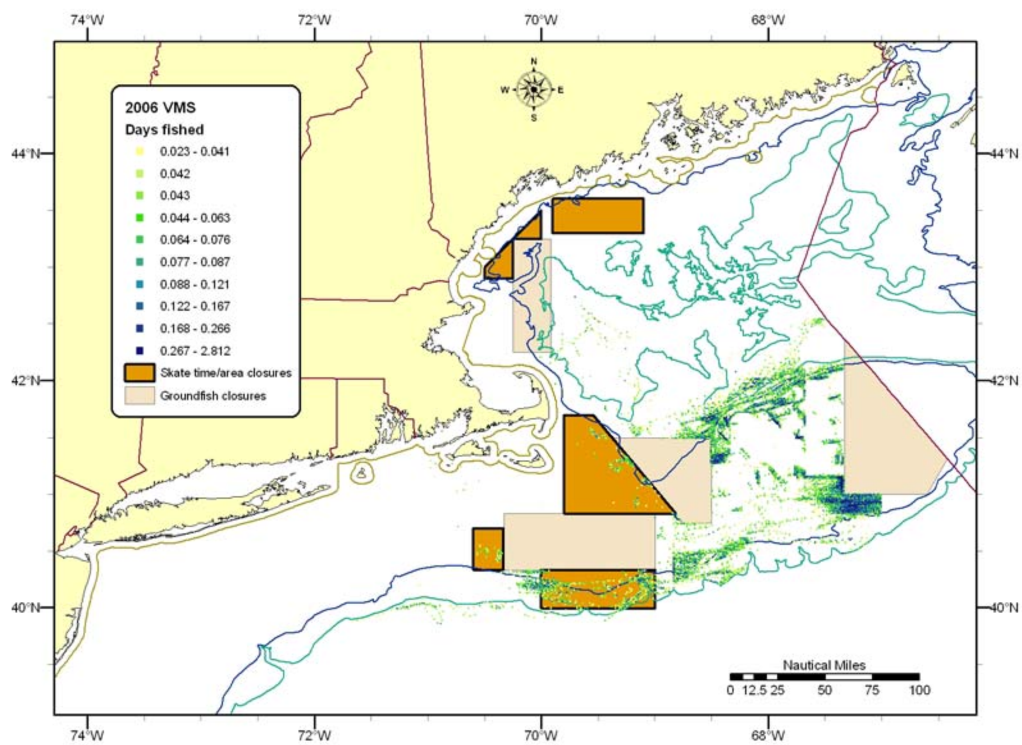
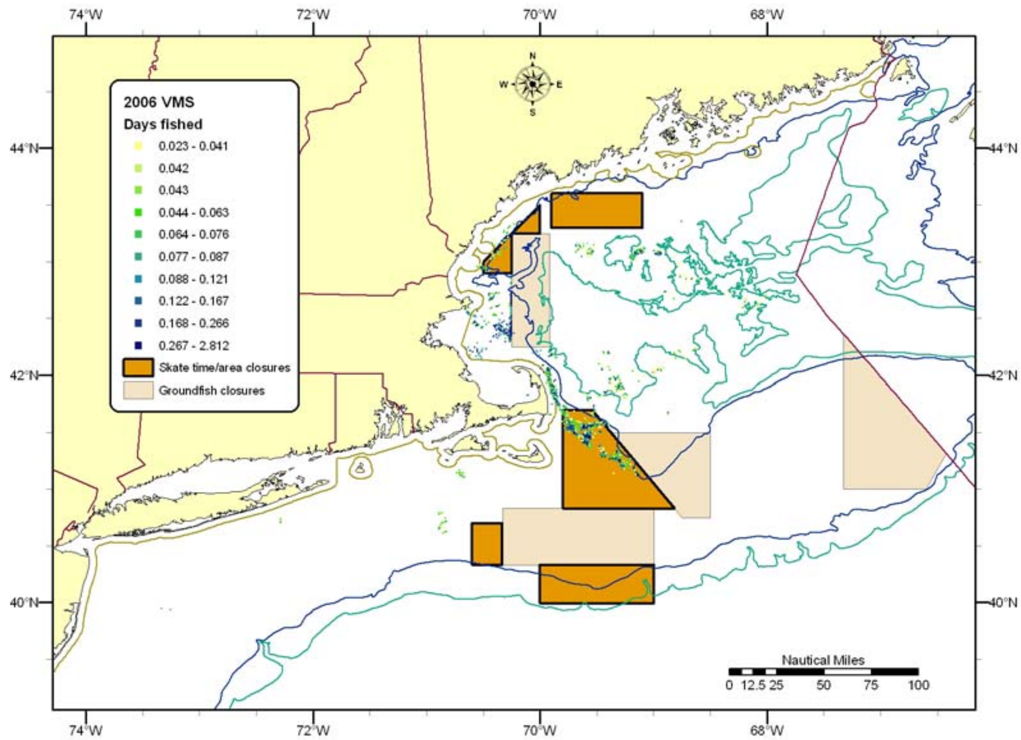
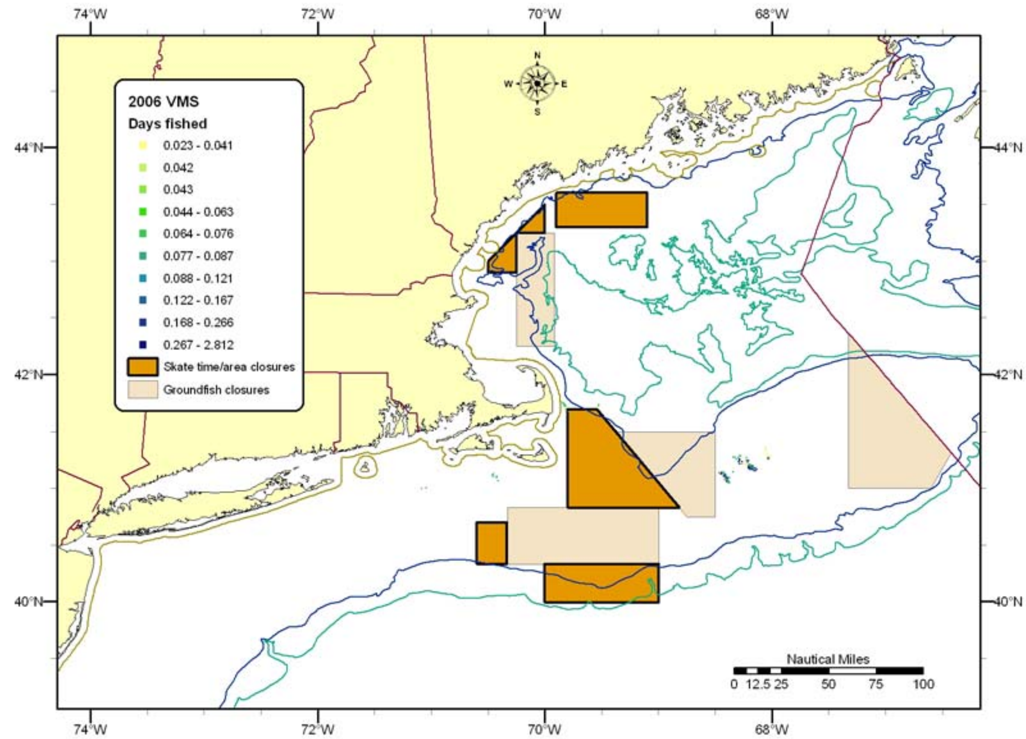


Figure 41. **2006 VMS fishing effort (0-4 knots) distribution by DAS management program on trips using** gillnets **and reporting skate landings on VTRs.**

Multispecies A DAS



Multispecies
B DAS



Multispecies
Gillnet
DAS

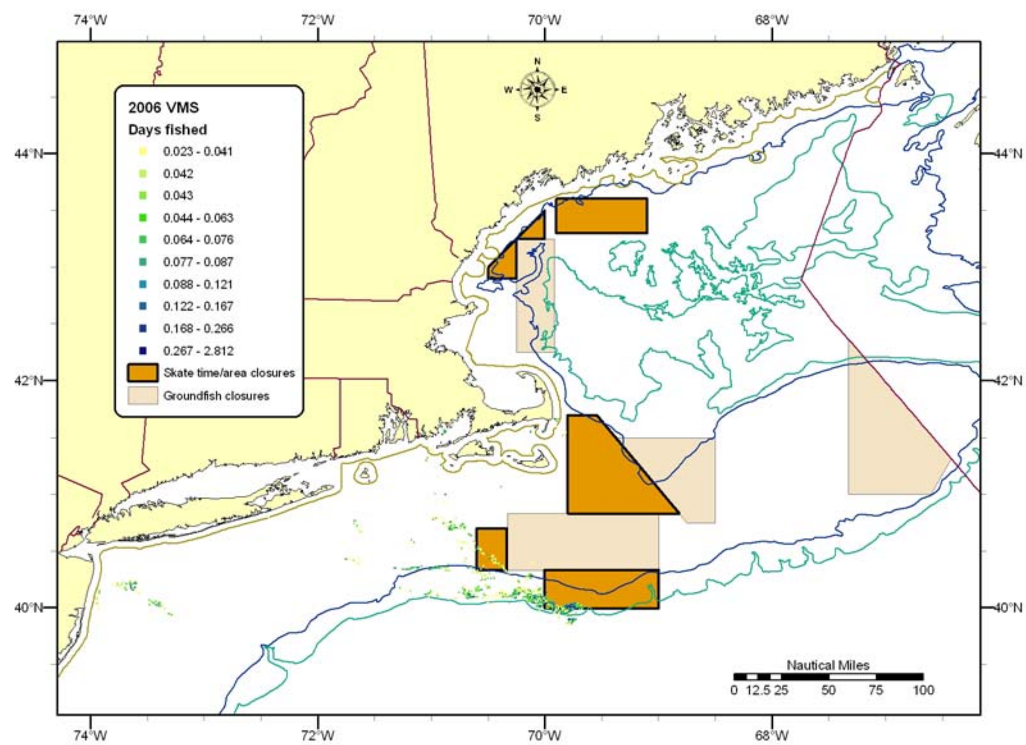
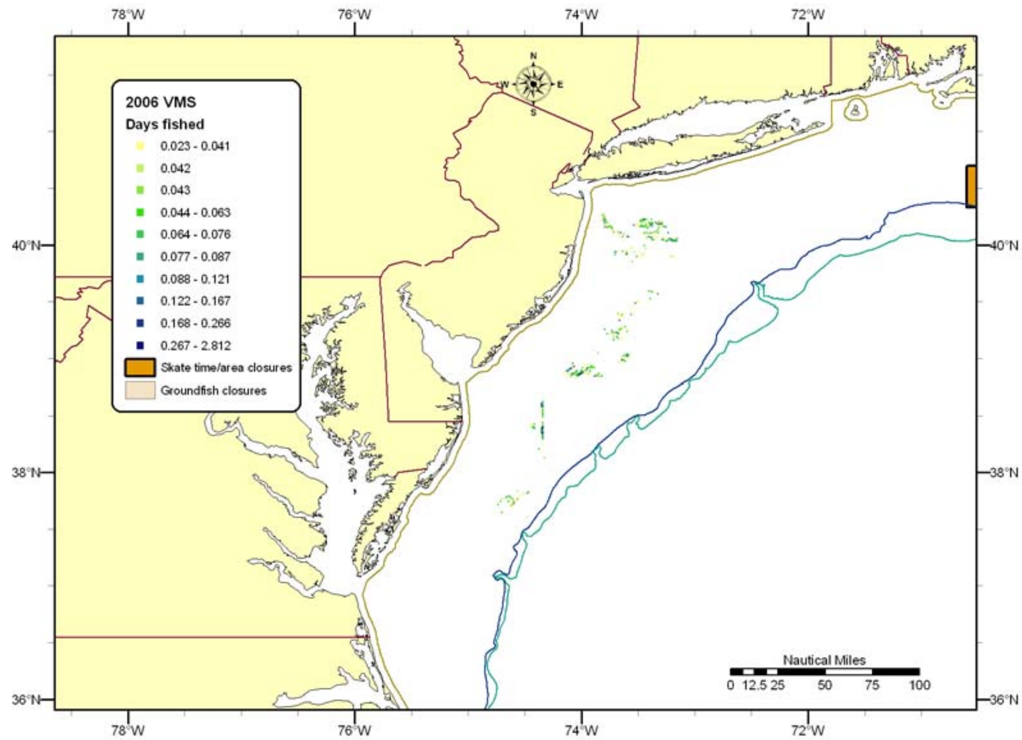


Figure 42. **VMS fishing effort (1-4 knots) distribution by DAS management program on trips using** <u>dredges</u> **and reporting skate landings on VTRs.**

Scallop general category DAS



8.3.1.10 Skate Discards

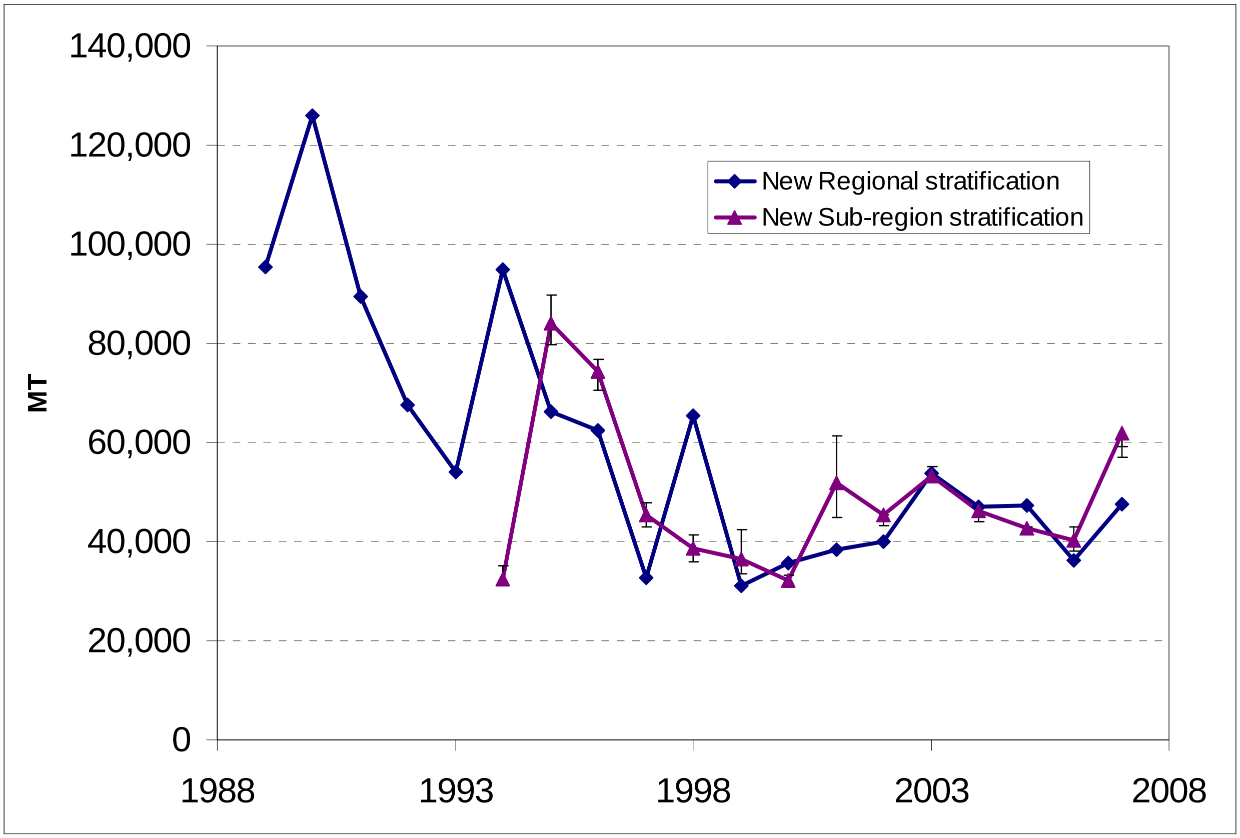
Skate discards are not actively managed by the Skate FMP and this amendment proposes no new regulations to manage skate discards, except by regulating trips that target skates (defined as any trip landing 500 or more lbs. of whole skates or 220 lbs. of skate wings.

Instead, the Skate FMP relies on other fishery regulations to limit or reduce skate discards, such as DAS limits, area restrictions, and mesh limits. The DAS limits control the amount of fishing activity and to some extent where it occurs (vessels may fish closer to port when DAS are reduced). Since skate catch per unit effort is constant, the DAS limits control skate discard mortality. Area restrictions to conserve other species may increase or decrease skate discards. If they coincide with areas of high skate abundance, then the area restrictions could reduce skate discards, and vice versa.

Minimum mesh regulations could reduce the catch of small skates and thereby reduce discards, but increases in the mesh size from present minimums may not improve skate size selectivity due to the peculiar morphology of skates. Quotas (sector or common pool) for other species could reduce or limit skate discards, but they could also increase targeting of skates when vessels cannot fish for other species due to quota restrictions. Possession limits for other species usually would increase targeting skates on DAS that cannot be used to fish for these other species.

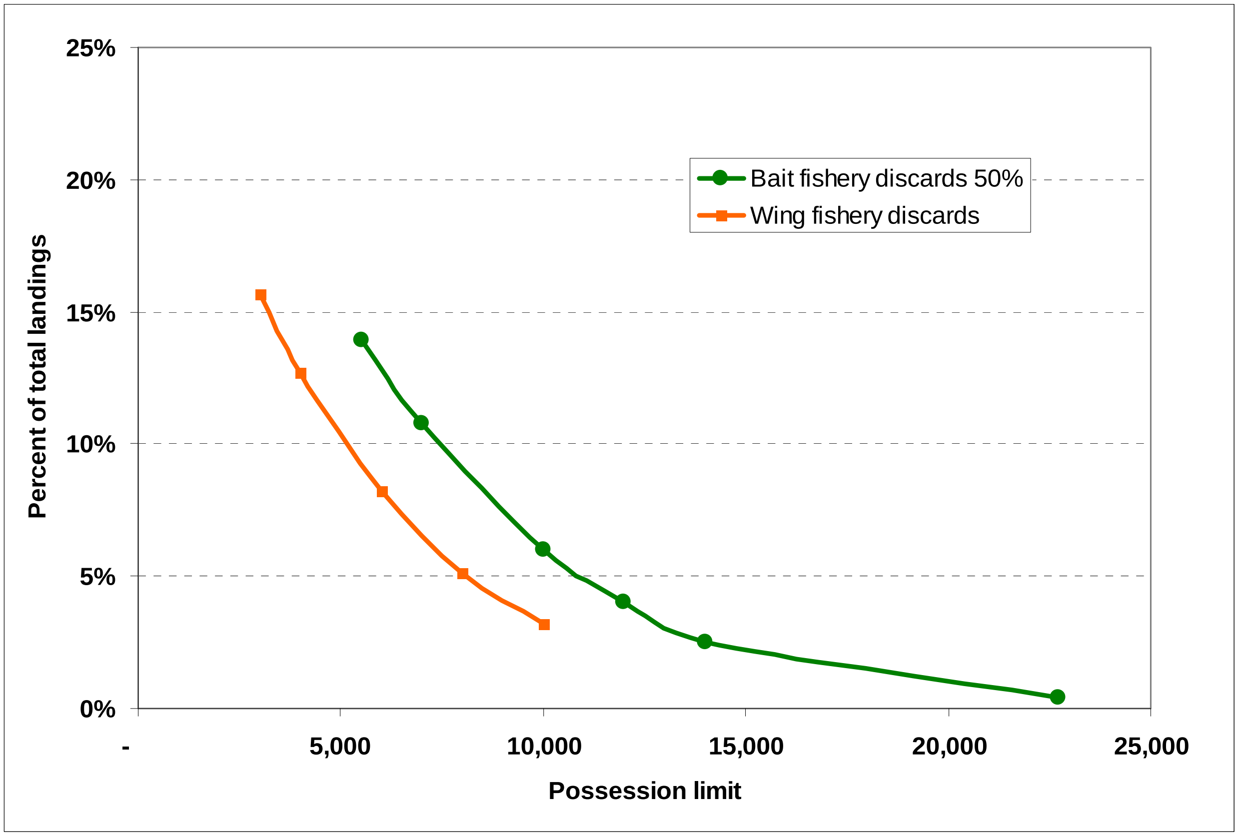
Skate discards (which cannot be estimated by species) declined from an estimated 47,291 mt in 2003 to 14,582 mt in 2006 (Figure 43). This decline is attributable to restrictions in the multispecies, monkfish, and scallop fisheries that all have a significant bycatch of skates. The decline in discards may also be related to an increase in the relative price of skate wings which would cause fishermen to retain more skates for sale and also to restrictions in the multispecies and possibly the monkfish fishery which cause vessels to use more DAS to target skates (a target fishery where skate discards may be less frequent). However, skate discards by fishery have not been estimated and the effect of increasing skate fishing may increase discards because vessels would be fishing in areas where skates of all sizes are likely to be more abundant.

Figure 43. **Trend in total estimated skate discards (NEFSC 2008, Data Poor Assessment Workshop Report).**



As a precautionary approach if the relationship between discards and landings in 2006 is anomalously low, the Council applied the 2004-2006 discard/total catch ratio to the TAC to specify a landings threshold (TAL). And although more restrictive skate possession limits would increase discards from trips that continue fishing for other species (see Figure 44 showing estimated conversion of landings to discards as percent of former landings), the possession limit model (see Document 12 in Appendix I) also predicts that many trips targeting skates will be of shorter duration, reducing both skate landings and discards. The Council is unable to predict how likely this will occur, but vessels may nullify the positive effect on discards by fishing for skates on more trips (to the extent possible under DAS limits) or by fishing for other species that co-occur with skates.

Figure 44. Increase in discards as a percent of original landings as predicted by the Two Bin model over a range of potential skate possession limit, by fishery.



8.3.2 Impacts of the final alternative

Except for three of the proposed management measures in the final alternative (Section 5.1), all of the measures remain unchanged from the draft alternatives and analyzed in Section 8.3.3. Based on public hearing comments and DEIS analyses, the Council recommends using Alternative 3B (Section 5.2.8.6) for the skate wing fishery. This alternative includes target TAC management, a 1,900 lb. skate wing possession limit, an incidental skate possession limit to apply to all vessels on a DAS (except for vessels on a Multispecies Category B DAS), and no time/area management. The Council also recommends using Alternative 4 (Section 5.2.8.7) for the skate bait fishery. This alternative includes target TAC management, a three season quota that applies to landings, and no time/area management.

The three changes made to the DEIS based on public comment include dropping the trip declaration requirements because they were unnecessary to monitor the TAL, raising the incidental skate possession limit, and revising the accountability measures (AMs).

During the final phases of the amendment and following the DEIS public hearings, the Northeast Fisheries Science Center conducted a Data Poor Assessment Workshop (DPWS) on skates (reports available at http://www.nefsc.noaa.gov/nefsc/saw/datapoor/Data Poor - Review Panel Report Final-1-20-09.pdf and http://www.nefsc.noaa.gov/publications/crd/crd0902/), which changed the Council's initial estimates of ABCs, TALs, and the overfishing definition reference points for six of the seven managed skate species[56]. As a major part of this assessment, major effort went into resolving species identification problems with the catch data. New discard estimates were also derived using a fuller set of sea sampling discard/kept ratios and new approaches were developed to estimate discards before 1991. Although several models were attempted using the new catch data, the analytical models did not fit the new skate data well and were deemed unreliable for management decisions at this time.

In lieu of status determinations and reference point estimates from analytical models, the DPWS recommended updating the biological reference points to include survey data through 2007 (2008 for little skate). The SSC and the Council accepted this recommendation and included the recommended changes to the overfishing definition in the final alternative (Section 5.1.1). As a result, smooth and winter skate are no longer classified as overfished and no rebuilding program is consequently needed. Thorny skate would remain overfished and overfishing was occurring in 2007. And as of 2008 (an update to the DPWS assessment), smooth and thorny skate are classified as overfished, i.e. their survey biomass is below the threshold, and no overfishing is occurring on any skate (see Table 2).

8.3.2.1 ABC, ACL, and TALs

Using the new catch data, the PDT re-estimated the observed changes in biomass compared to various historic catches and the rebuilding potential of all seven species. Based on this analysis, the Council's SSC approved an ABC of 30,643 mt per year using the median catch/biomass ratio of the time series and the current three-year moving average of the survey stratified mean weight per tow, aggregated over all seven managed skate species. The new ABC is 10% higher than that estimated in the DEIS, the difference mainly arising from better estimates of discards over a longer historical period. In general, when observed catch was higher than the median catch/biomass exploitation ratio, biomass declined for nearly all skate species. And conversely when catch was lower than the median, biomass generally increased. A table comparing the estimates using the new DPWS data and the old data in the DEIS are given in the table below. More detailed information is given in Appendix I, Document 15.

After evaluating the PDT's analysis and the dynamic response of skate biomass to catch levels, the Council's SSC set the ABC using the median catch/biomass exploitation ratio to prevent overfishing of skates and rebuild smooth and thorny skates, even though winter skate would not be classified as overfished using the new biomass reference point. Using the DEIS catch data, biomass increased 64% (49 of 77 times) of years when the catch was below the median and declined 64% (48 of 75 times) of the years when catch was above the median. Using the new DPWS catch time series, biomass increased 61% (69 of 114 times) of the years when catch was below the median and declined 51% (70 of 113 times) of the years when catch was above the median. According to the PDT analysis, the observed change in biomass was stronger when the catch was below the target (75% of the catch/biomass median). Using either data set, the results suggest that keeping catch below the median catch/biomass exploitation ratio will prevent biomass from declining more often than not, and vice versa.

[56] The selected time series for barndoor skate was not updated because a specific early period of the survey time series was selected as representative of conditions that are consistent with producing MSY.

Table 95. Catch/biomass response analysis results

Species Overfishing threshold	Catch/biomass median	New catch data (1964-2007)			DEIS catch data (1978-2006)[57]		
		Biomass increase (years)	**Biomass decrease (years)**	**Biomass, average annual change**	**Biomass increase (years)**	**Biomass decrease (years)**	**Biomass, average annual change**
Barndoor -30%	Above	8	14	-2.2%	6	3	137%
	Below	13	2	155.1%	11	0	165%
Clearnose -30%	Above	18	7	7.7%	7	4	37%
	Below	6	6	34.9%	6	5	30%
Little -20%	Above	16	7	17.2%	5	6	4%
	Below	11	3	31.1%	7	4	30%
Rosette -60%	Above	7	11	8.4%	4	7	18%
	Below	15	4	87.1%	6	5	48%
Smooth -30%	Above	1	17	-22.9%	3	8	-12%
	Below	14	5	48.1%	8	3	37%
Thorny -20%	Above	3	15	-20.7%	1	10	-23%
	Below	8	11	10.5%	4	7	5%
Winter -20%	Above	17	2	54.5%	1	10	-24%
	Below	2	14	-27.2%	7	4	34%

[57] Varies by species due to survey coverage differences

Thus the biological effect of the ABC on skates is essentially the same as that estimated in the DEIS. Keeping catches below the catch/biomass median is expected to inhibit biomass declines due to fishing. To account for the high level of scientific uncertainty from various sources (uncertain population dynamics, poorly identified catch, etc.); the Council's SSC also recommended using 75% of the catch/biomass median for a catch target (applied as an ACT in the new ACL framework). In terms of biological impacts, the revised ABC is not expected to have a materially different effect than had been anticipated in the DEIS.

The primary effect of the new DPWS catch time series arises from the higher estimate of discards in 2005-2007. Since discards are taken off the top (i.e. first to be subtracted from the ACT), the effect of the proposed allocation is to reduce allowable landings (TAL) to account for the greater amount of discards. The revised TAL is 9,427 mt (18% lower than estimated in the DEIS and 50% less than reported 2007 skate landings). Reducing the TAL to account for these discards will probably cause directed skate fishing to stop earlier than would have occurred using the TALs proposed in the DEIS. However total catch is not expected to change and although the lower TALs will have a meaningful economic effect, the biological effect of the revised TALs is not expected to be very different than estimated in Sections 8.3.1.1 to 8.3.1.3

8.3.2.2 Allocations of the TAL to skate wing and bait fisheries

In response to public comment, the Council proposes using Option 2 to allocate landings between the two skate fisheries. This option would use the longer 1995-2006 time series and allocate 66.5% of the landings to the wing fishery and 33.5% to the skate bait fishery. These proportions favor the skate bait fishery compared to Option 1 (2005-2007) and are expected to focus conservation on the skate wing fishery, which targets and lands mainly winter skates. The status of winter skate is perceived to be in worse condition (i.e. closer to the minimum biomass threshold) than the status of little skate (targeted by the bait fishery), so the final alternative is expected to have a more positive biological impact than option 1 (or No Action, which would allow for continued increases in the skate wing fishery).

8.3.2.3 Changes to the overfishing definition reference points

The biological reference points in the Skate FMP were chosen as a suitable proxy for B_{MSY}, because it was hypothesized that skate biomass had passed through a level since 1963 that could produce MSY. And furthermore, the DPWS reviewers believed that the 75^{th} percentile of the time series was a suitable proxy. The DPWS reviewers and the Council's SSC thought that although biomass trends occurred there was no reason to exclude more recent values from that biological reference point time series (see Appendix I, Document 17). Barndoor skate reference points were chosen on a different basis because the 75^{th} percentile of the time series was not representative of MSY and no update to the barndoor skate biomass threshold and target is proposed by this amendment.

Although there are slight changes in the biomass threshold values (see table below), the perception is that the thresholds are no more or less representative of ½ of B_{MSY}, represented by the survey proxy. Thus the updates are no more or less risk averse than they were in the Skate FMP.

Table 96. Changes in minimum biomass thresholds and biomass targets for updated biological reference points relative to current biomass.

Skate Species	Stratified mean biomass (kg/tow)				
	Current Biomass	Threshold	Proposed Threshold	Target	Proposed Target
Winter[58]	2.935	3.43	2.80	6.46	5.60
Little	5.040	3.27	3.51	6.54	7.03
Barndoor	1.002	0.81	0.81	1.62	1.62
Thorny[59]	0.425	2.2	2.06	4.41	4.12
Smooth[20]	0.144	0.16	0.14	0.31	0.29
Clearnose	0.635	0.28	0.38	0.56	0.77
Rosette	0.065	0.015	0.024	0.029	0.048

8.3.2.4 TAC management and ACL monitoring

The purpose of the ACLs and AMs are to prevent skate catch from exceeding biological limits. At the chosen levels in the DEIS, they were furthermore intended to promote rebuilding of thorny skate biomass. The final alternative applies this same framework to prevent skate overfishing, to prevent smooth and winter skate from becoming overfished, and to promote rebuilding of thorny skate.

The catch monitoring and AMs were furthermore strengthened in the final alternative, which is expected to have fewer and less severe impacts on the skate resource than the No Action alternative and any alternative in the DEIS. The possession limit triggers (which would reduce the skate wing and skate bait possession limits to the incidental landings allowance) were furthermore chosen at levels below 100% of the TAL, partly to ensure catches do not exceed the ABC and partly to compensate for continuing skate landings and catch between when the trigger is reached and the end of the skate fishing year.

8.3.2.5 Annual review, framework adjustments, and specification process

These final alternative measures are mostly the same as that in the DEIS (except for clarifying additions to the process). Although very difficult to quantify, all of the proposed changes in these measures are expected to allow the Council and NMFS to make more timely and effective changes that would have a positive biological impact, compared to the existing baseline review and framework adjustment process in the No Action alternative.

8.3.2.6 Skate wing and bait possession limits and incidental skate possession limit

No changes to the skate wing possession limits in Alternative 3B were made and the biological impacts are expected to be those identified in Section 8.3.1.7 and 8.3.3.2. Unlike Alternative 4, the final alternative includes a 20,000 lb. skate bait fishery possession limit as long as the landings do not exceed the TAL trigger. Of the 4,927 trips landings whole skates (mostly for bait) in 2007, 259 trips landing 3.1 of 8.3 million total lbs. possessed and landed more than 20,000 lbs. of whole skates. At this high (20,000 lbs.) limit, the Council expects vessels that fish for skate bait and land more than 20,000 lbs. will either

[58] Overfished under the existing biomass threshold, but not overfished under the proposed threshold

[59] Overfished under both biomass threshold options

take shorter and more frequent trips, or exit the skate fishery if the large trips become uneconomic. Coupled with reducing the propensity to invoke derby style fishing as landings approach the TAL trigger, this measure is expected to have a positive biological impact.

The Council also changed the incidental skate possession limit from 500 lbs. whole weight (220 lbs. of skate wings) to 1135 lbs. whole weight (500 lbs. of skate wings) due to concerns about skate discards. While skates are thought to be more resilient to discarding than other fish, the Council wants to minimize regulatory discards, particularly those caused by possession limits. Raising the incidental skate possession limit will, on one hand, decrease regulatory discards. On the other hand, there is some possibility that the higher incidental possession limit coupled with higher skate prices after landings are curtailed may encourage targeting skates on short trips, or more retention of skates on trips targeting other species. Again, it is difficult to quantify these countervailing effects, but reducing the negative economic effects caused by discarding probably outweighs the potential for vessels to keep more skates when fishing under the higher incidental skate possession limit. According to 2007 landings data, 3051 trips landed less than 500 lbs. of skates or an equivalent amount of skate wings together totaling 548,971 lbs. whole weight. In comparison, 4,129 trips (out of 7,649 trips landing skates or skate wings) landed less than 1135 lbs or an equivalent amount of skate wings together totaling 1,402,507 lbs. whole weight. Assuming that trips landing between 500 and 1135 lbs. of skates would discard the difference, the final alternative would avoid 314,536 lbs. of skate discards.

8.3.2.7 Skate bait fishery quota

The quotas in the final alternative are expected to keep catch from exceeding the ABC and thus will have a positive biological impact (i.e. improving conservation). This impact is expected to be exactly the same as those discussed for Alternative 4 in Section 8.3.3.3. The three season quota is not expected to have a meaningful biological impact, but only reduce economic costs associated with longer bait fishery closures with an annual or two-season quota.

8.3.3 Comparison of draft alternatives

All of the Amendment 3 draft alternatives are designed to achieve the same result, reduce landings to the total allowable landings of 11,544 mt (a 39% reduction compared to 2007 landings), reversing a recent trend of increasing landings in the skate wing fishery that lands predominantly winter skate. If discards as a proportion of total skate landings remain below the 2004-2006 average (estimated discards in 2006 were the lowest since 1989 and have been declining since 2003) then the total catch will be below the median catch/biomass exploitation ratio. When catches were below this level, historically it has frequently led to increases in skate biomass for winter, thorny, and smooth skates (see Appendix I, Document 4).

In addition, Amendment 3 applies a risk-adverse policy to set the TAL and ACT (annual catch target) at 75% of the median value, taking into account scientific uncertainty (e.g. the actual catch level that would cause rebuilding is actually less than that estimated) and management risk (e.g. discards might rise to levels above the 2004-2006 average, accountability measures will not be invoked early enough, or monitoring is less effective than it should be). So even if discards rise (more than predicted by the skate possession limit model), the total catch will be unlikely to exceed the median catch/biomass ratio under any Amendment 3 alternative.

The six alternatives, labeled 1A, 1B, 2, 3A, 3B, and 4 include various combinations of skate possession limits, time/area management (closures to vessels fishing for skates), seasonal quotas for the skate bait fishery, and accountability measures. In addition, a prohibition on using Multispecies Category B DAS (a source of recent increases in skate landings by vessels using gillnets), accountability measures [invoking an incidental skate possession limit for ALL trips and vessels, time/area closures (in Alternative 3A), and/or TAC modifications for prior overages), and trip declarations apply to all alternatives. There are probably no differences between the alternatives in biological effects for skates, except where one set of measures for an alternative might be more likely than another to keep catches from exceeding the median catch/biomass exploitation rate.

Although the skate fishery is managed via open access, fishing vessels must be on a multispecies, monkfish, or scallop DAS in most instances. And since these are limited access programs and DAS are restricted, there is a limit to the amount of fishing effort that can be used for skate fishing. More restrictions in the skate fishery may result in more DAS being used to target groundfish or monkfish, or it might simply result in fewer DAS being used if there are no other species to economically target. Conversely, more restrictions in other related fisheries that use DAS or skate price increases might result in more frequent trips to target skates, on trips shortened by skate possession limits.

Because of the overlap and interaction with regulations in related fisheries, the measures in the Amendment 3 alternatives would augment and interact with the existing restrictions on skate fishing which apply to vessels with limited access multispecies, monkfish, or scallop permits. The only two exceptions to this condition are the two exemption areas (SNE Monkfish and Skate Gillnet Exemption Area and SNE Monkfish and Skate Trawl Exemption Area) and state-permitted vessels fishing for skates in state waters. The Trawl Exemption Area is situated in deeper water than is practical for targeting skates with trawls, although it is situated in areas where vessels target monkfish and have an incidental catch of skates). Amendment 3 takes into account skate fishing in state waters by reducing the TAL by the recent state landings (1.9%), causing accountability measures in federal waters to be invoked earlier than they would be if the TAL was entirely allocated to skate landings in federal waters.

Two TAL allocations options are available for each alternative, which affect the target mortality reduction relative to 2007 landings. Option 1 uses a more recent period to allocate the TAL and since the skate wing landings have increased, it allows higher landings and mortality in the wing fishery which targets larger skates. Mortality for this allocation option is likely to be higher for winter, barndoor, and thorny skate. In contrast, allocation option 2 allows higher landings and mortality in the whole/bait skate fishery which lands predominantly little skate and secondarily small winter skate. Since there is a maximum size limit, some larger little and many winter skates are probably discarded.

The summary below describes the expected effects that the six alternatives and two allocation options will have on effort, skate landings, landings of species other than skates, and revenue on trips that landed skates. Since no measures directly affect skate discards or fisheries that have skate discards, no other effects are anticipated except for the two measures that could not be quantitatively analyzed: the prohibition on Category B DAS to fish for skates and the skate bait quota measure in Alternative 4.

The tables in this section show the expected effects of time/area closures and possession limits on trips that reported skate landings on the 2007 vessel trip reports (VTRs). The interaction of these two measures (for Alternatives 1A, 1B, and 4) were estimated by applying the average change in CPUE for trips reported to fish in the skate management areas to the trip within the possession limit model. As with any model, the results are conditioned on the assumptions and data used to populate the model. For this reason, the results are presented in relative rather than absolute terms relative to the ‘status quo’, i.e. trips with reported skate landings in the 2007 VTR data. For comparison, the estimated effects are given for each fishery, by gear, and by major port of landings.

Fishermen may react or compensate in unexpected ways or in ways that cannot be incorporated into the model. Furthermore, it was impossible to tell which trips in the VTR data were taken on a Multispecies Category B DAS or how the vessel operator may respond to the prohibition (using Category A DAS to fish for skates, for example). And the bait fishery quota in Alternative 4 will reduce the number of trips landing skates for the bait market, but it is difficult to forecast which trips would not be taken (and associated catch would not be landed) under quota management.

This section is followed in Section 8.3.1 by a summary of the probably effects that individual measures will have on skate catches or landings, and on the skate fishery (i.e. trips landing skates).

8.3.3.1 Alternatives 1A and 1B

In addition to the measures that apply to all alternatives, Alternatives 1A and 1B include time area closures and skate possession limits to reduce landings and skate mortality. Since the skate management areas include areas with high CPUE of winter skate, some mortality reduction (-15.1%) for the skate wing fishery is expected and the wing fishery possession limit can be higher than the other alternatives. .It is therefore unclear whether these alternatives would reduce mortality on overfished skates more than other alternatives that do not include time/area closures.

Not including shifts of effort to other species or fishing areas, the analysis indicates that Alternatives 1A and 1B would reduce effort by 9.5% in the whole/bait fishery and 16% in the wing fishery (Table 97) with allocation option 1 and by 2.6 and 18.6% respectively with allocation option 2 (Table 103). These predicted effort reductions are somewhat less than those for Alternatives 2, 3A, and 3B because more skate mortality reduction is achieved via the time/area closures, which shift effort to lower CPUE areas rather than shorten trips that target skates via a lower possession limit.

Total revenue from trips landing skates is estimated to decline by 10% in the whole/bait fishery and 17% in the skate wing fishery for allocation option 1 and by 3% and 17% respectively for allocation option 2. The estimated revenue losses in the whole/bait fishery are estimated to be about the same as that for Alternatives 2, 3A, and 3B, but the revenue losses for the wing fishery in Alternatives 1A and 1B are somewhat less than the other alternatives that do not include time/area closures. This is expected because trips that target larger skates for the wing market would shift effort to adjacent areas that remain open, making up the potential revenue loss through the catch of other species (primarily flounders) whose landings are estimated to decline less for Alternatives 1A and 1B than with the other alternatives.

With allocation option 1, the landings (on trips landing skates) of flounders, monkfish, and other groundfish species are estimated to decline by 3-9% in the whole/bait fishery and by 5-18% in the skate wing fishery (Table 97). With less of the TAL going to the wing fishery in allocation option 2, the reduction in landings of other species ranges from 6-20%.

Excluding the effects of the Category B DAS prohibition (Section 5.2.3) which applies only to vessels using gillnets and fishing on a Multispecies DAS, most of the effects of time/area closures and skate possession limits in Alternatives 1A and 1B would be experienced by vessels using trawls to fish for skates (Table 98 and Table 104). This result occurs because possession limits tend to affect longer trips landings higher amounts of skates on a trip. Vessels using trawls and landing skates (Table 99) tend to be larger vessels and take longer trips (1.45 DA/trip for trawl vessels vs. 0.57 DA/trip for a gillnet vessel in the wing fishery), presumably having higher skate landings. Moreover, the trips and vessels affected by possession limits and the time/area closures tend to be larger vessels taking longer trips (1.63 DA in the whole/bait fishery and 3.25 DA in the wing fishery) for both gear types.

Vessels using gillnets to land skates (Table 101 and Table 107) would experience fewer effects than vessels using trawls, presumably because they take shorter trips, have lower skate landings per trip, and do not fish as frequently in the skate management areas (Figure 35) as do vessels using trawls (Figure 34).

Vessels landing skates in New Bedford and Chatham MA would be more affected by Alternatives 1A and 1B than vessels landing skates in other ports, such as Point Judith RI because of their close proximity to the proposed skate management areas.

Even thought the areas that had higher CPUE were included in the proposed skate management areas, there are a substantial number of trips, landing skates in either MA or RI, that fished in the remaining open areas and landed more than the proposed possession limits (Figure 45 and Figure 46).

8.3.3.2 Alternatives 2, 3A and 3B

Time/area closures for vessels landing more than 500 lbs. of skates are not included in Alternatives 2, 3A, and 3B, except as an accountability measure in Alternative 2. As a result, the estimated effort reduction is marginally greater than Alternatives 1A and 1B (Table 97 and Table 103), due to the effect that lower skate possession limits would have on trip length. Associated with a change in trip length, the effects on revenue derived from the landings of species other than skates is also greater, as is losses in total and net revenue. Particularly for these alternatives, the reduction in skate landings and revenue is greater than the target reduction in landings, which is a natural outcome of accounting for the added discards caused by a lower possession limit. Skate fishing effort in this case would not shift out of the skate management areas to adjacent areas where skates are relatively abundant, but may shift to skate fishing areas closer to port or become more concentrated in areas where skates can be caught more quickly (i.e. in areas with higher CPUE), to compensate for a shorter trip length.

Like Alternatives 1A and 1B, the relative effect of the lower skate possession limits are estimated to have greater effects on vessels using trawls than on vessels using gillnets (Table 98 and Table 104). It does not appear that the skate possession limits for Alternatives 2, 3A, and 3B are so low that they would have much effect on vessel using gillnets on day trips.

Because the skate possession limits are lower for these alternatives than Alternatives 1A, 1B, or 4, they would affect more trips in all areas (Figure 45 and Figure 46). It also appears that more mixed species trips (targeting skates, yellowtail flounder, and monkfish) would be affected, particularly trips fishing on the northern edge of Georges Bank (Figure 45). A few more trips fishing off NY and NJ would be affected by this set of alternatives than for Alternatives 1A, 1B, and 4 (Figure 47), but only a small proportion of trips in this area would be affected by the skate possession limits in any of the alternatives.

8.3.3.3 Alternative 4

The estimated effects on effort, skate landings, landings of species other than skates, and revenue on trips that landed skates are exactly the same as Alternatives 1A and 1B for the skate wing fishery. The estimated effects on the whole/bait fishery include only the impacts of the time/area closures, because trips affected by a quota closure cannot be identified and have not been estimated. The impacts of the bait fishery quota would depend on the timing of a fishery closure and the responses by the fishery to an imminent closure. As long as the landings are accurately monitored and there are no loopholes to allow vessels to target small skates under skate wing fishery rules, then the effects on skate landings and skate revenue are expected to be equivalent to the other alternatives.

Allocation option 1 (2005-2007 basis)

Table 97. All vessels: Estimated changes in effort, landings, and revenue by alternative compared to effort, landings, and revenue from trip data derived from 2007 VTRs.

Fishery	Attribute	VTR effort, landings, and revenue	Change from status quo for landings and revenue		
		Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
Whole/ bait	**Effort (DA).**	**7,165**	**-9.5%**	**-9.9%**	**3.4%**
	Skate landings (live lbs.).	**19,940,586**	**-44.5%**	**-40.4%**	**4.6%**
	Additional skate discard mortality, lbs.	**NA**	**1,428,882**	**1,141,442**	**-**
	Skate revenue	**2,961,970**	**-40.4%**	**-37.0%**	**5.8%**
	Cod, haddock, and pollock landings (lbs.)	**3,218,333**	**-4.5%**	**-4.9%**	**2.2%**
	Flounder landings (lbs.)	**3,635,937**	**-7.2%**	**-8.4%**	**3.9%**
	Yellowtail flounder landings (lbs.)	**1,372,318**	**-8.9%**	**-8.1%**	**1.9%**
	Monkfish landings (lbs.)	**3,505,693**	**-3.0%**	**-3.2%**	**1.5%**
	Dogfish landings (lbs.)	**371230**	**-5.1%**	**-4.2%**	**0.4%**
	Other groundfish landings (lbs.)	**538,415**	**-1.4%**	**-1.6%**	**0.6%**
	Miscellaneous landings (lbs.)	**906,946**	**-8.5%**	**-7.7%**	**1.2%**
	Total revenue	**25,649,879**	**-10.3%**	**-10.3%**	**3.0%**
	Net revenue	**22,001,756**	**-9.0%**	**-8.5%**	**2.1%**
Wings	**Effort (DA).**	**7,349**	**-16.0%**	**-20.1%**	**-16.0%**
	Skate landings (live	**15,455,388**	**-40.9%**	**-50.0%**	**-40.9%**

Fishery	Attribute	VTR effort, landings, and revenue Status quo	Change from status quo for landings and revenue Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
	lbs.).				
	Additional skate discard mortality, lbs.	**NA**	**785,249**	**1,455,561**	**785,249**
	Total skate revenue	**3,722,501**	**-40.9%**	**-51.1%**	**-40.9%**
	Cod, haddock, and pollock landings (lbs.)	**4,640,849**	**-12.6%**	**-17.6%**	**-12.6%**
	Flounder landings (lbs.)	**3,561,876**	**-17.8%**	**-20.0%**	**-17.8%**
	Yellowtail flounder landings (lbs.)	**1,388,050**	**-14.9%**	**-25.3%**	**-14.9%**
	Monkfish landings (lbs.)	**3,469,338**	**-6.4%**	**-8.3%**	**-6.4%**
	Dogfish landings (lbs.)	**255,731**	**-7.8%**	**-7.6%**	**-7.8%**
	Other groundfish landings (lbs.)	**1,059,538**	**-4.8%**	**-7.2%**	**-4.8%**
	Miscellaneous landings (lbs.)	**1,503,374**	**-6.1%**	**-7.7%**	**-6.1%**
	Total revenue	**29,090,611**	**-16.9%**	**-22.1%**	**-16.9%**
	Net revenue	**24,882,799**	**-13.5%**	**-17.8%**	**-13.5%**

Table 98. All vessels: Effort and average vessel characteristics for vessels affected by each alternative compared to data derived from the 2007 VTRs.

		VTR effort, landings, and revenue	Change from status quo for landings and revenue		
Fishery	Vessel characteristic	Status quo	Alternative 1a and 1b	Status quo	Alternative 1a and 1b
Whole/ bait	**Number of trips**	**5,965**	**1,007**	**786**	**252**
	Number of vessels	**398**	**92**	**67**	**47**
	Effort (DA)	**7,165**	**1,481**	**824**	**1,112**
	Average crew	**2.5**	**3.2**	**3.1**	**3.8**
	Average GRT	**51**	**83**	**83**	**84**
	Average hold capacity, lbs.	**54,260**	**94,847**	**95,030**	**102,215**
	Average horsepower	**386**	**449**	**438**	**471**
	Average vessel length (ft)	**52**	**63**	**64**	**60**
Wings	**Number of trips**	**5,437**	**845**	**766**	**845**
	Number of vessels	**321**	**82**	**105**	**82**
	Effort (DA)	**7,345**	**1,143**	**1,070**	**1,143**
	Average crew	**2.6**	**3.7**	**3.8**	**3.7**
	Average GRT	**48**	**63**	**73**	**63**
	Average hold capacity, lbs.	**54,987**	**79,609**	**90,392**	**79,609**
	Average horsepower	**400**	**429**	**453**	**429**
	Average vessel length (ft)	**50**	**53**	**57**	**53**

Table 99. Vessels fishing with trawls: Estimated changes in effort, landings, and revenue by alternative compared to effort, landings, and revenue from trip data derived from 2007 VTRs.

		VTR effort, landings, and revenue	Change from status quo for landings and revenue		
Fishery	Attribute	Status quo	Alternative 1a and 1b	Status quo	Alternative 1a and 1b
Whole/ bait	Effort (DA).	5,793	-8.4%	-8.6%	2.7%
	Skate landings (live lbs.).	15,825,436	-36.0%	-31.8%	1.4%
	Additional skate discard mortality, lbs.	NA	1,158,015	945,991	-
	Skate revenue	$1,886,949	-26.3%	-22.9%	0.9%
	Cod, haddock, and pollock landings (lbs.)	3,004,118	2.2%	1.8%	8.8%
	Flounder landings (lbs.)	3,585,293	-7.2%	-8.4%	3.9%
	Yellowtail flounder landings (lbs.)	1,353,136	-8.9%	-8.1%	1.9%
	Monkfish landings (lbs.)	710,712	-1.9%	-1.8%	0.5%
	Dogfish landings (lbs.)	128,229	-4.2%	-3.3%	0.0%
	Other groundfish landings (lbs.)	528,868	-1.4%	-1.6%	0.6%
	Miscellaneous landings (lbs.)	827,086	-8.2%	-7.4%	1.0%
	Total revenue	20,065,371	-8.5%	-8.3%	2.2%
	Net revenue	17,232,472	-7.0%	-6.5%	1.3%
Wings	Effort (DA).	5,783	-14.2%	-18.4%	-14.2%
	Skate landings (live lbs.).	8,227,917	-25.2%	-32.0%	-25.2%

Fishery	Attribute	VTR effort, landings, and revenue Status quo	Change from status quo for landings and revenue Alternative 1a and 1b	Status quo	Alternative 1a and 1b
	Additional skate discard mortality, lbs.	**NA**	**659,595**	**977,479**	**659,595**
	Total skate revenue	**$2,088,264**	**-26.0%**	**-33.4%**	**-26.0%**
	Cod, haddock, and pollock landings (lbs.)	**4,029,236**	**-12.1%**	**-17.5%**	**-12.1%**
	Flounder landings (lbs.)	**3,530,263**	**-17.8%**	**-20.0%**	**-17.8%**
	Yellowtail flounder landings (lbs.)	**1,365,007**	**-14.9%**	**-25.3%**	**-14.9%**
	Monkfish landings (lbs.)	**886,300**	**-3.6%**	**-5.6%**	**-3.6%**
	Dogfish landings (lbs.)	**86,294**	**0.0%**	**-0.1%**	**0.0%**
	Other groundfish landings (lbs.)	**975,034**	**-4.8%**	**-7.2%**	**-4.8%**
	Miscellaneous landings (lbs.)	**1,382,362**	**-97.2%**	**-99.2%**	**-97.2%**
	Total revenue	**22,558,569**	**-14.3%**	**-19.3%**	**-14.3%**
	Net revenue	**19,241,200**	**-10.6%**	**-14.7%**	**-10.6%**

Table 100. Vessels fishing with trawls: Effort and average vessel characteristics for vessels affected by each alternative compared to data derived from the 2007 VTRs.

		Total	Affected by proposed limits on fishing and landing skates		
Fishery	Vessel characteristic	Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
Whole/ bait	**Number of trips**	**3,678**	**808**	**649**	**112**
	Number of vessels	**261**	**68**	**53**	**31**
	Effort (DA)	**5,035**	**1,315**	**746**	**892**
	Average crew	**2.4**	**3.0**	**3.0**	**3.9**
	Average GRT	**70**	**93**	**91**	**139**
	Average hold capacity, lbs.	**75,897**	**103,778**	**101,458**	**153,064**
	Average horsepower	**408**	**479**	**461**	**658**
	Average vessel length (ft)	**59**	**67**	**67**	**76**
Wings	**Number of trips**	**2,945**	**297**	**334**	**297**
	Number of vessels	**193**	**59**	**68**	**59**
	Effort (DA)	**4,256**	**965**	**923**	**965**
	Average crew	**2.5**	**4.3**	**4.2**	**4.3**
	Average GRT	**70**	**138**	**137**	**138**
	Average hold capacity, lbs.	**81,354**	**159,825**	**155,528**	**159,825**
	Average horsepower	**427**	**616**	**597**	**616**
	Average vessel length (ft)	**58**	**76**	**76**	**76**

Table 101. Vessels fishing with gillnets: Estimated changes in effort, landings, and revenue by alternative compared to effort, landings, and revenue from trip data derived from 2007 VTRs.

		VTR effort, landings, and revenue	Change from status quo for landings and revenue		
Fishery	Attribute	Status quo	Alternative 1a and 1b	Status quo	Alternative 1a and 1b
Whole/ bait	**Effort (DA).**	**1,372**	**-1.0%**	**-1.2%**	**0.7%**
	Skate landings (live lbs.).	**4,115,150**	**-8.5%**	**-8.6%**	**3.2%**
	Additional skate discard mortality, lbs.	**NA**	**270,867**	**195,451**	**-**
	Skate revenue	**1,075,021**	**-14.1%**	**-14.2%**	**5.0%**
	Cod, haddock, and pollock landings (lbs.)	**214,215**	**-6.7%**	**-6.7%**	**-6.6%**
	Flounder landings (lbs.)	**50,644**	**0.0%**	**0.0%**	**0.0%**
	Yellowtail flounder landings (lbs.)	**19,182**	**0.0%**	**0.0%**	**0.0%**
	Monkfish landings (lbs.)	**2,794,981**	**-1.1%**	**-1.3%**	**1.0%**
	Dogfish landings (lbs.)	**243,001**	**-0.9%**	**-0.9%**	**0.4%**
	Other groundfish landings (lbs.)	**9,547**	**0.0%**	**0.0%**	**0.0%**
	Miscellaneous landings (lbs.)	**79,860**	**-0.2%**	**-0.3%**	**0.2%**
	Total revenue	**5,584,508**	**-1.9%**	**-1.9%**	**0.8%**
	Net revenue	**4,769,284**	**-2.0%**	**-2.1%**	**0.8%**
Wings	**Effort (DA).**	**1,566**	**-1.8%**	**-1.7%**	**-1.8%**
	Skate landings (live lbs.).	**7,227,471**	**-15.7%**	**-18.1%**	**-15.7%**

Fishery	Attribute	VTR effort, landings, and revenue	Change from status quo for landings and revenue		
		Status quo	Alternative 1a and 1b	Status quo	Alternative 1a and 1b
	Additional skate discard mortality, lbs.	**NA**	**125,654**	**478,083**	**125,654**
	Total skate revenue	**1,684,198**	**-14.9%**	**-17.7%**	**-14.9%**
	Cod, haddock, and pollock landings (lbs.)	**611,613**	**-0.6%**	**-0.1%**	**-0.6%**
	Flounder landings (lbs.)	**31,613**	**0.0%**	**0.0%**	**0.0%**
	Yellowtail flounder landings (lbs.)	**23,043**	**0.0%**	**0.0%**	**0.0%**
	Monkfish landings (lbs.)	**2,583,038**	**-2.8%**	**-2.7%**	**-2.8%**
	Dogfish landings (lbs.)	**169,437**	**-7.7%**	**-7.5%**	**-7.7%**
	Other groundfish landings (lbs.)	**84,504**	**0.0%**	**0.0%**	**0.0%**
	Miscellaneous landings (lbs.)	**121,012**	**-8.8%**	**-8.5%**	**-8.8%**
	Total revenue	**6,532,042**	**-2.6%**	**-2.8%**	**-2.6%**
	Net revenue	**5,641,599**	**-2.9%**	**-3.1%**	**-2.9%**

Table 102. Vessels fishing with gillnets: Effort and average vessel characteristics for vessels affected by each alternative compared to data derived from the 2007 VTRs.

		Total	Affected by proposed limits on fishing and landing skates		
Fishery	Vessel characteristic	Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
Whole/ bait	**Number of trips**	**2,287**	**199**	**137**	**140**
	Number of vessels	**141**	**24**	**14**	**16**
	Effort (DA)	**1,420**	**166**	**78**	**220**
	Average crew	**2.6**	**3.7**	**3.8**	**3.7**
	Average GRT	**22**	**40**	**43**	**41**
	Average hold capacity, lbs.	**19,463**	**58,584**	**64,577**	**61,536**
	Average horsepower	**351**	**330**	**329**	**321**
	Average vessel length (ft)	**41**	**48**	**49**	**47**
Wings	**Number of trips**	**2,492**	**548**	**432**	**548**
	Number of vessels	**129**	**23**	**37**	**23**
	Effort (DA)	**1,419**	**178**	**147**	**178**
	Average crew	**2.7**	**3.3**	**3.4**	**3.3**
	Average GRT	**22**	**22**	**24**	**22**
	Average hold capacity, lbs.	**23,827**	**36,135**	**40,033**	**36,135**
	Average horsepower	**369**	**327**	**341**	**327**
	Average vessel length (ft)	**42**	**41**	**41**	**41**

Allocation option 2 (1996-2006 basis)

Table 103. **All vessels: Estimated changes in effort, landings, and revenue by alternative compared to effort, landings, and revenue from trip data derived from 2007 VTRs.**

		Total effort, landings, and revenue	Change from status quo for landings and revenue		
Fishery	Attribute	Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
Whole/ bait	**Effort (DA).**	**7,165**	**-2.6%**	**-4.0%**	**3.4%**
	Skate landings (live lbs.).	**19,940,586**	**-24.2%**	**-21.5%**	**4.6%**
	Additional skate discard mortality, lbs.	**NA**	**683,687**	**487,408**	**-**
	Skate revenue	**2,961,970**	**-20.9%**	**-19.4%**	**5.8%**
	Cod, haddock, and pollock landings (lbs.)	**3,218,333**	**-0.6%**	**-1.7%**	**2.2%**
	Flounder landings (lbs.)	**3,635,937**	**-0.6%**	**-2.8%**	**3.9%**
	Yellowtail flounder landings (lbs.)	**1,372,318**	**-2.1%**	**-2.5%**	**1.9%**
	Monkfish landings (lbs.)	**3,505,693**	**-0.3%**	**-1.0%**	**1.5%**
	Dogfish landings (lbs.)	**371230**	**-1.7%**	**-1.2%**	**0.4%**
	Other groundfish landings (lbs.)	**538,415**	**-0.1%**	**-0.5%**	**0.6%**
	Miscellaneous landings (lbs.)	**906,946**	**-3.5%**	**-3.3%**	**1.2%**
	Total revenue	**25,649,879**	**-3.4%**	**-4.3%**	**3.0%**
	Net revenue	**22,001,756**	**-3.3%**	**-3.7%**	**2.1%**
Wings	**Effort (DA).**	**7,349**	**-18.6%**	**-24.4%**	**-18.6%**

Fishery	Attribute	Total effort, landings, and revenue	Change from status quo for landings and revenue		
		Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
	Skate landings (live lbs.).	**15,455,388**	**-46.9%**	**-57.4%**	**-46.9%**
	Additional skate discard mortality, lbs.	**NA**	**1,035,740**	**1,745,892**	**1,035,740**
	Total skate revenue	**3,722,501**	**-47.0%**	**-58.4%**	**-47.0%**
	Cod, haddock, and pollock landings (lbs.)	**4,640,849**	**-15.1%**	**-22.1%**	**-15.1%**
	Flounder landings (lbs.)	**3,561,876**	**-20.4%**	**-24.2%**	**-20.4%**
	Yellowtail flounder landings (lbs.)	**1,388,050**	**-18.6%**	**-31.3%**	**-18.6%**
	Monkfish landings (lbs.)	**3,469,338**	**-7.6%**	**-10.9%**	**-7.6%**
	Dogfish landings (lbs.)	**255,731**	**-9.1%**	**-10.3%**	**-9.1%**
	Other groundfish landings (lbs.)	**1,059,538**	**-5.7%**	**-10.2%**	**-5.7%**
	Miscellaneous landings (lbs.)	**1,503,374**	**-7.1%**	**-9.4%**	**-7.1%**
	Total revenue	**29,090,611**	**-19.9%**	**-26.8%**	**-19.9%**
	Net revenue	**24,882,799**	**-15.9%**	**-21.6%**	**-15.9%**

Table 104. **All vessels: Effort and average vessel characteristics for vessels affected by each alternative compared to data derived from the 2007 VTRs.**

		Total	Affected by proposed limits on fishing and landing skates		
Fishery	Vessel characteristic	Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
Whole/ bait	**Number of trips**	**5,965**	**697**	**477**	**252**
	Number of vessels	**398**	**65**	**43**	**47**
	Effort (DA)	**7,165**	**1,490**	**678**	**1,112**
	Average crew	**2.5**	**3.3**	**3.2**	**3.8**
	Average GRT	**51**	**87**	**86**	**84**
	Average hold capacity, lbs.	**54,260**	**99,543**	**98,217**	**102,215**
	Average horsepower	**386**	**453**	**430**	**471**
	Average vessel length (ft)	**52**	**64**	**64**	**60**
Wings	**Number of trips**	**5,437**	**901**	**907**	**901**
	Number of vessels	**321**	**92**	**120**	**92**
	Effort (DA)	**7,345**	**1,155**	**1,157**	**1,155**
	Average crew	**2.6**	**3.7**	**3.7**	**3.7**
	Average GRT	**48**	**64**	**72**	**64**
	Average hold capacity, lbs.	**54,987**	**80,513**	**88,775**	**80,513**
	Average horsepower	**400**	**432**	**454**	**432**
	Average vessel length (ft)	**50**	**54**	**56**	**54**

Table 105. **<u>Vessels fishing with trawls</u>: Estimated changes in effort, landings, and revenue by alternative compared to effort, landings, and revenue from trip data derived from 2007 VTRs.**

		Total effort, landings, and revenue	Change from status quo for landings and revenue		
Fishery	Attribute	Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
Whole/ bait	**Effort (DA).**	**5,793**	**-2.3%**	**-3.4%**	**2.7%**
	Skate landings (live lbs.).	**15,825,436**	**-19.8%**	**-16.4%**	**1.4%**
	Additional skate discard mortality, lbs.	**NA**	**573,260**	**422,196**	**-**
	Skate revenue	**$1,886,949**	**-13.8%**	**-11.1%**	**0.9%**
	Cod, haddock, and pollock landings (lbs.)	**3,004,118**	**6.0%**	**5.0%**	**7.8%**
	Flounder landings (lbs.)	**3,585,293**	**-0.6%**	**-2.8%**	**3.9%**
	Yellowtail flounder landings (lbs.)	**1,353,136**	**-2.1%**	**-2.5%**	**1.9%**
	Monkfish landings (lbs.)	**710,712**	**-0.5%**	**-0.6%**	**0.5%**
	Dogfish landings (lbs.)	**128,229**	**-1.4%**	**-0.8%**	**0.0%**
	Other groundfish landings (lbs.)	**528,868**	**-0.1%**	**-0.5%**	**0.6%**
	Miscellaneous landings (lbs.)	**827,086**	**-3.5%**	**-3.2%**	**1.0%**
	Total revenue	**20,065,371**	**-2.6%**	**-3.3%**	**2.2%**
	Net revenue	**17,232,472**	**-2.5%**	**-2.6%**	**1.3%**
Wings	**Effort (DA).**	**5,783**	**-16.5%**	**-22.1%**	**-16.5%**
	Skate landings (live lbs.).	**8,227,917**	**-28.5%**	**-35.2%**	**-28.5%**

Fishery	Attribute	Total effort, landings, and revenue	Change from status quo for landings and revenue		
		Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
	Additional skate discard mortality, lbs.	**NA**	**791,387**	**1,098,637**	**791,387**
	Total skate revenue	**$2,088,264**	**-29.4%**	**-36.8%**	**-29.4%**
	Cod, haddock, and pollock landings (lbs.)	**4,029,236**	**-14.5%**	**-21.9%**	**-14.5%**
	Flounder landings (lbs.)	**3,530,263**	**-20.3%**	**-24.2%**	**-20.3%**
	Yellowtail flounder landings (lbs.)	**1,365,007**	**-18.6%**	**-31.3%**	**-18.6%**
	Monkfish landings (lbs.)	**886,300**	**-4.4%**	**-6.9%**	**-4.4%**
	Dogfish landings (lbs.)	**86,294**	**-0.1%**	**-0.4%**	**-0.1%**
	Other groundfish landings (lbs.)	**975,034**	**-5.7%**	**-10.2%**	**-5.7%**
	Miscellaneous landings (lbs.)	**1,382,362**	**1.8%**	**-0.7%**	**1.8%**
	Total revenue	**22,558,569**	**-16.8%**	**-23.2%**	**-16.8%**
	Net revenue	**19,241,200**	**-12.5%**	**-17.7%**	**-12.5%**

Table 106. **<u>Vessels fishing with trawls</u>: Effort and average vessel characteristics for vessels affected by each alternative compared to data derived from the 2007 VTRs.**

		Total	Affected by proposed limits on fishing and landing skates		
Fishery	Vessel characteristic	Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
Whole/ bait	**Number of trips**	**3,678**	**532**	**384**	**112**
	Number of vessels	**261**	**49**	**35**	**31**
	Effort (DA)	**5,035**	**1,305**	**610**	**892**
	Average crew	**2.4**	**3.2**	**3.1**	**3.9**
	Average GRT	**70**	**101**	**95**	**139**
	Average hold capacity, lbs.	**75,897**	**111,362**	**105,103**	**153,064**
	Average horsepower	**408**	**494**	**457**	**658**
	Average vessel length (ft)	**59**	**69**	**68**	**76**
Wings	**Number of trips**	**2,945**	**327**	**390**	**327**
	Number of vessels	**193**	**65**	**79**	**65**
	Effort (DA)	**4,256**	**979**	**992**	**979**
	Average crew	**2.5**	**4.3**	**4.2**	**4.3**
	Average GRT	**70**	**138**	**137**	**138**
	Average hold capacity, lbs.	**81,354**	**157,991**	**155,661**	**157,991**
	Average horsepower	**427**	**614**	**604**	**614**
	Average vessel length (ft)	**58**	**76**	**76**	**76**

Table 107. **Vessels fishing with gillnets: Estimated changes in effort, landings, and revenue by alternative compared to effort, landings, and revenue from trip data derived from 2007 VTRs.**

Fishery	Attribute	Total effort, landings, and revenue	Change from status quo for landings and revenue		
		Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
Whole/ bait	**Effort (DA).**	**1,372**	**-0.3%**	**-0.7%**	**0.7%**
	Skate landings (live lbs.).	**4,115,150**	**-4.4%**	**-5.2%**	**3.2%**
	Additional skate discard mortality, lbs.	**NA**	**110,428**	**65,213**	**-**
	Skate revenue	**1,075,021**	**-7.1%**	**-8.3%**	**5.0%**
	Cod, haddock, and pollock landings (lbs.)	**214,215**	**-6.6%**	**-6.7%**	**-6.6%**
	Flounder landings (lbs.)	**50,644**	**0.0%**	**0.0%**	**0.0%**
	Yellowtail flounder landings (lbs.)	**19,182**	**0.0%**	**0.0%**	**0.0%**
	Monkfish landings (lbs.)	**2,794,981**	**0.2%**	**-0.4%**	**1.0%**
	Dogfish landings (lbs.)	**243,001**	**-0.3%**	**-0.4%**	**0.4%**
	Other groundfish landings (lbs.)	**9,547**	**0.0%**	**0.0%**	**0.0%**
	Miscellaneous landings (lbs.)	**79,860**	**0.0%**	**-0.1%**	**0.2%**
	Total revenue	**5,584,508**	**-0.8%**	**-1.1%**	**0.8%**
	Net revenue	**4,769,284**	**-0.9%**	**-1.1%**	**0.8%**
Wings	**Effort (DA).**	**1,566**	**-2.1%**	**-2.3%**	**-2.1%**
	Skate landings (live	**7,227,471**	**-18.4%**	**-22.2%**	**-18.4%**

Fishery	Attribute	Total effort, landings, and revenue	Change from status quo for landings and revenue		
		Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
	lbs.).				
	Additional skate discard mortality, lbs.	NA	244,353	647,255	244,353
	Total skate revenue	1,684,198	-17.6%	-21.6%	-17.6%
	Cod, haddock, and pollock landings (lbs.)	611,613	-0.6%	-0.2%	-0.6%
	Flounder landings (lbs.)	31,613	0.0%	0.0%	0.0%
	Yellowtail flounder landings (lbs.)	23,043	0.0%	0.0%	0.0%
	Monkfish landings (lbs.)	2,583,038	-3.3%	-4.0%	-3.3%
	Dogfish landings (lbs.)	169,437	-9.0%	-10.0%	-9.0%
	Other groundfish landings (lbs.)	84,504	0.0%	0.0%	0.0%
	Miscellaneous landings (lbs.)	121,012	-8.9%	-8.7%	-8.9%
	Total revenue	6,532,042	-3.1%	-3.6%	-3.1%
	Net revenue	5,641,599	-3.4%	-3.9%	-3.4%

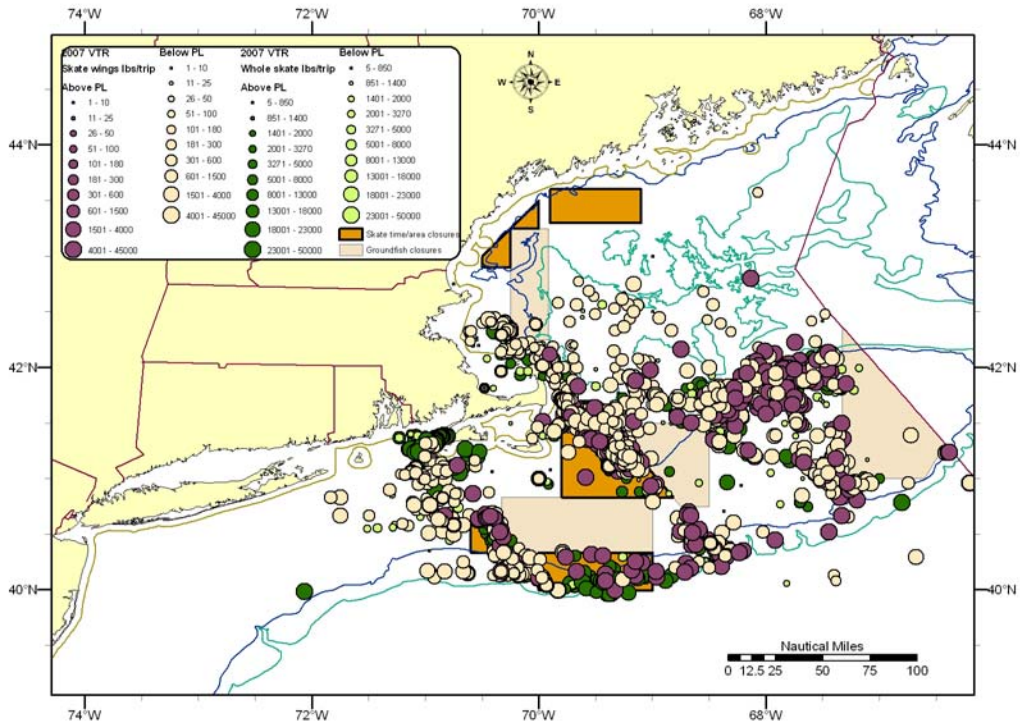
Table 108. **Vessels fishing with gillnets: Effort and average vessel characteristics for vessels affected by each alternative compared to data derived from the 2007 VTRs.**

		Total	Affected by proposed limits on fishing and landing skates		
Fishery	Vessel characteristic	Status quo	Alternative 1a and 1b	Alternative 2, 3a, and 3b	Alternative 4
Whole/ bait	**Number of trips**	**2,287**	**165**	**93**	**140**
	Number of vessels	**141**	**16**	**8**	**16**
	Effort (DA)	**1,420**	**184**	**69**	**220**
	Average crew	**2.6**	**3.7**	**3.9**	**3.7**
	Average GRT	**22**	**41**	**47**	**41**
	Average hold capacity, lbs.	**19,463**	**61,436**	**69,785**	**61,536**
	Average horsepower	**351**	**321**	**318**	**321**
	Average vessel length (ft)	**41**	**48**	**49**	**47**
Wings	**Number of trips**	**2,492**	**574**	**517**	**574**
	Number of vessels	**129**	**27**	**41**	**27**
	Effort (DA)	**1,419**	**176**	**165**	**176**
	Average crew	**2.7**	**3.3**	**3.4**	**3.3**
	Average GRT	**22**	**22**	**23**	**22**
	Average hold capacity, lbs.	**23,827**	**36,375**	**38,319**	**36,375**
	Average horsepower	**369**	**329**	**341**	**329**
	Average vessel length (ft)	**42**	**41**	**41**	**41**

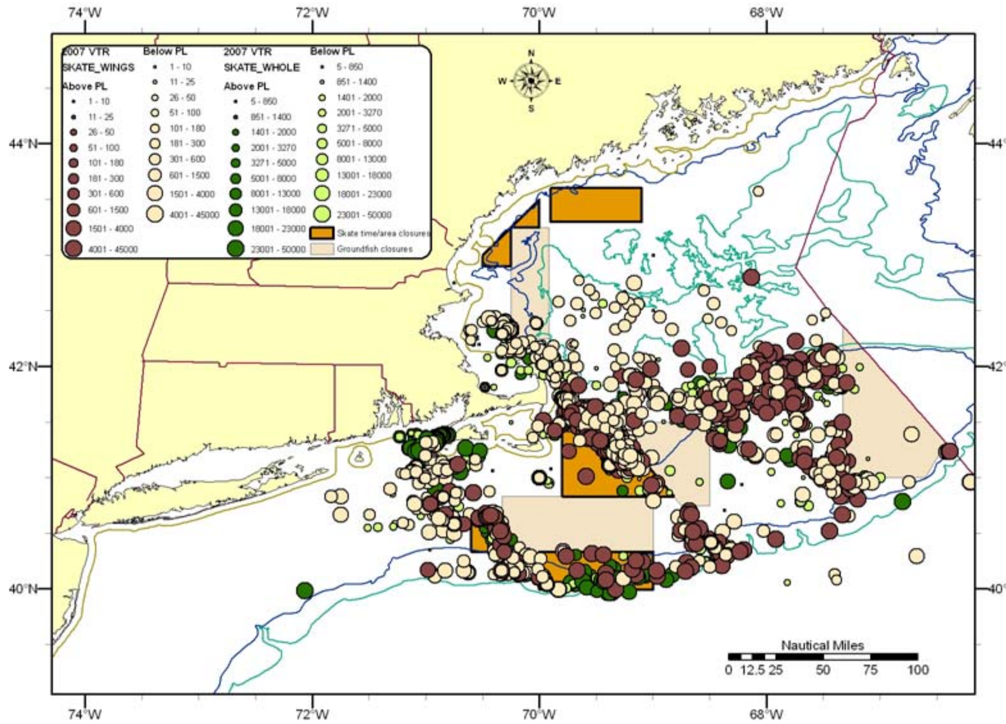
8.3.3.4 Impacts for major ports landing skates

Figure 45. **Reported location fished and whole/wing fishery skate landings in** Massachusetts **reported on 2007 Vessel Trip Reports compared to the proposed skate possession limits (categorized by color : dark green for whole skate, dark red for skate wing trips exceeding the proposed limits) and proposed skate time/area closures. The circle size represents the amount of skate landings per trip.**

- **Alternative 1a, 1b, and 4 (only wing possession limit and time/area closures)**
- **Allocation option 1 (2005-2007)**
- **4,000 lb. wing and 5,600 lb. whole skate possession limits**



- **Alternative 1a, 1b, and 4 (only wing possession limit and time/area closures)**
- **Allocation option 2 (1995-2006)**
- **3,300 lb. wing and 9,900 lb. whole skate possession limits**



- **Alternative 2, 3a and 3b (no time/area closures apply, except as an accountability measure)**
- **Allocation option 2 (1995-2006)**
- **1,500 lb. wing and 11,600 lb. whole skate possession limits**

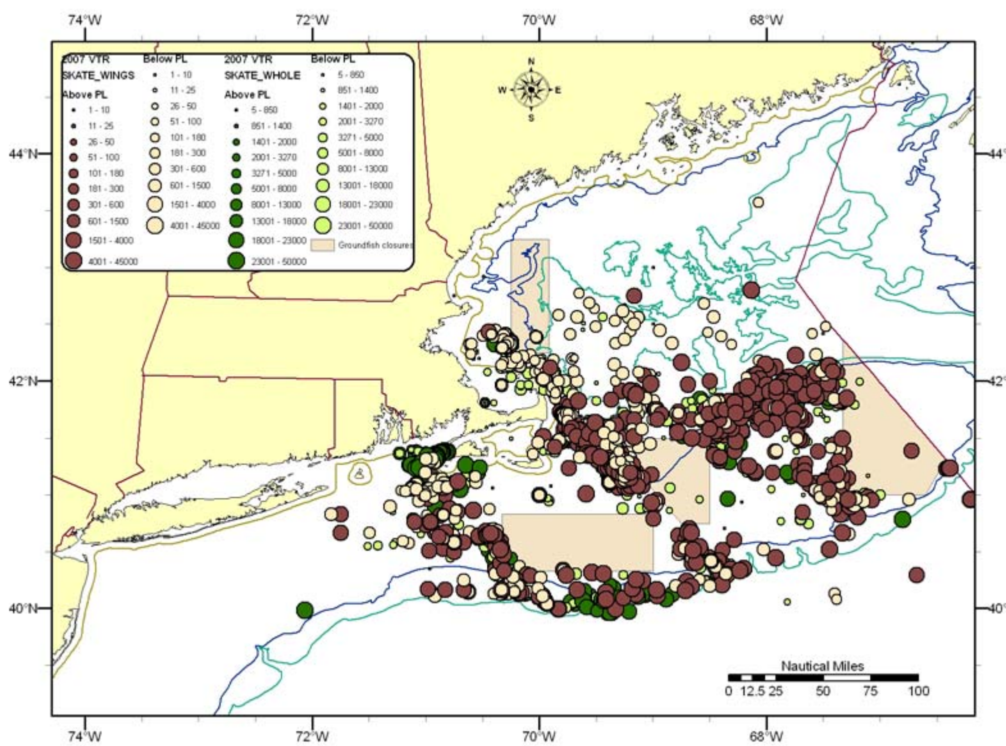
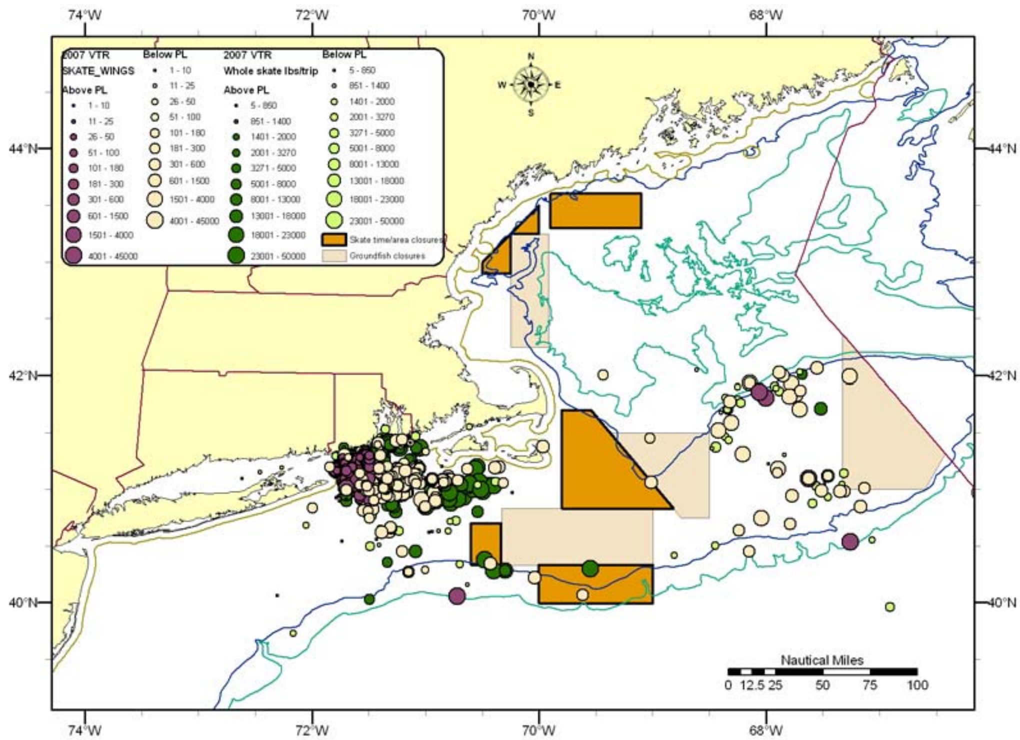
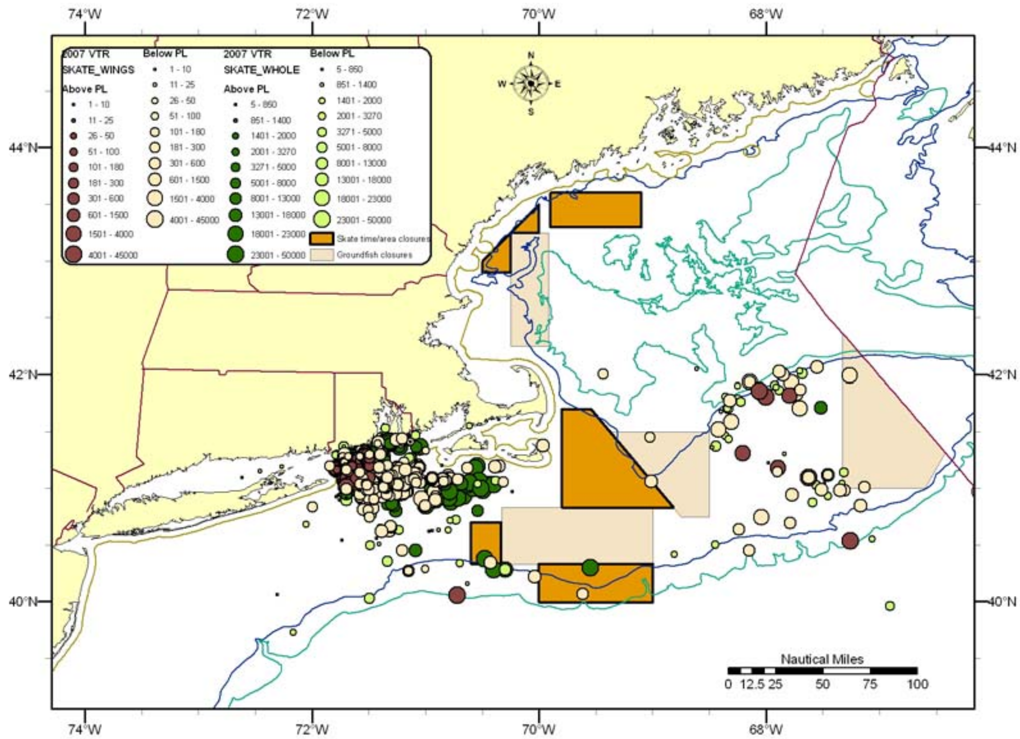


Figure 46. **Reported location fished and whole/wing fishery skate landings in** Rhode Island **reported on 2007 Vessel Trip Reports compared to the proposed skate possession limits (categorized by color : dark green for whole skate, dark red for skate wing trips exceeding the proposed limits) and proposed skate time/area closures. The circle size represents the amount of skate landings per trip.**

- **Alternative 1a, 1b, and 4 (only wing possession limit and time/area closures)**
- **Allocation option 1 (2005-2007)**
- **4,000 lb. wing and 5,600 lb. whole skate possession limits**



- **Alternative 1a, 1b, and 4 (only wing possession limit and time/area closures)**
- **Allocation option 2 (1995-2006)**
- **3,300 lb. wing and 9,900 lb. whole skate possession limits**



- **Alternative 2, 3a and 3b (no time/area closures apply, except as an accountability measure)**
- **Allocation option 2 (1995-2006)**
- **1,500 lb. wing and 11,600 lb. whole skate possession limits**

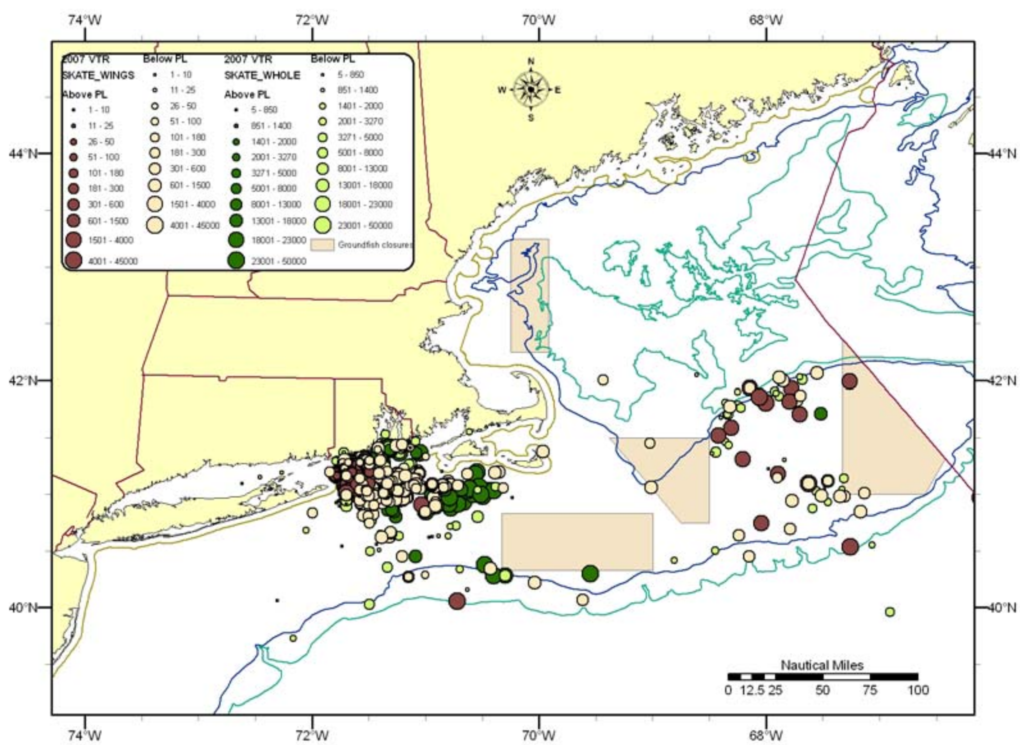
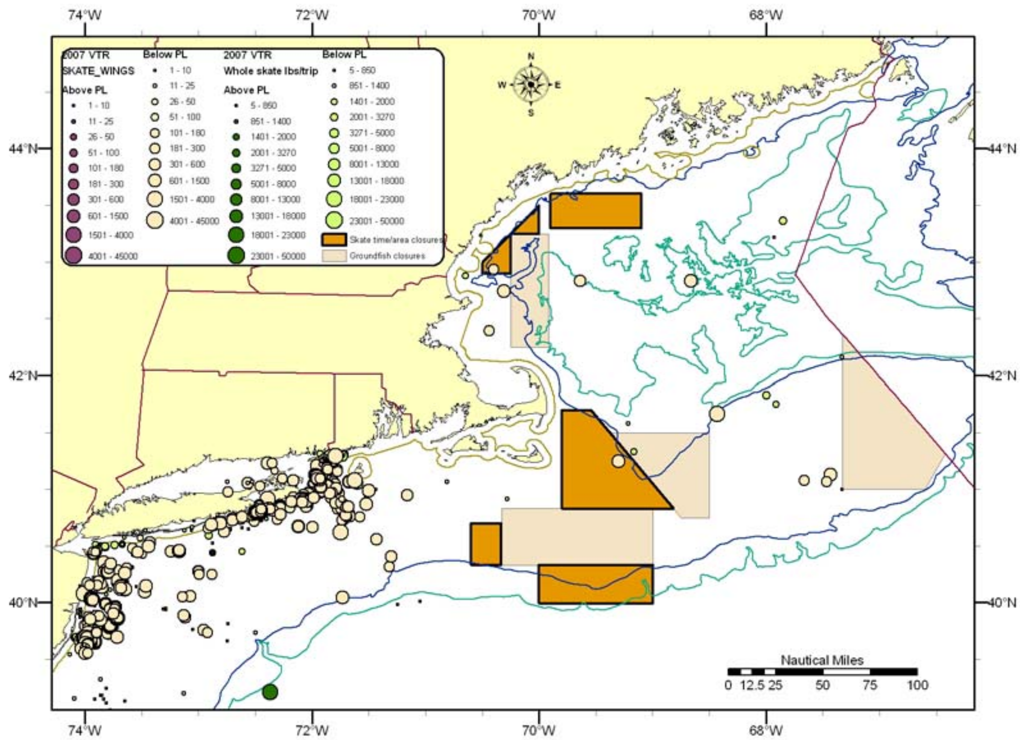
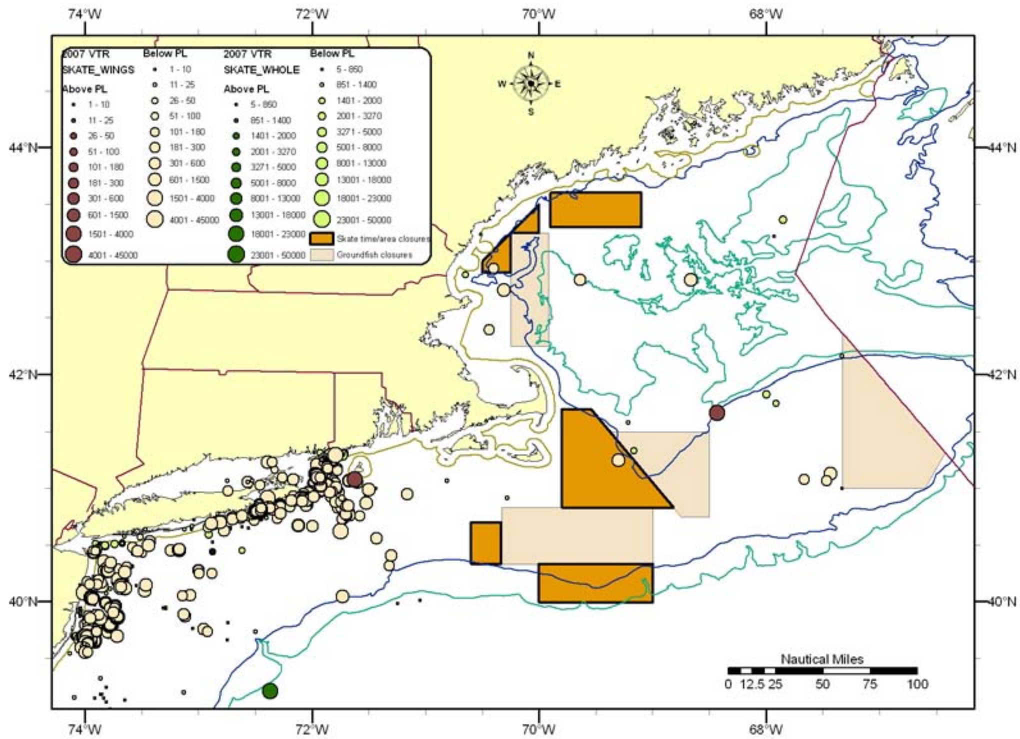


Figure 47. **Reported location fished and whole/wing fishery skate landings in states** <u>other than Massachusetts and Rhode Island</u> **reported on 2007 Vessel Trip Reports compared to the proposed skate possession limits (categorized by color : dark green for whole skate, dark red for skate wing trips exceeding the proposed limits) and proposed skate time/area closures. The circle size represents the amount of skate landings per trip.**

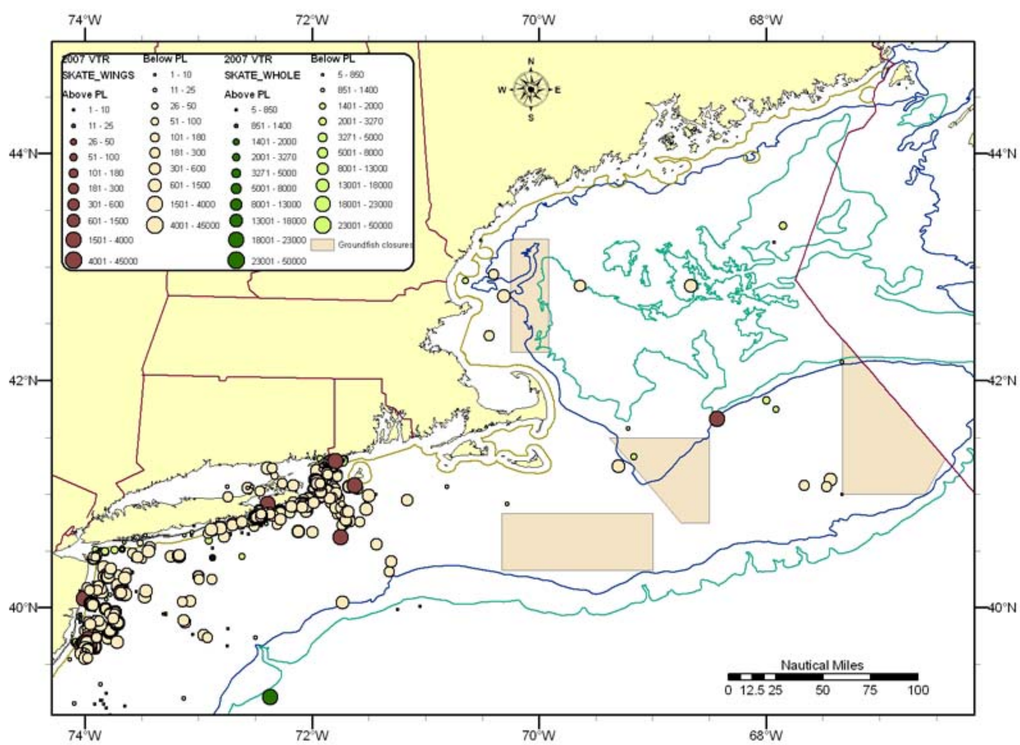
- **Alternative 1a, 1b, and 4 (only wing possession limit and time/area closures)**
- **Allocation option 1 (2005-2007)**
- **4,000 lb. wing and 5,600 lb. whole skate possession limits**



- **Alternative 1a, 1b, and 4 (only wing possession limit and time/area closures)**
- **Allocation option 2 (1995-2006)**
- **3,300 lb. wing and 9,900 lb. whole skate possession limits**



- **Alternative 2, 3a and 3b (no time/area closures apply, except as an accountability measure)**
- **Allocation option 2 (1995-2006)**
- **1,500 lb. wing and 11,600 lb. whole skate possession limits**



8.3.4 Impacts on other finfish and fisheries

8.3.4.1 Multispecies and monkfish fisheries

Part of the reason behind the recent increase in skate wing landings has been the more restrictive regulations in the groundfish and monkfish fisheries. And part of the intent of Amendment 3 is to scale back this recent increase in skate wing landings. Doing so with skate possession limits and time/area closures could make it relatively more costly to use DAS to fish for skates (particularly if differential DAS accounting comes into play).

As a result, once more restrictive skate regulations are in place, vessels may use more of their Multispecies DAS allocations to fish for traditional species than has occurred since 2005. Vessels may also redirect fishing effort into other areas (because of skate time/area closures or to fish closer to port) where groundfish and monkfish may be more (or less) abundant. When this occurs, the vessels may have a greater incidental catch of groundfish and/or monkfish, but this effect is impossible to quantify.

The final alternative (proposed action) includes lower TALs than anticipated in the DEIS and as a result, the skate possession limit may be reduced to discourage skate fishing earlier in the year than had been anticipated. Some skate bait fishermen may continue fishing for bait using the skate wing fishery possession limit and a DAS when the skate bait quotas are reached and the skate bait possession limit is reduced. But when the wing fishery reaches the TAL trigger and the skate wing possession limit is reduced, vessels may use the remaining days to fish for multispecies and monkfish, as allowed by regulations in those FMPs. The final alternative does not include skate time/area closures, which could have had an effect on multispecies and monkfish catches when vessels redirected fishing effort during a closure.

8.3.4.2 Scallops

Few, if any, scallop DAS are used to target or land skates. It is therefore unlikely that the proposed alternatives would effect scallops or effort directed on scallops. Some vessels with general category scallop permits land skates incidental to their scallop fishing, however. The skate landings apparently add value to the (up to 400 lbs.) of scallop landings allowed under general category rules. It is possible that reducing the allowable skate landings on a scallop trips will reduce profits, but it is unlikely to cause most trips to become unprofitable. On the other hand, Scallop Amendment 11 rules are intended to exclude vessels that do not qualify for general category scallop permits and effort may decline for trips that land an incidental amount of skates. Some vessels that do not qualify for a limited access general category scallop permit may turn to skate fishing in exempted areas to make up for their loss in the scallop fishery.

The final alternative (proposed action) does not include skate time/area closures and is therefore unlikely to effect the scallop fishery. Most scallop vessels do not land more skates than the 1135 lb. whole weight skate possession limit, so the proposed action is unlikely to change skate landings by vessels on a scallop DAS. Some general category vessels retain a mix of species to augment the landings of 400 lbs. of scallops, so the proposed action may have cause general category vessels to discard skates that they would otherwise have landed. The effect on their revenue is unlikely to change their fishing behavior and reduce skate discards.

8.3.4.3 Fisheries not regulated by DAS limits

Vessels unable to use DAS to fish for skates or loose skate revenue may target other species for which the vessel has a permit to possess and land. Since many vessels that fish for skates land in Southern New England, it is likely that some may target other species like summer flounder or squid to compensate for the lower revenue from skate fishing. This may be more of a factor for Alternative 4, which could cause the skate bait fishery to close for extended periods. In addition, the supply of skates for lobster bait will decline and other species (such as herring, mackerel, and menhaden) may be a suitable (but more costly) substitute, increasing demand for other species. Since the proposed action is a combination of Alternative 3B for the skate wing fishery and Alternative 4 for the bait fishery, the above discussion is a good qualitative approximation of the effects on other fisheries not regulated by DAS limits.

8.4 Discards (Bycatch) of Non-target Species

Bycatch of other fish and shellfish in the skate fishery have not been estimated, therefore the effects of the Amendment 3 management alternatives on finfish bycatch cannot be quantified. Changes in discarding of a target species (in this case one or more of the four species in the skate complex which may be landed) are often not difficult to predict using an economic behavior model. These estimates are provided in Section 8.3.1.10, with comparisons between alternatives.

Discards of non-target species (or species that may become targeted due to more restrictive skate regulations) are unpredictable, since in most cases they will depend on the individual behavior of skate fishermen in response to a plethora of internal and external factors. Discarding of non-target species is influenced by fish size and relative availability of the species to fishing operations, the processing capabilities of the vessel, gear selectivity, market prices, and other factors. Vessels may change fishing locations in response to more restrictive skate fishing regulations, moving to other areas where time/area closures (Section 5.2.5) prevent a vessel from fishing in a traditional location. Vessels may also make more frequent trips, fishing closer to port in response to lower skate possession limits (Section 5.2.6). Fishermen may also choose to target other species in areas where finfish bycatch is higher than in traditional skate fishing areas. Instead of targeting skates, a vessel might fish for summer flounder or yellowtail flounder which have size and possession limit regulations, for example. Skate fishermen may target other species if the skate fishery essentially closes to fishing when the TACs are met (Section 5.2.1.1), where or when finfish discards may be higher or lower than they are when fishing for skates.

Because changes in finfish discards due to the proposed skate alternatives is unpredictable, differences between alternatives cannot be explained with respect to their effects on finfish discards. Alternatives with lower skate possession limits (Alternatives 2, 3A, and 3B) may or may not have a greater effect on finfish discards than alternatives with time/area closures and higher skate possession limits (Alternatives 1A, 1B, 4). Moreover, the effect that a hard TAC accountability measure (Alternatives 1A and 3A) vs. a target TAC accountability measure (Alternatives 1B, 2, 3B, and 4) on finfish discards is anyone's guess, depending largely on how the programs are implemented and when closures will actually occur. One thing that either measure will assuredly do is increase skate discards. The Hard TAC approach (Section 5.2.1.3) would prohibit skate landings when the total skate landings approach or meet the TAC. The Target TAC approach (Section 5.2.1.4) would reduce the skate possession limit to a 500 lbs. skate whole weight incidental landings limit. Therefore by definition, the Hard TAC approach would increase skate discards more than the Target TAC approach, except the former trigger is based on total catch estimates while the latter is based on landings. As such, they might be triggered at different times of the year, which are difficult to predict.

8.4.1 Impacts from the final alternative/proposed action

In the final alternative (proposed action), the Council raised the incidental skate possession limit to 500 lbs. of skate wings or 1135 lbs of whole skates. This change will help to alleviate some of the concerns expressed above, although it may allow some vessels to continue targeting skates on day trips, particularly for the wing market if prices increase in response to lower domestic landings. At the same time, there is considerable uncertainty about the effects on discards of non-target species, particularly considering the effect of changing multispecies regulations. While skate fishing will undoubtedly decline and bycatch on skate fishing trips will likewise decline, vessels may use DAS to target other species. In that case, the catches of non-target species in the skate fishery could increase, either by becoming a targeted species or as bycatch in another fishery (yellowtail flounder in the monkfish fishery, for example). Fishermen may redirect fishing effort to different areas to target other species on their DAS trips, which may increase or decrease bycatch. It is impossible to quantify or even qualitatively evaluate these effects because fishermen may react to the lower skate TALs in many ways if they cannot target skates.

8.5 Impacts on Protected Species

8.5.1 Management Measures

As described in Section 7.5.1, the skate fishery is divided into two main components, the wing fishery and the whole-skate (primarily bait) fishery, and is prosecuted by bottom trawls and gillnets. While landings in the wing fishery are roughly evenly split between the two gear types, effort, measured in days absent, is more than three times greater for trawl vessels than for gillnet vessels landing skates. In the bait fishery, on the other hand, both landings and effort by trawls are four times those of the gillnet fishery.

Vessels fishing for skates must either be fishing on a multispecies, monkfish or scallop DAS, or be in an experimental or exempted fishery. While vessels fishing under the latter programs are clearly directing on skates, identifying directed skate fishing effort under the DAS programs requires some analysis or assumptions. In some cases, vessels are using a DAS but are targeting skates almost exclusively, while in others, they are targeting skates during trips when they are also targeting other species (groundfish, monkfish or scallops), and in yet other cases, skates are not the target of any directed effort, but are caught incidentally, retained, and landed. This spectrum of directed effort, therefore, complicates the analysis of the impact of skate management measures being considered in this amendment on protected species because the primary impact will be driven by the changes in directed skate fishing effort, and by how those changes are distributed between the two principal gears. In most cases, however, skate fishing effort is controlled by the management and effort control measures in other (multispecies, monkfish or scallop) FMPs, and would not be significantly affected by the measures under consideration in this amendment. In those cases, if the measures to control skate effort cause vessels to stop fishing for skates, or to discard incidentally caught skates, those vessels would likely continue fishing for other target species while using the applicable DAS.

NMFS conducted a Section 7 consultation under the Endangered Species for the proposed skate fishery management plan, and signed a Biological Opinion on July 24, 2003, available on the Regional Office website at: http://www.nero.noaa.gov/prot_res/section7/NMFS-signedBOs/Skate2003signedBO.pdf. The Agency concluded at that time that the skate fishery is not likely to jeopardize the continued existence of any listed marine mammals or sea turtles. The focus of the 2003 consultation was on the directed skate fishery, since the effects of the incidental fishery were considered during the consultation on those other directed fisheries (where the skate is an incidental catch, regardless of whether the skates are landed or discarded). Since 2003, a number of relevant factors have changed, including the status of some skate species, the pattern of effort in the skate fishery (gear, amount and distribution of effort, etc.), the status of ESA-listed species, and agency guidance on how consultations are to be conducted. NMFS has reinitiated the consultation on the skate fishery in response to new information on the anticipated takes of loggerhead turtles in the bottom trawl gear such as that used in the skate fishery.

The following discussion is divided into two parts based on the structure of the description of proposed management actions in Section 5.2.1. In that description, the first part outlines the measures under consideration, including: catch limits; options for allocating the catch limits between bait and wing fisheries; annual plan review and specification setting; trip declaration and monitoring of landings; incidental skate possession limit; time/area management; skate possession limits and/or skate bait fishery quota. The second part of the following discussion focuses on the specific alternatives 1-4 described in Section 5.2.8. Those alternatives 1-4 comprise various combinations of the measures described in the first part. Some of the measures discussed in the first part will apply to all four alternatives, while others will only apply under one or two of the alternatives. The discussion of protected species impacts of the four alternatives, therefore, will be a synthesis of the expected impact of the measures as described in the first part compared to the status quo (no action) alternative.

8.5.1.1 Protected Species Impacts of Allocation Options (Section 5.2.1.2)

The Council is considering two methods for allocating TALs between the wing fishery and the bait fishery based on the proportions of landings during two historical periods, 2005-2007 (Option 1) and 1995-2006 (Option 2). Option 1 would result in a greater proportion of the TAL being allocated to the wing fishery than Option 2, but in both cases the proportion allocated to the wing fishery is greater than that to the bait fishery. To the extent that trawl gear, such as that used in the skate fishery, may interact with sea turtles, particularly the loggerhead turtle, then Option 2, which allocates a greater proportion to the trawl-dominated bait fishery, could have a relatively greater effect on sea turtles than Option 1. In both cases, however, the total allocations to both fisheries represents a reduction from recent levels of catch (of approximately 50-60%), which translates to a reduction in effort that would contribute to reducing overall fishery impacts on protected species.

8.5.1.2 Protected Species Impacts of Interim catch limits and accountability measures (Section 5.2.1.1)

The reauthorized MSA requires FMPs to specify Annual Catch Limits (ACLs) and contain measures to ensure accountability (AMs) such that catches do not exceed the specificed limits. ACLs and AMs are intended to prevent overfishing and maintain catches at sustainable levels, and to provide for rebuilding of overfished stocks. This is an administrative component of the plan, and as such, will not have a direct impact on protected species. But, since ACLs and AMs will provide a sounder, or more robust basis for controlling fishing effort than currently exists, they will indirectly have a positive effect on protected species. Without such a regulatory framework within which the Council will develop management measures, there is a greater potential for effort to increase beyond the intended level with no clear or immediate consequences.

8.5.1.3 Annual Review, SAFE Report and Specification Setting (Section 5.2.2)

The Council is considering several alternatives for reviewing and reporting on the status of the fishery relative to management objectives. These are administrative components of the plan, and will not have a direct protected species impact, although improved monitoring of the fishery may indirectly benefit those species due to early identification of changes in effort and fishery interactions with those species.

8.5.1.4 Trip Declaration and Monitoring of Landings (Section 5.2.3)

Section 5.2.3 contains a description of the measures being considered to monitor skate fishing effort and landings. As with the preceding section, these are administrative measures, and will not have a direct protected species impact, although improved monitoring of the fishery may indirectly benefit those species due to early identification of changes in effort and fishery interactions with those species.

8.5.1.5 Incidental Skate Possession Limit (Section 5.2.4)

Under this measure, vessels that are not declared into either the skate wing fishery or the skate bait fishery will be limited to possessing not more than 1135 lbs. of whole skate or 500 lbs. of skate wings. The proposed incidental limit covers fishing activities that are managed under other FMPs, and will not likely have any effect on the magnitude or spatial and temporal distribution of fishing effort. Therefore, the impact on protected species is likely neutral compared to taking no action.

8.5.1.6 Time/area management[60]

Time/area closures are a component of two of the alternatives under consideration, Alternatives 1a and 1b (Section **5.2.5**). These are semi-annual closures during trips on which vessels have declared their intent to exceed the skate incidental limits, and are focused on areas where the skate catch rates are highest. The areas are shown in **Map 1**. The likely effect of these closures will be to redistribute directed skate fishing effort to areas immediately adjacent to the closures, or to the period when those areas are open, overall effort reductions notwithstanding. While the closures may reduce skate catch, due to lower catch rates outside or at other times of the year, they are not likely, in and of themselves, to reduce overall effort. The closures are also not likely to have an impact the interaction of the fishery with any protected species due to their size relative to the area covered by the movement and migration of such species. Furthermore, any protection to endangered species that might accrue from the closures, would likely be offset by the concentration of fishing effort around the margins of those areas. The impact of the time/area management proposals on protected species, therefore, is likely to be neutral.

8.5.1.7 Skate possession limits

The Councils are considering various skate possession limits for the directed fishery (vessels on a declared skate trip) under the four alternatives described in the next section. Under Alternative 4, the skate bait fishery will not have a possession limit, but will instead be operating under a seasonal quota system. The possession limits that apply under the no action alternative are described in Section **5.2.8.1**. In general, reduced skate possession limits will not have an impact on overall effort, which is controlled in most cases by DAS allocated under other FMPs, but may cause a redistribution of that effort, depending on several factors. If reaching the possession limit causes a vessel to stop fishing and return to port, rather than continuing to fish and discarding skates in excess of the possession limit, then the vessel will essentially be making more, shorter trips for a given DAS allocation. This will result in more of the DAS being used to account for steaming time, rather than fishing time, and there could be some marginal benefit to protected species over the course of the year.

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[60] NB This measure is not included in the proposed action, but was considered in some of the alternatives in the DEIS.

Whether more, shorter trips changes the likelihood of protected species interactions, however, depends on when and where those trips are taken. Under that circumstance, actual fishing time, when there is a potential for protected species interactions, may be reduced because a greater proportion of the allocated DAS would be consumed by steaming between port and fishing grounds. If the fishing effort is expended during the same general time and/or area as it otherwise would, then there would likely be no impact, compared to taking no action. On the other hand, if the effort is shifted to another area or time of year, the likelihood of protected species interactions will depend on the relative distribution of those species during the times when the skate fishing takes place. It is not possible to predict how the effort those shifts might occur under such a scenario, but in any case, as noted earlier, overall effort is likely to remain unchanged under a skate possession limit. Therefore, the protected species impact is likely to be neutral compared to a no-possession-limit scenario.

8.5.1.8 Skate bait fishery quota (Section 5.2.7)

As noted in the previous paragraph, under Alternative 4, the skate bait fishery will operate under a seasonal quota rather than a possession limit. Three quota options are under consideration, an annual quota, a two-season quota, and a three-season quota (Options 1-3, respectively). The quota period(s) starts on May 1 under Option 1, May 1 and November 1 under Option 2, and May 1, August 1, and November 1 under Option 3. Since the skate bait fishery is predominantly a trawl fishery, and trawl fisheries in general have been identified as having interactions with sea turtles, the potential impact of these alternatives on protected species depends on how effort shifts under the various options. Since sea turtle migration through the region occurs during the spring, summer and fall seasons, the option which results in the greatest potential for some closure during that time of year (Option 3) would likely have a relatively positive impact on protected species compared to one that would result in a closure during the winter months or toward the end of the fishing year (Option 1).

8.5.2 Protected Species Impacts of Alternatives

The following section comprises a comparative, qualitative analysis of the alternatives under consideration and the status quo (no action) alternative. The status quo alternative is not a viable alternative because it does not satisfy the requirements of the MSA to stop overfishing and rebuild overfished stocks, and to adopt annual catch limits and measures to ensure accountability. The Council is considering a total of five alternatives (1a, 1b, 2, 3a, 3b, and 4) which are described in detail in Section **5.2.8**.

8.5.2.1 Proposed Action

The proposed action described in Section 5.1 is a combination of Alternative 3b (analyzed below in Section 8.5.2.4) and Alternative 4 (analyzed below in Section 8.5.2.5). The proposed action includes annual review, SAFE Report, and specification setting (analyzed in Section 8.5.1.3); monitoring of landings (analyzed in Section 8.5.1.4); an incidental skate possession limit (analyzed in Section 8.5.1.5, but raised to 1135 lbs. of whole skate or 500 lbs. of skate wings); skate possession limits for vessels targeting skates for the wing market and for bait (analyzed in Section 8.5.1.7); and a skate bait fishery quota allocated in three seasons (analyzed in Section 8.5.1.8).

The proposed action does not include time/area closures and therefore larger changes in geographic or seasonal effort distributions are unlikely. The proposed action does, however, include a prohibition on using a Multispecies B DAS to target skates and an additional 20,000 lb. whole skate possession limit for vessels holding a skate bait Letter of Authorization. Nearly all of the Multispecies B DAS used to target skates were from vessels using gillnets, because vessels with trawls were already subject to a low 500 lb.

skate landings limit when fishing on a Multispecies B DAS. Thus, vessels that use gillnets will have more Multispecies B DAS available to target groundfish and other species. It is unclear how or if these additional Multispecies B DAS would be redeployed, or whether this change will have an impact on protected species. Of course, the vessels could not switch to using trawls to fish for skates on a Multispecies B DAS, because of existing restrictions. The 20,000 lb. whole skate possession limit is not likely to affect a large number of trips, but some vessels fishing for bait may target skates closer to shore to reduce costs. This may have a differential affect (compared to status quo) depending on where and when this effort is shifted relative to the distribution of protected species at the time.

There are several administrative provisions in the proposed action that are unlikely to have an impact on protected species. These include revised accountability measures and assignment of landings to the skate wing or bait fishery (i.e. monitoring). The increase in the incidental skate possession limit (compared to the draft alternatives) was intended to reduce skate discards, but this measure is offset by a reduction in the TAL triggers (to 80-90% of the wing and bait fishery TALs) which would discontinue the possession limits that allow vessels to target skates for wings and bait. Thus the higher incidental skate possession limit taken together with a potential reduction in trips targeting skates is likely to have a neutral effect on protected species.

The Council chose allocation option 2, which allocates relatively more of the TAL to the skate bait fishery, due to greater concern of the effects of the skate wing fishery on skate overfishing and rebuilding. Nonetheless, the TAL for the skate bait fishery would still be lower than recent landings and the resultant decline in effort may have a positive effect on protected species, depending on how the vessel redeploys its time and fishing effort. The variety of responses and possibilities against the backdrop of fishing costs and restrictions on other fisheries makes it very difficult to determine whether the skate fishing restrictions in this amendment will have a positive or negative effect on protected resources. For example, vessels in the bait fishery may target herring or mackerel to supply the bait fishery. Or the vessels may begin to target summer flounder or squid. Both choices face restrictions depending on permit availability and other management measures, however. Vessels in the skate wing fishery may redeploy their time and effort onto monkfish or groundfish, which depending on how, when, and where this occurs the potential effort shift (if it occurs at all) may have either a negative or positive effect on protected species.

8.5.2.2 Status quo/ No Action

The status quo, no action alternative is described in 5.2.8.1. While this is not a viable alternative because it fails to satisfy the requirements of the MSA with respect to rebuilding overfished stocks and implementing ACLs and AMS, it does provide a basis for comparison of the impacts of the alternatives under consideration on protected species. The current Biological Opinion (BO) was signed in 2003, and until updated by a new BO, the 2003 finding provides the best available assessment of the impact of the skate fisheries on protected species. In 2003, the agency concluded that the skate fishery is not likely to jeopardize the continued existence of any listed marine mammals or sea turtles. As discussed above, the focus of the 2003 consultation was on the directed skate fishery, since the effects of the incidental fishery were considered during the consultation on those other directed fisheries (where the skate is an incidental catch, regardless of whether the skates are landed or discarded). Since 2003, a number of relevant factors have changed, including the status of some skate species, the pattern of effort in the skate fishery (gear, amount and distribution of effort, etc.), the status of ESA-listed species, and agency guidance on how consultations are to be conducted. NMFS has reinitiated the consultation on the skate fishery in response to new information on the anticipated takes of loggerhead turtles in the bottom trawl gear such as that used in the skate fishery.

8.5.2.3 Alternatives 1a and 1b

In addition to the administrative measures and the two TAL options discussed under Management Measures, above, Alternatives 1a and 1b (Sections 5.2.8.2 and 5.2.8.3) consist of skate possession limits and the time/area management options, also described above. The principal difference between the two is that Alternative 1a would impose a hard TAC, which would result in a prohibition on skate landings when the TAC is reached (based on skate landings and estimated discards), while Alternative 1b would impose the incidental possession limit on all vessels landing skates when the TAL (landings only) is reached. Since vessels would likely continue fishing for other species once the directed fishery is closed and either discard all skates (under Alternative 1a) or skates in excess of the incidental limit (under Alternative 1b), the impact on fishing effort for these two alternatives is equivalent. The analysis in (Section 8.3.2) estimates effort reductions, measured in days absent, of 9.5% and 16% for the whole/bait and wing fisheries, respectively, under Allocation Option 1, and 2.6% (whole/bait) and 18.6% (wing) under Allocation Option 2, compared to the status quo. In both cases, the majority of the reductions would be borne by trawl vessels. Thus, these alternatives may have a slightly positive impact on protected species, especially sea turtles, compared to the status quo. As discussed below, the expected effort reductions under Alternatives 2, 3a and 3b, are slightly greater than under 1a and 1b, while, under Alternative 4, they are equivalent for the wing fishery and slightly lower for the bait fishery, with commensurately inverse potential effects on protected species, based solely on estimates of overall effort. It is not possible to predict with any certainty how effort might shift, spatially, temporally or across fisheries under these different alternatives, making any more detailed estimates of protected species impacts impossible.

8.5.2.4 Alternatives 2, 3a and 3b

Alternatives 2, 3a and 3b are discussed together in this section because the estimated impact of these three alternatives, in terms of reduced effort measured in days absent, are equivalent (see Section 8.5.2.4). Alternative 2 contains the same management measures as Alternative 1b, except that the time/area closures would only be implemented as an in-season accountability measure, if and when the TAL is projected to be reached. Alternative 3a contains the same measures as Alternative 1a, without the time/area closures, and includes lower possession limits in the directed skate fisheries to compensate for the lack of time/area closures. Alternative 3b contains the same measures as Alternative 1b, without the time/area closures, and with the same compensatory possession limits that apply in Alternative 3b.

The analysis of changes in effort in Section 8.5.2.4 indicates that the reductions, compared to the status quo, will be slightly greater than Alternatives 1a and 1b under both allocation options. In all cases, most of the effort reductions will be borne by trawl vessels. Consequently, the impact of these alternatives (2, 3a and 3b) on protected species will likely be positive compared to taking no action, and in comparison to the other alternatives under consideration. This conclusion does not take into consideration the indirect effect of potential shifts in effort that might occur to other times of year, other areas or other fisheries because those cannot be predicted.

8.5.2.5 Alternative 4

Alternative 4 contains the same measures as Alternative 1b, without the skate bait fishery possession limit. Instead, the skate bait fishery would be regulated with a seasonal quota, resulting in a closure for the quota period when the skate bait landings meet or are expected to meet the quota, while the wing fishery would be controlled primarily by skate possession limits. Thus, the impacts of Alternative 4 on fishing effort would be the same as those expected for Alternatives 1a and 1b, with commensurate effects on protected species, the only difference being how the seasonal quota redistributes skate bait fishing effort over the year.

As noted above in Section 8.5.1.8 three quota options are under consideration, an annual quota, a two-season quota, and a three-season quota (Options 1-3, respectively). The quota period(s) starts on May 1 under Option 1, May 1 and November 1 under Option 2, and May 1, August 1, and November 1 under Option 3. Since the skate bait fishery is predominantly a trawl fishery, and trawl fisheries in general have been identified as having interactions with sea turtles, the potential impact of these alternatives on protected species depends on how effort shifts under the various options. Since sea turtle migration through the region occurs during the spring, summer and fall seasons, the option which results in the greatest potential for some closure during that time of year (Option 3) would likely have a relatively positive impact on protected species compared to one that would result in a closure during the winter months or toward the end of the fishing year (Option 1).

8.6 Effects of Alternatives on Habitat, Including Essential Fish Habitat

8.6.1 Effects of proposed measures in draft alternatives

The primary measures in the alternatives that could affect fishery effects on essential fish habitat are time/area closures of five skate management areas (Alternatives 1A, 1B, and 2; Sections 5.2.8.2 to 5.2.8.4, but not included in the final alternative), a prohibition on using Multispecies Category B DAS to target skates (all alternatives including the final alternative), and indirectly, skate possession limits and quotas (both included in all alternatives including the final alternative). No measures are proposed that would otherwise limit where vessels may fish for skates or would modify the gear to change its impact on the seabed and associated fauna.

Due to shifts in effort to areas that surround the skate management areas, changes in the number of trips to compensate for the lower skate possession limit, or shifts in effort to focus on other species using the same or similar fishing gear, **none of the six Amendment 3 alternatives is expected to adversely impact EFH for any species that occurs within the geographic range of the skate fishery**. No shifts in effort from using trawls to capture skates to gillnets, or vice versa, are expected. And since all the alternatives are intended to keep catches from exceeding a single ABC, their effects are expected to be identical, except for those alternatives (1A, 1B, and 2) which include time/area closures as a management measure.

Unlike the other alternatives and the No Action alternative, Alternative 4 includes a seasonal or annual quota to regulate landings in the skate bait fishery. When landings reach the TAL and the fishery closes, vessels in the skate bait fishery may have permits to target other species which inhabit different areas. Examples are fishing for summer flounder, scup, black sea bass, or squid. If this occurs, the trawl fishing effort in the inshore waters of Southern New England (where the skate bait fishery is concentrated) may expand to other offshore areas adjacent to the areas fished for small skates. It is unlikely that a significant adverse effect on EFH would be caused by a potential effort shift out of the skate bait fishery, because the nearby areas of the continental shelf are already highly impacted by mobile, bottom-tending gear used in these alternative fisheries and are also exposed to natural disturbance caused by strong bottom current and storms

Trips that land skate nearly all use either finfish trawls or sink gillnets to land skates for food or for lobster bait. Many of the trips using trawls to fish for skates surround the Western Gulf of Maine EFH closed area and the Closed Area I EFH closed area (Figure 48, top panel). Some of the high volume trips that would be affected by the skate possession limit occur along the northern edge of Georges Bank, between Closed Area I and Closed Area II, as well as in the northern part of the Great South Channel, SE of Cape Cod. There is also a skate fishery for lobster bait that occurs inshore, south of RI.

Many of the trips using gillnets to fish for skates occur in the same area of the Great South Channel with a little more intensity to the east of Cape Cod (Figure 48, bottom panel). Trips also fish frequently west and southwest of the Nantucket Lightship Area, and (in a mixed skate/monkfish fishery) off northern NJ.

The time/area closures in Alternatives 1A, 1B, and 4 would expand the area that are currently closed to skate fishing using trawls and gillnets. As proposed, however, the skate time/area closures would individually be off-limits to fishing only by vessels targeting skates. They would remain open to vessels targeting other species using mobile bottom tending gears, as long as they retain no more than the incidental skate possession limit. For vessels targeting skates, these proposed time/area closures would close to skate fishing only for six months, when skate catches are above average.

There is a slight overlap between Winter Skate Management Area 3 and the Nantucket Lightship EFH closed area, but very little skate fishing has occurred there. Unless fishing for skates in other areas becomes uneconomic, the two-bin model (Documents 12 and 13 in Appendix I) anticipates an effort shift to neighboring areas where the skate CPUE is lower. Vessels may shift effort to other species to compensate or increase the duration of the trip to catch the same amount of skates, if there are DAS available to do so. Vessels that land skates as an incidental catch may also elect to continue fishing in the same area and not land more than 500 lbs. of skate wings, or 1135 lbs. of whole skates.

Because the proposed time/area closures (Alternatives 1A, 1B, and 2) would be closed only to vessels targeting skates and only for a six month duration each fishing year, they are not by themselves expected to have any substantial positive effect on EFH. In fact, vessels that continue fishing for skates may shift effort to other open areas or modify their fishing behavior to target a different mix of species. In some cases, this may change the impacts on EFH in either direction, depending on the changes in fishing behavior and the vulnerability of EFH in areas experiencing increasing fishing effort. There may be some increase in fishing intensity in some areas, however, but these areas are already heavily fished and the effect may be limited by restrictions on DAS use.

Both skate possession limits and quotas (and fuel price increases) may cause some effort to shift closer to shore, but vessels may also compensate by fishing for other species with the same or similar gear, or to the extend that the DAS regulations allow take shorter, but more frequent trips. Quotas may cut effort on trips targeting skates, but vessels may also use DAS to target other species with the same or similar gear if the skate fishery closes (by reducing the skate possession limit to zero or 500 lbs.).

The prohibition on using Category B DAS to fish for skates will reduce total fishing effort available to fish for skates (which in 2007 accounted for less than 5% of total skate landings). This measure would affect only fishing for skates with gillnets (using trawls to fish for skates on a Category B DAS are already prohibited). It is not known exactly how vessels using gillnets respond, but they may go back to using Multispecies Category A DAS if they are not used to fish for more profitable species. Multispecies Amendment 16 may reduce the Category A DAS allocations (or change differential accounting). Multispecies Amendment 16 is expected to reduce Category A DAS use from 18 to 54% to achieve the groundfish rebuilding and mortality objectives. This reduction will substantially affect the ability of vessels targeting skates with a B DAS to continue targeting skates but with Multispecies Category A DAS.

8.6.2 Comparison among draft alternatives

Alternatives 1A, 1B and 2 include time/area closures which could potentially redistribute and redirect fishing effort for skates and other groundfish. EFH impacts, however, are not expected to be substantially positive or negative and the higher possession limit in these alternatives is not expected to cause a negative impact on EFH, relative to No Action.

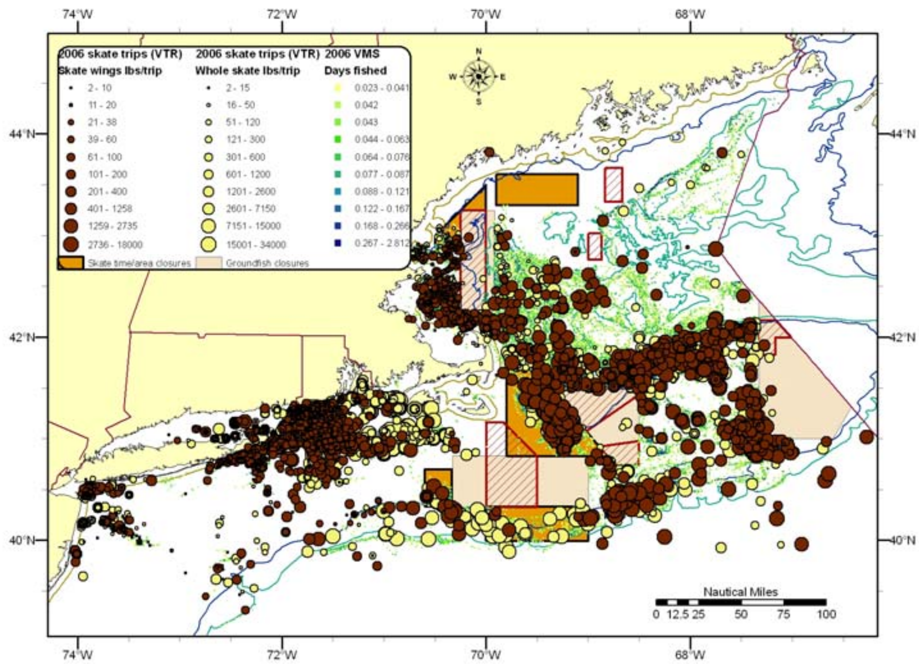
Alternatives 1A and 3A use hard TACs as a method to prevent skate catches from exceeding the ACLs, while Alternatives 1B and 3B would use a target TAC approach to control skate catches. The difference between these two methods is subtle and has virtually no difference of impacts on EFH. Both methods are intended to keep skate catches below the ABC, which could limit fishing effort targeting skates and its adverse effects on EFH.

Alternative 4 was proposed at industry suggestion to allow a quota-managed skate bait fishery, since the industry needs trips landing large volumes of skates to supply the market for bait. Whether by possession limits (in Alternatives 1A, 1B, 2, 3A, or 3B) or by quotas, the intent is to cap or reduce landings to sustainable levels, preventing overfishing of little skate and reducing the catch of small winter skate. By either method, less fishing for small skates for the bait market is expected, potentially reducing fishing effort (days absent) and having a potentially positive effect on EFH. On the other hand, vessels may take substitute trips to target other species, subject to the regulations that apply and the permits held. The fishing effort (days absent) for these substitute trips may have either a positive or negative impact on EFH, depending on the new gear used and areas fished on substitute trips.

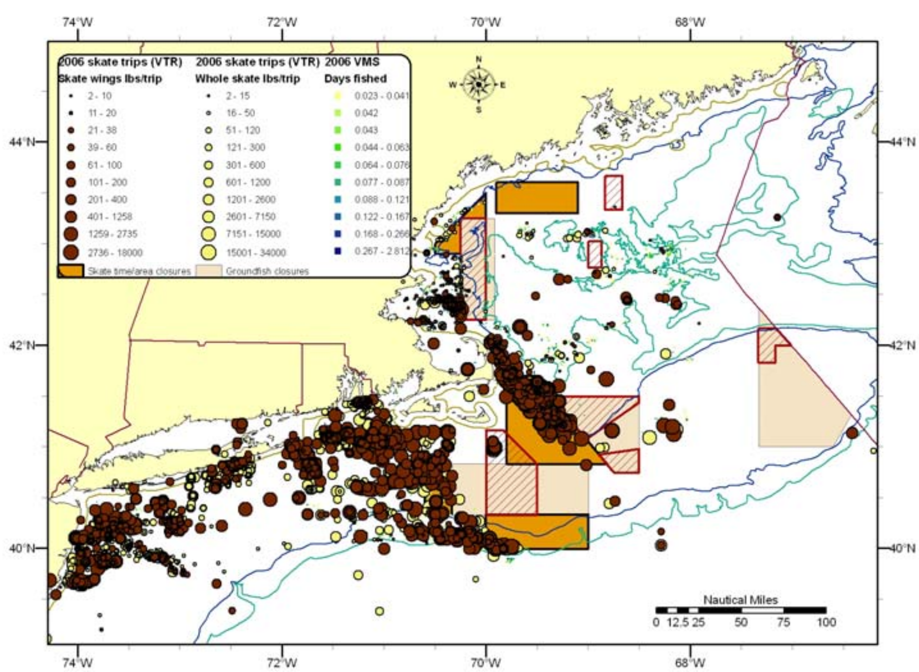
In terms of EFH impacts, none of the six alternatives have a clearly greater positive impact on EFH than another. All are expected to prevent skate catches from exceeding the ACL, prevent overfishing, allow rebuilding of depleted stocks, and thereby reduce fishing effort for skates compared to No Action. Changes in fishing behavior may mitigate this anticipated reduction in fishing effort, but this is influenced by a very wide variety of market conditions and responses, as well as other regulations, which unfortunately cannot be quantified or predicted with any degree of accuracy. Total days absent for trips targeting skates is expected to decline, but total days absent for vessels affected by the proposed alternatives on trips targeting any species may increase or decrease.

Figure 48. Distribution of fishing effort by gear type for trips landing skates during 2006, compared with closed groundfish areas, EFH closure areas (hatched), and proposed time/area closures for vessels landing more than 500 lbs. of skates. Source; NMFS vessel trip reports

Trips using trawls and landing skates



Trips using gillnets and landing skates



8.6.3 Habitat Impacts of the Proposed Action (Final Alternative; Section 5.1)

Except for three of the proposed management measures in the final alternative (Section 5.1), all of the measures remain unchanged from the draft alternatives and analyzed in Section 8.3.3. Based on public hearing comments and DEIS analyses, the Council recommends adopting Alternative 3B (Section 5.2.8.6) for the skate wing fishery. This alternative includes target TAC management, a 1,900 lb. skate wing possession limit, an incidental skate possession limit to apply to all vessels on a DAS (except for vessels on a Multispecies Category B DAS). The Council also adopted Alternative 4 (Section 5.2.8.7) for the skate bait fishery. This alternative includes target TAC management, a three season quota that applies to landings, and a 20,000 lbs skate bait possession limit to discourage derby-style fishing behavior if landings approach the seasonal quotas.

The three changes made to the DEIS based on public comment include dropping the trip declaration requirements because the Council adopted a less burdensome method for assigning landings to each skate fishery based on dealer-supplied information, raising the incidental skate possession limit to reduce discards, reducing the TAL triggers below 100% of the skate fishery TALs, and revising the accountability measures (AMs) to reduce the probability of future ACL and TAL overages if they occur.

8.6.3.1 Skate Wing Fishery (Alternative 3B as modified)

An overall reduction in fishing effort, relative to the status quo, is likely under the final alternative. This will have a slightly positive net impact to EFH via reduced time-on-bottom for both gillnet and trawl vessels, noting that effort reductions are predicted to be proportionally greater for the trawl fisheries. In the aggregate, the skate wing fishery will be a small fraction total fishing effort in the New England region and any adverse effects from fishing in this fishery are minimal and temporary.

8.6.3.2 Skate Bait Fishery (Alternative 4 as modified)

Fishing effort in the skate bait fishery is likely to remain constant relative to the status quo. The significant aspect of this final alternative (the three season quota) is not likely to result in a change in fishery landing or bottom contact time by either gillnets or trawls gears. In the aggregate, the skate wing fishery will be a small fraction total fishing effort in the New England region and any adverse effects from fishing in this fishery are minimal and temporary.

Map 25. Spatial extent of primary skate fishery grounds

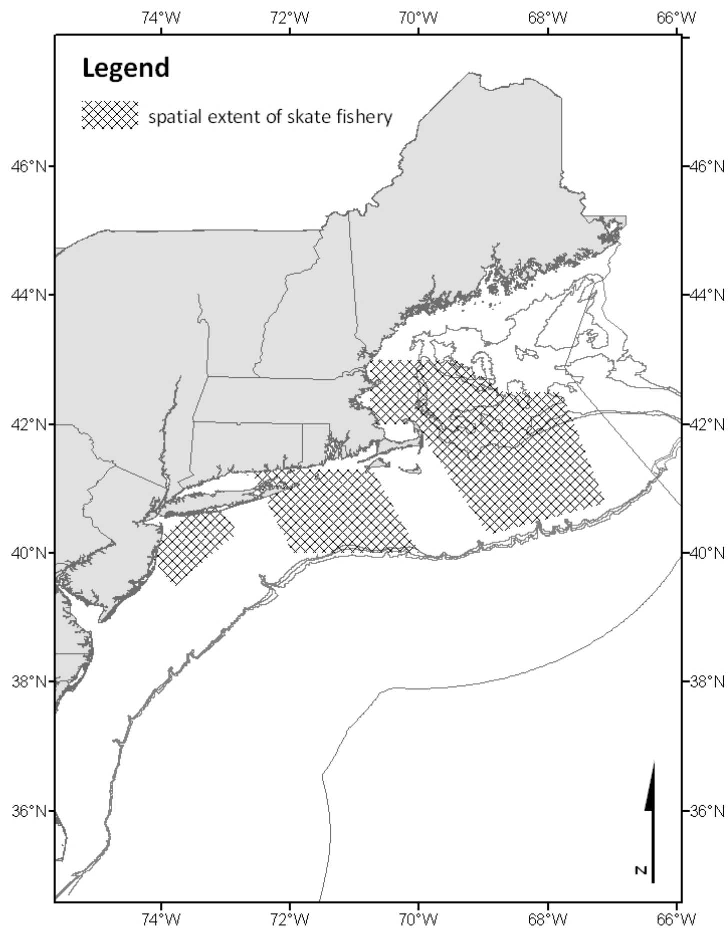


Table 109. Designated EFH overlap with spatial extent of primary skate fishery grounds (x=overlap)

Species	*Life Stage*			
	Adult	**Juvenile**	**Egg**	**Larvea**
American place	x	x	x	x
Atlantic cod	x	x	x	x
Atlantic halibut	x	x	x	x
Atlantic herring	x	x		x
Atlantic sea scallop	x	x	x	x
Barndoor skate	x			
Clearnose skate				
Deep sea red crab				
Haddock	x	x	x	x
Little skate	x	x		
Monkfish	x	x	x	x
Ocean pout	x	x	x	x
Offshore hake				x

Pollock	x	x	x	x
Red hake	x	x	x	x
Redfish	x	x	x	x
Rosette skate				
Silver hake	x	x	x	x
Smooth skate	x	x		
Thorny skate	x	x		
White hake	x	x	x	x
Windowpane flounder	x	x	x	x
Winter flounder	x	x	x	x
Winter skate	x	x		
Witch flounder	x	x	x	x
Yellowtail flounder	x	x	x	x

(shaded) = EFH NOT DESIGNATED

8.6.4 Essential Fish Habitat Assessment

This essential fish habitat (EFH) assessment is provided pursuant to 50 CFR 600.920 of the EFH Interim Final Rule to initiate EFH consultation with the National Marine Fisheries Service.

8.6.4.1 Description of the Proposed Action

The proposed action is described in Section 5.1. The activity described by this proposed action, fishing for species in the skate complex, occurs across designated EFH for most Council-managed species (Table 109). The range of this activity also occurs across the designated EFH of most species managed by the Mid-Atlantic Fishery Management Council and species managed under the NMFS Highly Pelagic Species FMP.

8.6.4.2 Potential Adverse Effects of the Proposed Action

This action proposes to employ target-TAC based management, with aggregate skate possession limits to control fishing mortality in the skate wing and bait fisheries. Under existing and future fishing regulations, vessels that land skates must be fishing during a Multispecies, Scallop, or Monkfish DAS in a limited access program that limits the amount of DAS that vessels may use. Actions that restrict DAS use or allocations, like the recent Multispecies Interim Action and possibly Multispecies Amendment 16, will also limit fishing effort targeting skates.

This amendment does not propose to increase current levels of fishing activity in the U.S. EEZ. None of the proposed actions will have any direct adverse impacts on the EFH of any managed species relative to the baseline conditions established in this Amendment.

8.6.4.3 Proposed Measures to Avoid, Minimize, or Mitigate Adverse Impacts of This Action

Since the proposed action does not increase adverse impacts, no measures to mitigate impacts are required.

8.6.4.4 Conclusions

The action proposed under this framework has no potential adverse effects on the EFH of any species managed by the New England, Mid-Atlantic, or South Atlantic Fishery Management Councils or the National Marine Fisheries Service. Because there are no potential adverse impacts associated with this action, an EFH consultation is not required.

8.7 Economic Impacts

8.7.1 Descriptive Economic Statistics

Skate landings in New England during 1980-2006 ranged from a minimum of 155.5 thousand pounds to a maximum of 13.1 million with substantial increases since 1994. However, as noted elsewhere in this section, the 1994-1996 data may be unreliable due to changes in the data system starting in 1994. The corresponding landed values ranged from a minimum of $7.8 thousand to a maximum of about $1.1 million. Ex-vessel prices ranged from a low of about $0.05/lb., to a high (in 1996) of about $0.19/lb. As background for the following analysis of impacts of the alternatives, the following table contains descriptive statistics for the New England skate fishery.

Table 110. **Descriptive skate landings statistics for New England.**

Statistic	Metric tons	Pounds	$	$/lb.
Means	3942	8,691,357	662,470	$0.0770
Min	71	155,500	7,832	$0.0503
Max	5950	13,117,377	1,332,712	$0.1943
Range	5880	12,961,877	1,324,880	$0.1440
Std. Dev.	1737	3,829,120	349,467	$0.0350
Coeff. Of variation	44.06	44.06	52.75	45.45

Annual landings by state for the past five years are presented in Table 111. Descriptive Statistics (average, min, max, etc.) are presented in Table 112. It is notable that MA has by far the largest landings, ME has a higher price and RI has the lowest price. This is consistent with the sectoral and economic surplus discussion below. It is possible that the analysis for lobsters should be extended to MA. However, since MA was included in the wing sector analysis, the effects, while inexact, are already in the surplus measures for the wing export market.

The available information did not permit an examination of induced and secondary impacts.

8.7.2 Economic Analysis

The proposed regulations include measures that are intended to reduce skate harvests. An economic analysis of measures that restrict the supply of a commodity cause changes in *economic surpluses*. In this section: 1) The concept of economic surpluses is explained; 2) Estimates of demand and supply parameters are reported, and 3) The effect of quantity restrictions on these economic surpluses are estimated.

Table 111. **Skate landings and value for New England states, 2001-2005.**

	ME			NH			MA		
Year	Pounds	$	$/lb.	Pounds	$	$/lb.	Pounds	$	$/lb.
2001	304,718	58,670	$0.1925	73,105	12,129	$0.1659	14,734,219	1,963,191	$0.1332
2002	302,395	67,622	$0.2236	53,976	8,839	$0.1638	13,965,933	2,037,232	$0.1459
2003	168,374	39,826	$0.2365	32,807	5,008	$0.1527	17,852,615	2,751,009	$0.1541
2004	29,342	4,965	$0.1692	23,320	4,029	$0.1728	22,213,163	3,869,967	$0.1742
2005				20,705	4,272	$0.2063	19,817,549	3,872,565	$0.1954
2006							24,542,861	5,426,989	$0.2211

	RI			CT			Totals		
	Pounds	$	$/lb.	Pounds	$	$/lb.	Pounds	$	$/lb.
2001	10,000,439	806,144	$0.0806	1,364,417	208,259	$0.1526	26,476,898	$2,033,990	0.0768
2002	11,088,078	892,915	$0.0805	810,328	169,852	$0.2096	26,220,710	$2,113,693	0.0806
2003	12,161,703	912,313	$0.0750	956,048	80,173	$0.0839	31,171,547	$2,795,843	0.0897
2004	10,764,144	859,734	$0.0799	973,697	80,937	$0.0831	34,003,666	$3,878,961	0.1141
2005	9,301,278	864,475	$0.0929	779,025	215,844	$0.2771	29,918,557	$3,876,837	0.1296
2006	8,931,874	1,089,848	$0.1220	572,327	53,855	$0.0941	34,047,062	$5,426,989	0.1594

Table 112. **Descriptive skate landings statistics by New England state.**

	ME			NH			MA		
	Pounds	$	$/lb.	Pounds	$	$/lb.	Pounds	$	$/lb.
Sums	804,829	$171,083.0	$0.8219	203,913	$34,277.0	$0.8614	88,583,479	$14,493,964.0	$0.8028
Means	201,207	$42,770.8	$0.2055	40,783	$6,855.4	$0.1723	17,716,696	$2,898,792.8	$0.1606
Min	29,342	$4,965.0	$0.1692	20,705	$4,029.0	$0.1527	13,965,933	$1,963,191.0	$0.1332
Max	304,718	$67,622.0	$0.2365	73,105	$12,129.0	$0.2063	22,213,163	$3,872,565.0	$0.1954
Range	275,376	$62,657.0	$0.0673	52,400	$8,100.0	$0.0537	8,247,230	$1,909,374.0	$0.0622
std.Dev.	131,110	$27,738.8	$0.0304	22,307	$3,529.2	$0.0204	3,450,133	$939,533.1	$0.0245
CV	65.16	64.85	14.81	54.70	51.48	11.82	19.47	32.41	15.27
% of Total	0.68%	1.45%	209.34%	0.14%	0.23%	175.52%	59.94%	98.60%	163.58%

	RI			CT			Totals		
Statistic	Pounds	$	$/lb.	Pounds	$	$/lb.	Pounds	$	$/lb.
Sums	53,315,642	4,335,581	$0.4090	4,883,515	755,065	$0.8063	147,791,378	14,699,324	$0.4908
Means	10,663,128	867,116	$0.0818	976,703	151,013	$0.1613	29,558,276	2,939,865	$0.0982
Min	9,301,278	806,144	$0.0750	779,025	80,173	$0.0831	26,220,710	2,033,990	$0.0768
Max	12,161,703	912,313	$0.0929	1,364,417	215,844	$0.2771	34,003,666	3,878,961	$0.1296
Range	2,860,425	106,169	$0.0179	585,392	135,671	$0.1939	7,782,956	1,844,971	$0.0528
std.Dev.	1,087,463	40,272	$0.0067	233,193	66,641	$0.0835	3,283,602	906,053	$0.0228
CV	10.20	4.64	8.13	23.88	44.13	51.81	11.11	30.82	23.21
% of Total	36.07%	29.50%	83.33%	3.30%	5.14%	164.29%	100.00%	100.00%	100.00%

8.7.3 Economic Surpluses

There are several measures of economic surplus that can be derived from supply and demand curves. The names vary slightly depending on context. For example, a consumer enjoys a surplus when he buys something for less than he would have been willing to pay. In this context, the excess of value in use over what has actually been paid is called *Consumers' Surplus* (CS). The value to a business that exceeds the price that must be paid for a commodity can be termed *Buyers' Surplus* (BS). The value to seller who sells the input for more than he would have been willing to sell it is *Producers' Surplus* (PS), or *Sellers' Surplus* (SS). We will have occasion to refer to CS, BS and SS. In terms of skate wings, because they are sold in an export market, CS is irrelevant for two reasons: 1) The world market is large relative to New England exports, so the world price is affected only very slightly by New England exports, and, 2) CS changes outside the U.S. do not affect net national benefits which are a MSA consideration and are therefore of no concern to fishery managers.

Skate harvesters realize a SS at time of sale. Dealers who buy skates realize a BS. And, for the bait skate sector, lobster fishermen realize a BS.

<u>Measurement of Economic Surpluses</u>

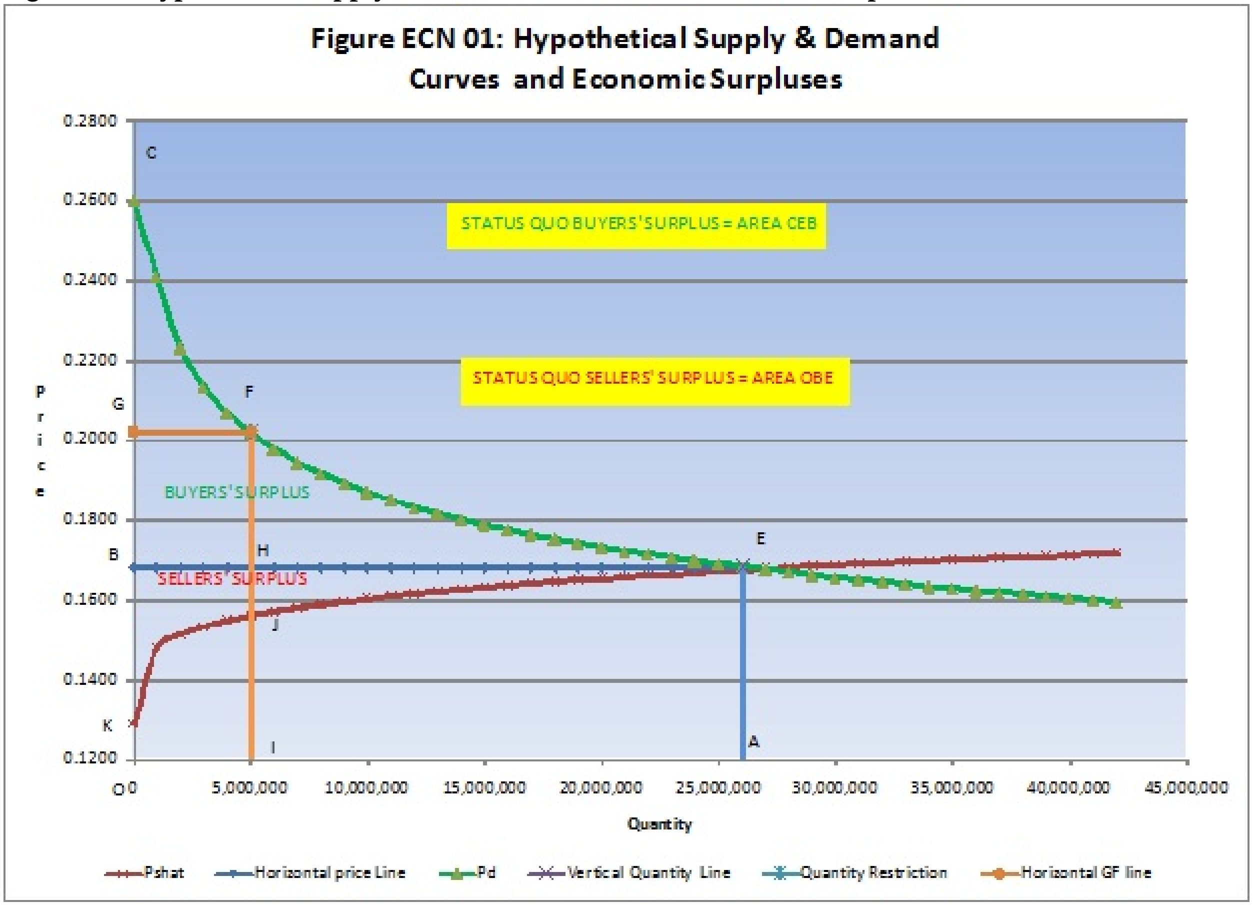
It is possible, in principle, to measure PS from cost and revenue data. But such data is often not available. Additionally, not everyone has the same costs, and point estimates tend to give misleading estimates of what is a distribution of outcomes. Moreover, the amount of PS realized by on the vessel owner, captain and crew depends on how profits are shared under the lay system (a pre-determined method for allocating costs and revenue between the vessel owner, the captain, and fishermen). For sectors other than the harvest sector, the scarcity of data makes this approach even more problematic. Fortunately, there is an alternative approach to getting approximate measures of surplus via supply and demand curves.

A demand curve reflects the actual behavioral responses of buyers under different price and quantity combinations. At a given price, the demand curve of buyers measures their marginal values and the area beneath the demand curve measures total *use value*. The amount actually paid is a rectangular area, (price*quantity). It is also known as *Exchange Value*. In general, use value exceeds exchange value; otherwise exchange would not take place. The difference between values in use (also known as "willingness to pay") is a BS.

Similarly, a supply curve reflects the actual behavioral responses of sellers under different price quantity combinations. At a given price, the supply curve of sellers measures their marginal values and the area beneath their supply curve measures variable costs. The amount received is a rectangular area equal to price*quantity. Note that when supply and demand are equal, the exchange value of buyers and sellers is equal. The cost to the former is the gross revenue of the latter. The difference between sellers' exchange value and cost is PS. We can illustrate these concepts with the aid of Figure 49.

In Figure 49, the supply curve is the red curve, OHE. The demand curve is the green curve, CFE. Although these curves are close to the skate data for 2006, they should be regarded as illustrative only. The status quo market equilibrium is at E where the two curves intersect. At E, the quantities supplied and demanded are equal at about 26 million lbs. The Buyers Value in Use is the area COAE. The exchange value (buyers' cost) is the rectangle OAEB. The Buyers Surplus is the area bounded by the demand curve, the vertical axis and the horizontal price line BE. This area is BHEFC. Turning to the suppliers, the exchange value (Sellers Revenue) is the rectangle OAEB. In an unregulated market, it can be assumed that the supply curve is a least cost way of achieving any given level of output. In a regulated market, this presumption is questionable; a point to which we must eventually return. The area beneath the supply curve (Sellers' Cost) is OHEA. The difference, area OHEB is the Sellers' Surplus, (SS or PS). If Figure 49 is regarded as representing the skate fishery, total surplus in skate harvest and marketing is the sum of these two areas. The demand curve is a derived demand for skates by Skate marketers. The BS is the surplus realized in the marketing of skates. The supply curve is the supply of skates by harvesters. The SS is the producers' surplus realized by skate harvesters.

Figure 49. **Hypothetical supply and demand curves and economic surpluses.**



8.7.3.1 The Effects of a Reduction in Quantity of Skates Landed

Impact on Buyers

The proposed action would have a negative impact on buyers of skates resulting from a result of a reduction in buyers' surplus; however, it is not possible to quantify the amount of this reduction. If the quantity skates is reduced as shown in Figure 49, by vertical line JHF that intersects the horizontal (quantity) axis at J, the supply curve at J, the status quo price line at H, and the demand curve at F, the new (higher) market clearing price will be at F. Let us use the existing curves as is and later inquire about the stability of supply. BS is reduced to the triangular area CGF. The old BS was BHEFC. The reduction in BS is the (approximately) triangular area HEF.

Impact on Sellers

The proposed action also would have a negative impact on sellers of skates resulting from a result of a reduction in sellers' surplus. At the new higher price, and smaller quantity, the exchange value is the rectangle OIJHFGB. The old exchange value was the rectangle OAEHB. So the sellers have "lost" the revenue rectangle IAEH and "gained" the revenue rectangle BHFG. In this example, obviously the gain has exceeded the loss, but this outcome depends on demand parameters. In other cases the net change could be negative. The new SS is the irregular area KJHFGFB versus the old SS which was the approximately triangular area KJEHB.61

For some captains (and crews), opportunity cost may be the value of leisure time, which varies seasonally, with the age of family, and with loan repayment obligations. For other captains, it may be the earnings foregone by not fishing for groundfish, which depends on available days at sea. In the longer run, the innovations of net designers, naval architects, electronics specialists, etc. will increase the fishing power of vessel days at sea. In an unregulated market, adoption of new technologies occurs only if it is cost effective. In a regulated market, this discipline is not entirely lost, but it is attenuated, as we saw with the generator example (see footnote).

Given the new higher price when landings are reduced, it is likely that more and higher cost (inclusive of opportunity cost62) effort will be focused on skates. Although the amount of the effort shift cannot be predicted, the direction is clear. In Figure 49, the supply curve, OKJE can be expected to move upwards, which reduces SS. Fortunately, the upward drift would be bounded. As the supply curve moves upward, the intersection point E slides leftward along the demand curve. In the limit, it may become coincident with point F. At that point, SS is very small; much less than at the status quo at point E. In effect, input stuffing may erase almost all of the SS that is realized at the status quo.

8.7.3.2 Economic Surplus in the Lobster Fishery

The reduction of buyer's surplus would also apply to bait dealers and lobster fishermen who buy skates to use or sell as bait in the lobster fishery, since in essence Figure 49 also serves as a derived demand curve

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61 Other considerations: (a) If, as was provisionally assumed, producers were to remain focused on cost effectiveness, the new (lower) cost will be the area OIJ which is obviously less than the old cost OAEJK. New Sellers' Surplus, SS, is the irregular area KJHFGFB versus the old SS which was the approximately triangular area KJEHB. Because the gained rectangle BHFG is larger than the lost triangular area JEH, SS has increased. (b) The provisional assumption was made earlier, that suppliers continued, as in an unregulated market to supply each level of output at minimal cost. It is time to examine this assumption and to introduce "input stuffing". This is not a topic unique to fisheries. A generation ago, it was noted that certain "natural monopolies", such as electrical utilities or telephone companies could exploit their market power to realize abnormally high rates of return. The "obvious' policy solution was to regulate the allowed rate of return. Here is the problem. If "costs" were given, objectively knowable, this might have worked; but they are not. Suppose a manager of a power plant is considering replacement of a generator. Suppose he has a choice between a "Rolls Royce" generator for $10 million, and a "Volkswagen" version for $1 million. He is allowed to make 10% return on investment and can borrow funds at 5%. The manager would buy the "Rolls Royce" version of course, because he would earn a 5% profit on an additional $9 million. As a result, the policy of a 10% rate of return has resulted in higher costs to consumers and lower Consumers' Surplus. A policy intended to benefit consumers has actually injured them.

62 Now, apply this idea of input stuffing to fisheries. Are there any ways to accelerate skate harvest before the limit is exhausted? That depends somewhat on which option is chosen. Here is one way. The "cost" of harvesting skates includes an opportunity cost; what a captain could have earned had he chosen to do something other than harvesting skates. Opportunity cost for an individual is the maximum of the several non-skate revenue alternatives available to him.

for lobster fishermen using skates as bait. This added cost for lobster bait is of greatest concern in Rhode Island where skates are a widely used for lobster bait in the offshore fishery. 63. The reduced supply of skates for bait will raise fishing costs in the lobster fishery, but will not prevent the lobster fishery from continuing to operate. Other products, such as herring or groundfish 'racks', are available during times when skates may be unavailable. While less preferable, these alternative baits are frequently and successfully used in other areas of New England. In Southern New England, skates are preferable because of their lower relative cost and durability from being consumed in lobster traps by isopods (aka sea lice). The relative price of bait substitutes will place a cap on increases of bait costs estimated in the analysis described below.

Empirical Estimates of Supply and Demand

Derived Demand for New England Skates

Marketers of wing skates export to various world markets (specific data on product form and destination are not available). Prices of sharks, rays, etc. were obtained from Globefish.64 Given prices in export markets, New England marketers of skates have a derived (ex-vessel) demand price for skates. A log linear form was used. Abstracting from details, this gives a derived demand curve of the form:

. $$P_{sd} = \alpha_d \, Q_s^{bd}$$

The intercept coefficient α changes with other explanatory variables such as the world price of skates, rays, etc. Such shift variables will be assumed constant and collapsed into the coefficient α. Practically this means that given a status quo value for skate price and quantity, and a value for the coefficient b, α is solved for so as to make the equation true. New England skate landings and ex-vessel value data from 1980 to 2006 were obtained from the NMFS Market News and Statistics website.65 (http://www.st.nmfs.noaa.gov/st1/market_news/index.html) and yielded a price flexibility coefficient of 0.11. The regression coefficient was statistically significant and had the expected negative sign (b = -0.11).

New England Skate Supply Curve

Although skates are a bycatch in a multispecies fishery, it seems plausible that there may be a minimal price required to induce positive landings. Due to cost inflation, it is expected that this minimal or "choke" price would increase over time. Additional landings are forthcoming as ex vessel prices rise above this minimal price. The equation for ex-vessel skate supply price (P_{ss}) was:

$$P_{ss} = \alpha_s \, e^{rt} + \gamma Q_s^{bs}$$

Figure 50 shows a plot of actual and predicted skate prices. Because this equation is intrinsically nonlinear, the Excel solver was used as for nonlinear least squares subject to non-negativity of α_s, r, γ and b_s . The R^2 was 0.95, indicating that the regression accounted for 95 percent of the observed variation.

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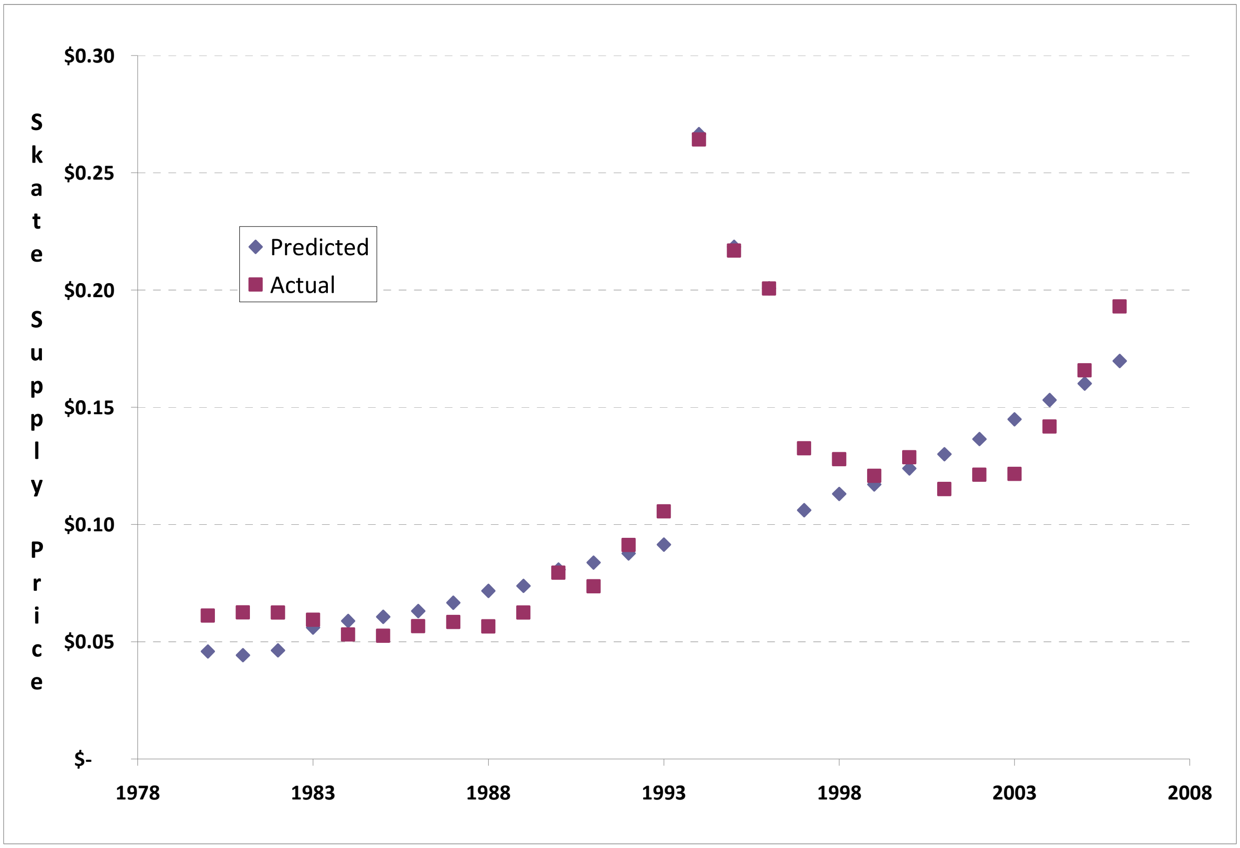
63 An increase in bait costs may also be induced by the adoption of trap limits in the new ASMFC Lobster Plan. (Gates 2000).
64 With the assistance of Dr. John Ward.
65 NMFS Market News and Statistics: http://www.st.nmfs.noaa.gov/st1/market_news/index.html

Figure 50. **Actual and predicted skate supply price, bait market.**



The explanatory variables for both derived demand and supply included dummy variables for 1994, 1995 and 1996. Based on discussions in the Plan Development Team, the anomalous data for these years is believed due to a changeover in the data collection system, beginning in 1994. Excluding these dummy variables reduces the R^2 , but does not change the parameter estimates.

8.7.3.3 Rhode Island Derived Demand for Bait Skates

Bait skates in RI are used primarily as bait for the lobster fishery. They are generally lower in value than skate wings and their abundance and demand vary seasonally and over time. In general, the lobster prices affect the derived demand for skates as bait, as does the price of substitutes. Herring is a substitute lobster bait, but in the warmer waters of RI, skates are preferred. In Maine, the colder waters make herring more attractive as bait. Consequently, the hypothesized derived demand price in RI was:

$$Ln(P_{sdRI}/ P_l)\ \ \beta_0 + \beta_t Ln(t) + \beta_h Ln(P_h / P_l) + \beta_{sin} Sin(\theta M) + \beta_{cos} Cos(\theta M) + \beta_Q Ln(Q_{sdRI})$$

Where:

P_{sdRI} = Rhode Island ex-vessel monthly price of skates
P_l = RI ex vessel lobster price
P_h = RI ex vessel herring price
t = year
M = month #; M = 1,2,...,12
$\theta = \pi/6$ maps M into radians; 12 months = 2π radians = 360 degrees

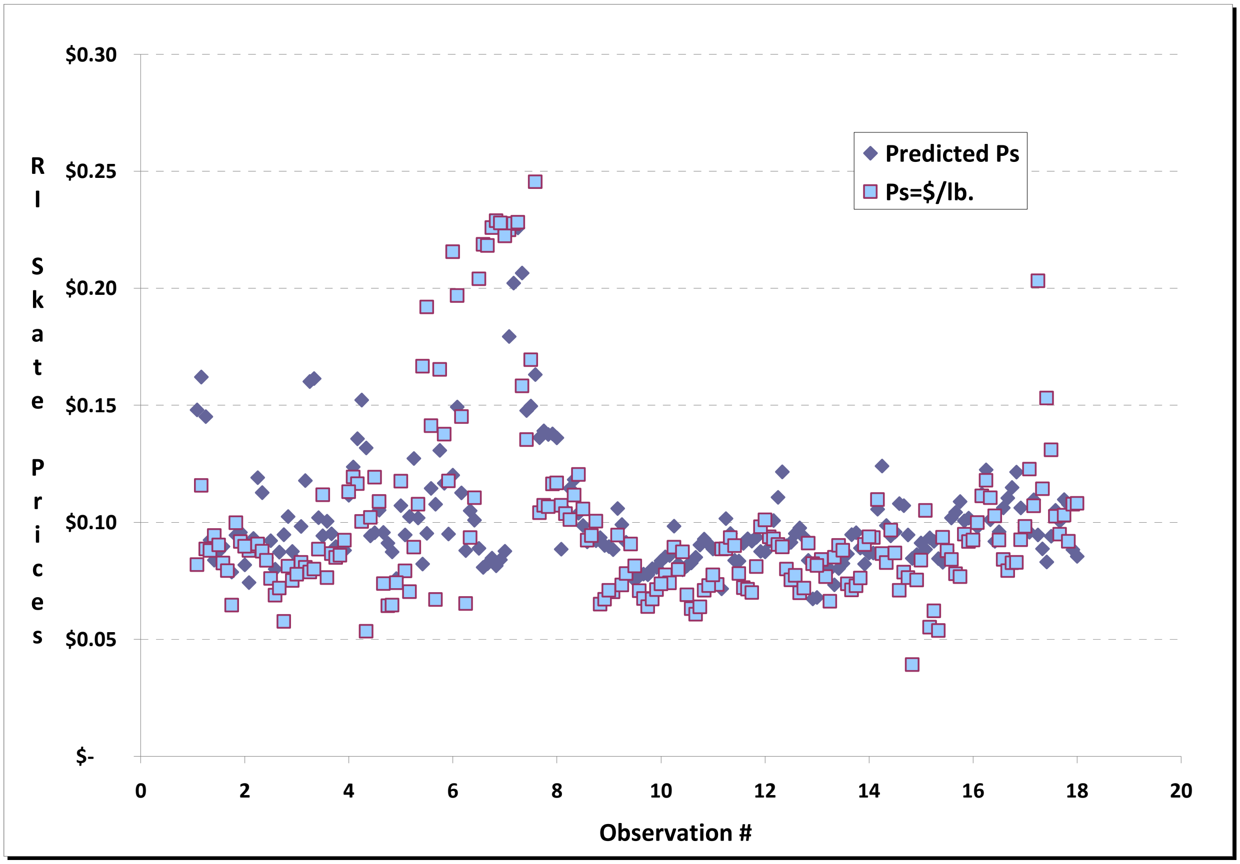
The anomalous years 1994 - 1996 were excluded from the estimation. This is equivalent to adding dummy variables for the anomalous years. All variables were statistically significant except for herring price which had the expected positive sign although not statistically significant at conventional levels of significance. Although all months were used in estimation, when using the demand curve, we use only months May through September since these correspond to the principal lobster season. For a given month and holding explanatory variables constant, this equation can be simplified to:

$$P_{sdRI} = \alpha_M Q^{\beta Q}$$

Where β_Q = -0.14.

In practice, α_M is calculated from values for P,Q and β_Q = -0.14. Given these values, α_M is solved as the value which makes the equation true. Figure 51 shows actual and predicted prices for RI skates using the estimated equation.

Figure 51. **Actual and predicted RI skate prices.**



8.7.3.4 Application of Supply and Demand Equations to Economic Surplus Estimation

In this section, the estimated demand and supply relationships are used to calculate the economic surpluses described earlier. To repeat, there are the following surpluses:

- A Buyers' Surplus realized by skate marketers
- A Sellers' Surplus realized by skate harvesters
- A Buyers' Surplus realized by lobstermen
- The Social Surplus which is the sum of all three surpluses

The first two of these involve New England skate landings and prices. The third one involves RI skate landings and prices during the lobster season. The surpluses are calculated for percentage skate reductions of zero percent, which is the status quo. They are also calculated for reductions of 5%, 10%, … 50% in increments of 5%. The results appear in Table 112.

8.7.4 Summary of Economic Impacts, Aggregate comparison of alternatives

This section summarizes the major short-term economic impacts expected from the management alternatives under consideration. It is not possible to estimate long-run economic impacts because the effects of near-term reductions in the catch of skates on future stock size and yield levels cannot be quantified. Also all alternatives were designed to achieve the same reductions in skate landings to achieve the biological targets that were recommended to the Council by its Scientific and Statistical Committee based on the work of the Skate Plan Development Team. As a result, the main differences in the economic impacts of the management alternatives are in how economic loss or gain is distributed among various groups in the skate fishery rather than in terms of the absolute amount of revenue lost to the fishery.

8.7.4.1 Harvesting Sector

Impacts on Ex-vessel Revenues

The expected value of landings from all species under the status quo situation totals $54.7 million with $25.7 from the whole/bait fishery and $29.0 million from the wing fishery. The impacts of the various alternatives range from -$4.1 to -$9.1 million or -8% to -17%, depending on the management measure chosen (Table 113).

Table 113. Total revenue changes by management alternative and option for trips landing skates in 2007. Summary of information derived from **Table 97** and **Table 103**.

	All Vessels			
	Status Quo	Alternatives 1a &1b	Alternatives 2, 3a & 3b	Alternative 4[66]
Option 1				
Ex-vessel revenues	54.7	47.2	45.7	50.6
Change in revenues	-	(7.6)	(9.1)	(4.1)
Percentage change	-	-14%	-17%	-8%
Option 2				
Ex-vessel revenues	54.7	48.1	45.8	49.7
Change in revenues	-	(6.7)	(2.2)	3.9
Percentage change	-	-12%	-16%	-9%

Distributional Impacts

Table 114 summarizes the percentage change in gross revenues for the whole/bait and wing fisheries type based on the more detailed information presented in Table 97 and Table 103.

Table 114. Percentage changes in total revenues by fishery components from status quo, for trips landing skates in 2007.

	All Vessels	
Whole /Bait	**Option 1**	**Option 2**
Alternatives 1a &1b	-10%	-3%
Alternatives 2, 3a & 3b	-10%	-4%
Alternative 4[67]	2%	3%
Wings		
Alternatives 1a &1b	-17%	-20%
Alternatives 2, 3a & 3b	-22%	-27%
Alternative 4	-17%	-20%

- Allocation Option 1 allocates the negative economic impacts more evenly between the whole/bait and the wing fishery than Option 1.
- Option 2 results in a more even distribution of negative impacts in whole/bait fishery for the different alternatives but has a greater negative economic impact on the wing fishery under Alternatives 2, 3a & 3b than does Option 1.
- Alternatives 1a, 1b and 4 result in less impact on the wing fishery because they allow a higher skate wing possession limit, due to the mortality reduction associated with time/area management. These alternatives however result in lower skate bait fishery possession limits due to the estimated effort displacement caused by area closures.

[66] The estimated economic impacts for Alternative 4 do not include the likely negative economic impacts of quota management for the skate bait fishery, because the timing and effects are unpredictable and will vary from year to year. The skate bait fishery effects reported in this table only include the estimated effort displacement caused by time/area closures.
[67] The economic effects are underestimated. See footnote above.

Table 115 shows the relative impacts among the two major gears in the fishery, trawls and gillnets.

Table 115. Percentages Changes in Ex-vessel Revenues by Gear and Fishery Component from Status Quo

	Trawls		Gillnets	
Whole /Bait	**Option 1**	**Option 2**	**Option 1**	**Option 2**
Alternatives 1a &1b	-9%	-3%	-2%	-1%
Alternatives 2, 3a & 3b	-8%	-3%	-2%	-1%
Alternative 4[68]	2%	2%	1%	1%
Wings				
Alternatives 1a &1b	-14%	-17%	-3%	-3%
Alternatives 2, 3a & 3b	-19%	-23%	-3%	-4%
Alternative 4	-14%	-17%	-3%	-3%

Option 1 allocates the negative impacts more evenly between trawls and gillnets in the wing fishery but Option 2 allocates the impacts more evenly between these gears in the whole/bait fishery.

8.7.4.2 Processors and Dealers

Impacts on processors and dealers are expected to be distributed mainly according to the major product categories of whole/bait or wings. Economic data for individual dealers processors are not available and therefore it is not possible to estimate the range of impacts on dealers and processors because they will depend on what percentage of their revenues are derived from skates.

8.7.4.3 Geographical Distribution of Impacts

The major impacts will be on the ports of New Bedford, MA, Chatham, MA and Point Judith, RI in that order. Other port areas that also will be impacted in their order of importance are Tiverton, RI, Newport, RI, Boston, MA, Stonington, CT, Gloucester, MA, Barnegat, NJ and Hampton, VA (Figure 12). Port areas that will be more impacted because they handle a higher proportion of wings than whole skates are New Bedford, Chatham, Boston, Gloucester, Barnegat and Hampton. Rhode Island ports and Stonington, CT have historically contributed to the majority of whole skate (i.e. bait) landings. Although the above summary tables show the estimated average effect of the proposed alternatives on total revenue derived from trips landing skates, local and individual vessel impacts will be much greater than the coast-wide averages. Some vessels and ports may experience revenue reductions of as much as 40-50% annually.

8.8 Social Impact Assessment

The social and community characteristics of ports where skates are landed have not appreciably changed since the original Skate FMP was prepared in 2002. Although some vessels and smaller ports (e.g. Chatham, MA and Point Judith, RI) rely on skate revenue for a substantial part of their total fishing income, the landings of other species contribute the majority of revenue for most New England ports (e.g. New Bedford). Skate landings in the Mid-Atlantic region are insignificant, except for a mixed monkfish/skate fishery with gillnets in Point Pleasant, NJ.

[68] The economic effects are underestimated. See footnote above.

Since the implementation of the Skate FMP, prices for wings have risen (Figure 22), regulations in related fisheries have become stricter, and fuel prices have risen. Some regulations in related fisheries have made it more difficult to fish for skates on a DAS, mainly due to differential DAS counting. But in other cases, the importance of skate revenue to communities have become more important to replace declining landings and revenue of other fish. Section 7.5.1 documents the recent changes in landings and revenue by community.

When compared to the No Action alternative, all of the proposed alternatives are expected to result in impacts similar to those summarized in the original FMP, with one exception. The one difference is that the proposed time/area closures (Section 5.2.5) in Alternatives 1A, 1B, and 4 will negatively affect communities and have social impacts that are more acute in nearby ports, such as Chatham, MA, due to expected decline in revenues on skate fishing trips. In some cases, the revenue on skate trips could decline by as much as 40-50%. This may affect shoreside employment, but it may also be mitigated by vessels targeting species other than skates. The effects on landings, total revenue, and net revenue are estimated in Section 8.3.

8.8.1 Defining What Constitutes a Community

Before beginning, a few words are necessary about how community is defined in this document. By National Standard 8 requirements of the MSA, a "fishing community" must be a geographic entity. Generally speaking, we use any geographic unit that the U.S. Census recognizes as a "place". This includes cities, towns, and some townships, boroughs or other small administrative entities. However, it must be smaller than a county. Occasionally a town may be unincorporated and not have been surveyed as a "Census Designated Place" or CDP. In this case, there are no available census data for the entity. Unless it appears as important in terms of landings or residence of permit holders, such an entity will be aggregated into the next smallest available census place. In this document the port/town is the most basic unit of analysis. Because in some cases there is a port which serves as the base for fishing activity but most fishermen do not reside directly in that port town, both owner's home address and primary port of landing for a vessel are discussed. Other sections of the MSA require analyses that need not be place-based. Thus, some discussions will be about gear groups or those who target skate versus those who take skate as a bycatch or about other groups such as processors or dealers.

8.8.2 Organization of the SIA

The discussion below focuses on social and cultural impacts of the FMP on communities and individuals. Because economic impacts also have social and cultural ramification, they are also included, though in a different form than seen in the economic impact sections of the document. First the SIA discusses some general features of importance within and across communities, which create different contexts for the various proposed conservation measures. Then, rather than discuss impacts by alternative - as these may change, the discussion is divided into sections on each of the proposed conservation measures.

Background data are given and social characteristics are described of top ports landing skates is contained in Section 7.6.3 of the SAFE Report, included in this document.

8.8.3 Summary of Factors Important to Assessing Vulnerability

Factors important for community vulnerability include the following:

- Having 50 or more skate permits listing that place as homeport or owner's residence in 2007 or at least 2% of all skate permits by homeport or owner's residence in 2007
- Having landed at least 100,000 lbs of skate in 2007
- Having landed at least $100,000 worth of skate in 2007
- Having skate account for at least 10% of overall pounds landed in the port
- Having skate account for at least 10% of overall value landed in the port
- Areas exhibiting key demographic variables from the 2000 US Census for the port communities profiled based on their fisheries-related factors, including:
    - Top three communities for percent of people in the category of fishing, "farming and forestry"
    - Top three communities in terms of highest percentage of people in poverty
    - The three communities with the lowest population levels
    - median age of residents
    - The three communities with the lowest percentage of persons age 25 or over who have graduated at least high school
    - Top five communities with highest percent of the population 16 or over that is in the labor force but unemployed
    - Having the highest level of occupational dependence, the highest poverty level or lowest level of education among the top three ports by landings and value
- Having 5 or more skate dealers buying in that community
- Presence of a skate processor
- Top ports for bait skate
- Top ports for food skate
- Port with vessels that target skate rather than catch skate as a bycatch
- Top five lobster ports where skate are also landed
- Skate ports having 5% or more of lobster permits listing that place as homeport or owner's residence in 2007
- Ports anticipated to receive the brunt of impacts from the proposed alternatives, as estimated and described in the Economic Impacts analysis (Section 8.7)

The port characteristics and these vulnerability factors are discussed in detail within the SAFE Report (Section 7.6 of this document).

8.8.4 Summary of Economic Impacts

The Economic Impact Analysis in this EIS indicates negative effects for both buyers and sellers (-8 to 17%) of all actions due to reduced quantity of skates landed. The reduction in supply to buyers would have a negative effect on the lobster fisher as well, as bait would be limited.

The major impacts would be on (in order of highest to lowest level of impacts): New Bedford, Chatham and Point Judith, and secondarily Tiverton, Newport, Boston, Stonington, Gloucester, Barnegat Light and Hampton (VA).

8.8.4.1 Combined Factors for Vulnerability

Some towns show up in multiple indices of vulnerability; others in only one. Communities with multiple elements of vulnerability are generally more at risk for potential negative impacts. Those with fewer are generally likely to have more positive outcomes. We must, however, remember that some factors have a stronger impact than others. One very strong impact factor may equal several smaller impacts. Nonetheless, by simple count of factors Chatham and New Bedford, MA and Point Judith, RI are the most at risk.

Taking geographic closeness into account, we can see that communities with 5 or more factors tend to cluster in four areas, 1) Cape Cod (Chatham and Provincetown), 2) the southern shore of Massachusetts (New Bedford, Gloucester, Boston), 3) Rhode Island (Point Judith, Tiverton and Newport) and Connecticut (Stonington) and 4) New Jersey (Barnegat Light/Long Beach).

Risks to individuals and families include job loss, family disruption and damage to long-standing social networks. On the industry side, there is the threat to fishermen, dealers and especially processors of losing workforce locally and market share abroad that may be difficult to regain at a later point in time, as other providers establish new relationships with buyers.

Table 116. Number of combined vulnerability factors per town among the profiled communities

ST	PORT	Number of Factors
MA	Chatham	11
MA	New Bedford	10
RI	Point Judith/Narragansett	10
MA	Boston	8
MA	Gloucester	7
NJ	Barnegat Light/Long Beach	6
RI	Newport	6
RI	Tiverton	6
MA	Provincetown	5
NY	Montauk	5
CT	Stonington	4
MA	Fall River	4
NJ	Sea Isle City	4
ME	Portland	4
NY	Hampton Bays/Shinnecock	3
NJ	Belford/Middletown	2
NJ	Cape May	2
NJ	Point Pleasant/Point Pleasant Beach	2
RI	Little Compton	2
MD	Ocean City/West Ocean City	1
VA	Hampton	1

8.8.4.2 Special effects on the Southern New England lobster fishery

For lobstermen in Southern New England (SNE), Little Skate is critical as bait. Northern New England uses herring or groundfish racks (mainly redfish, codfish and haddock). But for SNE to switch to herring would require trucking it from Maine (as herring landings during lobster season are primarily in the Gulf of Maine). Given that herring degrades rapidly (much more rapidly than skate) it would be difficult to get enough bait. And the degrading problem would be even greater for offshore lobstermen than for inshore vessels. This would be a serious impact on all lobstermen from Massachusetts south.

Little Skates are not overfished, though as juveniles they can be confused with Winter Skate (which are overfished) by people who are insufficiently trained in recognizing them. Andrea Incollingo of The Bait Company in Point Judith notes that she had a NMFS staff person come train her when she began her business and now has no difficulty in distinguishing them. Further, she reports that both her observations and comments from observers show little Winter Skate mixed with Little Skate in landings at her facility. Jim Fox of Sea Fresh USA (Tiverton) and Handrigans (Point Judith) notes that he simply does not buy juvenile bait skates so his boats quickly learn to land only adults. In this way he simply avoids the potential problem.

Lobstermen need for skate fishermen to have large enough possession limits and steady enough year-round supply (as offshore lobstermen fish year-round) in order to stay in business.

8.8.5 Discussion of Specific Conservation Elements of the Alternatives

Material in this section is based on the information above plus 37 interviews with NMFS port agents, skate vessel owners, lobster vessel owners, fishing association staff, dealers and processors throughout the region. One overarching issue for many involved in the skate fishery is a question of how good the science is. Given that wings versus whole skates have only been distinguishable since 2004, and that there is some question of confusion between juvenile little and winter skates, and that fishermen are seeing a lot of skates out on the grounds, there is concern over the accuracy of assessments. This may to some degree undermine any provisions implemented. Others feel that it is not the time to implement new skate regulations, given that there's move afoot to create a skate sector but that this cannot be in place before 2010 even if it is implemented. "Why not wait for the sector?" they ask. There is concern that too quick and drastic action may make it difficult for skate fishermen to adapt economically.

Some wonder why the increasing restriction on groundfish DAS and the fact that the lobster fishery has been cutting back on traps over the past few years aren't enough to ease pressure on the resource. Some processors have already cut back their hours, e.g., from 5am-5pm down to 8am-1pm. Some lobstermen are already having trouble getting bait. If the availability of bait skate is cut dramatically then SNE lobster vessels will have to turn to the herring and menhaden, and the redfish and cod racks, that are more commonly used in ME and northern New England, putting greater pressure on these species. Already ME lobstermen are being required to cut back on herring bait use due to restrictions in Gulf of Maine herring fishing, leaving little opportunity for increased use of herring by Southern New England lobster fishermen.

Several processors noted that if they could not get steady product at sufficient levels they would go the way of many recent dogfish processors and shut down at least their skate division and in some cases their entire facility.

The current economy does not make it any easier for fishermen who are already stressed, though recent drops in fuel prices help to some degree. Some fishermen note that in areas where skate cluster there are few other species in the catch, so it is easy to target or avoid.

8.8.5.1 Trip Limits

Universally, fishermen (both those who target skate and those who catch it as a bycatch), dealers and processors emphasize that 2500 lbs of skate wings per trip would put large numbers of people out of business. Day fishermen like gillnetters seem to see 4800 lbs skate wings per trip as perhaps possible, though 6,800lbs would be better. Trip boats like draggers in New Bedford are currently bringing in 15-20,000lbs and see a drop to 12-14,000lbs as more feasible.

8.8.5.2 Time/Area closures

Chatham fishermen note that the proposed closures cover precisely the grounds they normally fish and would therefore be devastating to their fleet. To go further out beyond the closures would be too expensive in terms of fuel, given the price of skate. In addition, this would push draggers and gillnetters into a smaller section of bottom and lead to gear conflicts.

8.8.5.3 Quota Management

Several skate fishermen said they'd prefer an ITQ or a sector to the measures currently proposed. At least then they'd know how much fish they could catch and could decide when to catch it.

In terms of an annual versus a trimester or a quarterly TAC, many fishermen, processors and dealers expressed a preference for a trimester or quarterly TAC in order to smooth out the flow of product throughout the year. However, since skate catch is seasonal for most fishermen there is some concern over the setting of the within year TACs and there is the question of whether quota underages in one period could be carried over to the next within the year.

8.8.5.4 Prohibition on Using Multispecies Category B DAS to fish for skates

One lobster association staff person noted that this is an excellent way to limit discards. A skate gillnetter noted that as he understands it B days are being cut due to a slightly lower tow on the Albatross that he feels is insufficient to warrant such a large change. More generally, the dropping of B days is expected to turn draggers away from skate and limit total landings – a problem for dealers and processors.

8.8.5.5 Comments on Specific Alternatives

With regard to the specific alternatives proposed, the one most mentioned as feasible for the skate bait fishery is Alternative 4, though 3B was also noted – if the possession limits were higher. Since the final alternative is a combination of Alternative 3B for the wing fishery and Alternative 4 for the skate bait fishery, it is responsive to industry concerns and methods of doing business.

9.0 Other Laws and Executive Orders

9.1 Endangered Species Act

Section 7 of the Endangered Species Act requires federal agencies conducting, authorizing or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species. The NEFMC has concluded, at this writing, that the proposed framework adjustment and the prosecution of the multispecies fishery is not likely to jeopardize any ESA-listed species or alter or modify any critical habitat, based on the discussion of impacts in this document. NMFS has already concurred on that action.

The Council does acknowledge that endangered and threatened species may be affected by the measures proposed, but impacts should be minimal especially when compared to the prosecution of the fishery prior to implementation of the FMP for the NE Skate Complex and Amendment 13 to the NE Multispecies FMP (which governs the amount of effort and types of gear that may be used to fish for skates in areas east of 72°30' W longitude. The NEFMC is now seeking the concurrence of the National Marine Fisheries Service with respect to Amendment 3 to the Skate FMP.

For further information on the potential impacts of the fishery and the proposed management action on listed species, see Section 8.5.

9.2 Marine Mammal Protection Act

The NEFMC has reviewed the impacts of the Proposed Action on marine mammals and has concluded that the proposed management actions are consistent with the provisions of the MMPA. Although they are likely to affect species inhabiting the skate management unit, the measures will not alter the effectiveness of existing MMPA measures, such as take reduction plans, to protect those species based on overall reductions in fishing effort that have been implemented through the FMP and through the NE Multispecies, Scallop, and Monkfish FMPs which determine the total amount of fishing effort that may be used to target those species as well as skates.

For further information on the potential impacts of the fishery and the proposed management action on marine mammals, see Section 8.5.

9.3 Coastal Zone Management Act

Section 307(c)(1) of the Coastal Zone Management Act (CZMA) of 1972, as amended, requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. The CZMA provides measures for ensuring stability of productive fishery habitat while striving to balance development pressures with social, economic, cultural, and other impacts on the coastal zone. It is recognized that responsible management of both coastal zones and fish stocks must involve mutually supportive goals. The Council has developed this amendment document and will submit it to NMFS; NMFS must determine whether this action is consistent to the maximum extent practicable with the CZM programs for each state (Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina). Letters documenting NMFS' determination will be sent to the coastal zone management program offices of each state.

9.4 Administrative Procedure Act

This action was developed in compliance with the requirements of the Administrative Procedures Act, and these requirements will continue to be followed when the proposed regulation is published. Section 553 of the Administrative Procedure Act establishes procedural requirements applicable to informal rulemaking by Federal agencies. The purpose of these requirements is to ensure public access to the Federal rulemaking process, and to give the public adequate notice and opportunity for comment. At this time, the Council is not requesting any abridgement of the rulemaking process for this action.

9.5 Executive Order 13132 (Federalism)

This E.O. established nine fundamental federalism principles for Federal agencies to follow when developing and implementing actions with federalism implications. The E.O. also lists a series of policy making criteria to which Federal agencies must adhere when formulating and implementing policies that have federalism implications. However, no federalism issues or implications have been identified relative to the measures proposed in Amendment 3. This action does not contain policies with federalism implications sufficient to warrant preparation of an assessment under E.O. 13132. The affected states have been closely involved in the development of the proposed management measures through their representation on the Council (all affected states are represented as voting members of at least one Regional Fishery Management Council). No comments were received from any state officials relative to any federalism implications that may be associated with this action.

9.6 Executive Order 13158 (Marine Protected Areas)

The Executive Order on Marine Protected Areas requires each federal agency whose actions affect the natural or cultural resources that are protected by an MPA to identify such actions, and, to the extent permitted by law and to the maximum extent practicable, in taking such actions, avoid harm to the natural and cultural resources that are protected by an MPA. The E.O. directs federal agencies to refer to the MPAs identified in a list of MPAs that meet the definition of MPA for the purposes of the Order. The E.O. requires that the Departments of Commerce and the Interior jointly publish and maintain such a list of MPAs. As of the date of submission of this Amendment, the list of MPA sites has not been developed by the departments. No further guidance related to this Executive Order is available at this time.

9.7 Paperwork Reduction Act

The purpose of the PRA is to control and, to the extent possible, minimize the paperwork burden for individuals, small businesses, nonprofit institutions, and other persons resulting from the collection of information by or for the Federal Government. The authority to manage information and recordkeeping requirements is vested with the Director of the Office of Management and Budget (OMB). This authority encompasses establishment of guidelines and policies, approval of information collection requests, and reduction of paperwork burdens and duplications.

The proposed action for Amendment 3 contains no new collection of information requirements subject to the PRA. The proposed program for ACL monitoring will rely on existing systems to collect data on landings and discards, which have already met PRA requirements. Supporting documents have been submitted to and approvals have been obtained from the Office of Management and Budget (OMB) in association with previous fishery management actions.

9.8 Regulatory Impact Review (EO 12866)

Executive Order 12866

The purpose of E.O 12866 is to enhance planning and coordination with respect to new and existing regulations. This E.O. requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be "significant." Section 8.11.2 of this document represents the RIR, which includes an assessment of the costs and benefits of the Proposed Action, in accordance with the guidelines established by E.O. 12866. The analysis included in the RIR shows that this action is a not "significant regulatory action" because it will not affect in a material way the economy or a sector of the economy.

E.O. 12866 requires a review of proposed regulations to determine whether or not the expected effects would be significant, where a significant action is any regulatory action that may

•Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

•Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

•Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

•Raise novel legal or policy issues arising out of legal mandates, the President's priorities, of the principles set forth in the Executive Order.

Of these four criteria, the discussion to follow focuses only on the expected magnitude and duration of the economic impacts of the Proposed Action. The Proposed Action would implement a suite of measures that have been designed to would meet the conservation objectives of the FMP for the NE Skate Complex and of the Magnuson-Stevens Fishery Conservation and Management Act. These regulatory changes would promote increases in biomass to restore conditions to produce MSY, promote rebuilding of overfished thorny skate, and reduce the risk of overfishing, assuring that the long term economic benefits of rebuilding will be realized.

The Proposed Action would implement a number of regulatory measures some of which would reduce effort on stocks of concern while minimizing impacts and providing flexibility to the skate fishery which supplies bait to the lobster fishery. The Proposed Action would have a direct affect on commercial fishing vessels, but not on recreational anglers. The Proposed Action would also have indirect impacts on the regional economy through changes in purchases by fishing vessels, seafood dealers, and processors as well as changes in purchased by affected households. These impacts, detailed in Section 8.7, are summarized below.

Executive Order 12886 of 1993 is intended to limit the promulgation of regulations to those that are required by law, or are made compelling public need. In the latter category are the failure of private markets to protect and improve the health and safety of the public, the environment or the well-being of the American people. Selection of the ways and means of regulation is to require, where practical, an assessment of all costs and benefits of available regulatory alternatives including the alternative of not regulating. In choosing among alternatives, agencies are instructed to select approaches that maximize net benefits, unless a statute requires another regulatory approach. Net benefits are to include potential economic, environmental, public health and safety, and other advantages such as distributive and equity impacts. The Regulatory Principles state a dozen Principles to which agencies should adhere. They are:

(1) Each agency shall identify in writing the specific market failure (such as externalities, market power, lack of information) or other specific problem that it intends to address (including, where applicable, the failures of public institutions) that warrant new agency action, as well as assess the significance of that problem, to enable assessment of whether any new regulation is warranted.

(2) Each agency shall examine whether existing regulations (or other law) have created, or contributed to, the problem that a new regulation is intended to correct and whether those regulations (or other law) should be modified to achieve the intended goal of regulation more effectively.

(3) Each agency shall identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public.

(4) In setting regulatory priorities, each agency shall consider, to the extent reasonable, the degree and nature of the risks posed by various substances or activities within its jurisdiction.

(5) When an agency determines that a regulation is the best available method of achieving the regulatory objective, it shall design its regulations in the most cost-effective manner to achieve the regulatory objective. In doing so, each agency shall consider incentives for innovation, consistency, predictability, the costs of enforcement and compliance (to the government, regulated entities, and the public), flexibility, distributive impacts, and equity.

(6) Each agency shall assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs.

(7) Each agency shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information concerning the need for, and consequences of, the intended regulation or guidance document.

(8) Each agency shall identify and assess alternative forms of regulation and shall, to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt.

(9) Wherever feasible, agencies shall seek views of appropriate State, local, and tribal officials before imposing regulatory requirements that might significantly or uniquely affect those

governmental entities. Each agency shall assess the effects of Federal regulations on State, local, and tribal governments, including specifically the availability of resources to carry out those mandates, and seek to minimize those burdens that uniquely or significantly affect such governmental entities, consistent with achieving regulatory objectives. In addition, as appropriate, agencies shall seek to harmonize Federal regulatory actions with related State, local, and tribal regulatory and other governmental functions.

(10) Each agency shall avoid regulations and guidance documents that are inconsistent, incompatible, or duplicative with its other regulations and guidance documents or those of other Federal agencies.

(11) Each agency shall tailor its regulations and guidance documents to impose the least burden on society, including individuals, businesses of differing sizes, and other entities (including small communities and governmental entities), consistent with obtaining the regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations.

(12) Each agency shall draft its regulations and guidance documents to be simple and easy to understand, with the goal of minimizing the potential for uncertainty and litigation arising from such uncertainty.

9.8.1 Principle 1: Problems addressed

This Principle requires that, "*Each agency shall identify in writing the specific market failure (such as externalities, market power, lack of information) or other specific problem that it intends to address (including, where applicable, the failures of public institutions) that warrant new agency action, as well as assess the significance of that problem, to enable assessment of whether any new regulation is warranted.*"

In the context of fish harvesting, market failures have been a problem five decades. The basis of the failure is biological (a finite, renewable resource), and institutional; however, the reason for proposed action is based on the biological need to end overfishing and rebuild several skate stocks. The multispecies nature of the vessels and gear that harvest skates, the geographical and seasonal differences and the (species correlated) differences in product markets between skate species, complicate attainment of this desirable conservation objective.

The ideas of species-specific, quantitative limits, or non-global input restrictions (e.g. Multi species days at sea), inevitably encounter difficulties when every species is to be maintained at some high level. An alternative might be based on revenue metrics such as revenue quotas of revenue days at sea. However, while these approaches might allow increased flexibility and reduce discards, their effects on particular low valued species is threatening under certain circumstances. The fact that they reduce the incentives to high grade and discard, also may mean increased catches of low-valued, high CPUE species; regardless of stock status.

The economic analysis has quantified the economic effects of the measures by a sensitivity analysis of alternative percentage reductions in skate landings. The measures used were economic surpluses of buyers and sellers. These included a Buyers Surplus to skate marketers, Sellers' Surplus to skate harvesters, and a Buyers Surplus to the RI lobster industry. Changes in these surpluses were estimated for percentage reductions in skate landings fro zero percent (the status quo), to 50 percent. The following

Figure 52 shows graphically how Economic Surpluses decline in all three sectors when skate landings fall. The largest surplus (and reduction thereof), is in the marketing of skates. The declines are linear when plotted against percent skate reduction. The total economic surplus declines range from zero at the status quo, to $568 thousand when skate landings are halved. Not only is the decrease largest for the marketing sector; the rate of decline is steeper. (It should be noted that the horizontal axis is percent decrease, not a in decrease in quantity of skate landings.) This is equivalent to a logarithmic scale. That is because, for example, a 10 percent decline from a base of 100pounds is a 10-pound reduction, but a 10 percent decline from a base of 20 pounds is only a 2-pound change.

9.8.2 Principle 2: Existing regulations

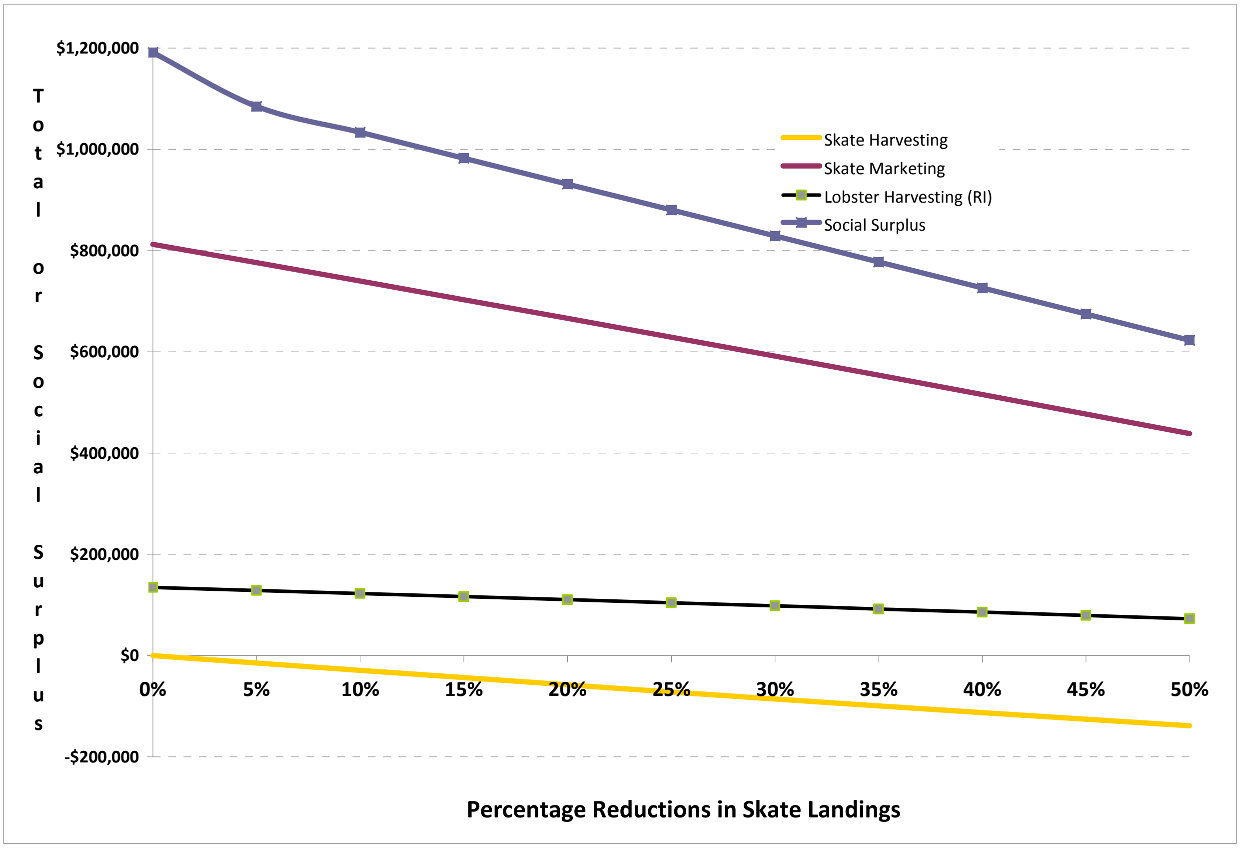
It is possible that existing regulations in the Multispecies fishery may have contributed to increased harvest of skates. However, DAS limits appear not to have been limiting in recent years (pers. Comm., E.Thunberg, NEFSC). Also, the statistical analyses of supply and demand show no patterns in recent years that could reasonably be imputed to existing regulations. An important factor has been increased export demand, undoubtedly encouraged by favorable exchange rates for US exports.

9.8.3 Principle 3: Alternatives

The Plan Development Team (PDT) for skates identified the following three area management options for analysis:

(1) Time/area closures that apply to vessels that target skate species
(2) Seasonal gear restricted areas that could apply to vessels fishing with any of the following gears: Trawls (small and large mesh), gillnets, scallop dredges, and hook gear.
(3) Seasonal gear restricted areas as above, but implemented as an in-season accountability measure (AM) triggered when catch exceeds a specified threshold.

Figure 52. Predicted change in economic surpluses by sector in response to lower skate landings.



9.8.4 Principle 4: Risks

No significant change in risks is expected.

9.8.5 Principle 5: Cost effectiveness

The incidence or distribution of economic surpluses between states is presumably related to the distribution of landings which was presented in Table 3 which was presented and discussed earlier. Note particularly the economic surplus decrease associated with the RI lobster fishery where small skates are used as bait. However, this is much the smaller of the measured surplus changes.

The enforceability of the options (repeated under Principle 3, above), appears reasonable. The three options are consistent with past regulations by the NEFMC. Incentives remain for innovation; indeed, concern is expressed that the supply curve may drift upward which would further diminish economic surpluses even if conservation objectives are realized.

9.8.6 Principle 6: Benefits and Costs

The costs (reductions in benefits) have been estimated for regulatory actions that reduce skate landings. The costs are measured by reduced economic surpluses as discussed earlier. Additional costs for monitoring and compliance have not been estimated but are not expected to be high since the proposed action would entail modifications to restrictions already in place. Estimation of benefits requires a projection of stock recovery rates. At present, biological knowledge of the various skate species is insufficient to permit such a projection.

9.8.7 Principle 7: Best Available Information

The FMP is based on the best available information.

9.8.8 Principle 8: Performance Objectives

The performance objective is stock recovery.

9.8.9 Principle 9: Views of Appropriate State, Local and Tribal Officials

The views of appropriate officials will be contained in public hearings and comments on the draft FMP.

9.8.10 Principle 10: Avoidance of Regulations that are Inconsistent, Incompatible or Duplicative

Avoidance is attained via the processes of Plan Development, Council and its advisory committees and the public review and comment process. In particular, the Skate FMP relies on regulations in other FMPs to the extent practicable to achieve its goals, because nearly all skate fishing must occur on a multispecies, monkfish, or scallop DAS trip. Thus, the Skate FMP avoids duplicate or incompatible regulations which apply to vessels permitted in these fisheries.

9.8.11 Principle 11: Least Burden on Society

The FMP for skates is based on rather minimal extension of similar regulations used in the Multispecies fishery whose vessels account for most of skate landings. The ideas of species-specific, quantitative limits, or non-global input restrictions (e.g. Multispecies DAS), inevitably encounter difficulties when every species is to be maintained at some high level. An alternative might be based on revenue metrics such as revenue quotas of revenue DAS. However, while these approaches might allow increased flexibility and reduce discards, their effects on particular low valued species is threatening under certain circumstances. The fact that they reduce the incentives to high grade and discard, also may mean increased catches of low-valued, high CPUE species; regardless of stock status.

9.8.12 Principle 12: Simplicity

The options proposed are simple and familiar, by example, to fishermen and regulators and should minimize uncertainty and litigation.

9.8.13 Summary and Conclusions

The proposed regulations would result in reductions in economic surpluses of $0-$568 thousand on an annual basis. A present value analysis was not done because the rates of recovery of skate stocks are unknown. These reductions in surpluses consist of reductions in (1)Buyers surplus (in skate marketing), Sellers' Surplus (in skate harvesting) and Buyers' Surplus (in the RI lobster fishery). The largest of these reductions in economic surplus is in Buyers' Surplus and amounts to two-thirds of the total.

The major regulatory question with the options proposed is their efficacy in achieving stock recovery. This question arises from uncertainties about the behavioral responses of fishermen and the available biological knowledge. It is reasonable to assert that, while uncertain in their effectiveness, the options presented are potentially more conservative than doing nothing. To the extent that the regulations are less than fully successful in reducing skate harvests, the projected reductions in economic surpluses will be correspondingly less.

9.8.13.1 Summary of Recreational Fishing Impacts

The proposed action has no effect on recreational fishing.

9.8.13.2 Mitigating Measures

No mitigation is necessary, since the environmental impacts

9.9 Initial Regulatory Flexibility Analysis (IRFA) - Determination of Significance

The purpose of the Regulatory Flexibility Act (RFA) is to provide opportunities for small entities to participate in the development of proposed regulations and to identify ways to reduce the regulatory burden and record-keeping requirements on small businesses. To achieve this goal, the RFA requires government agencies to describe and analyze the effects of regulations and possible alternatives on small business entities. Based on this information, the Regulatory Flexibility Analysis determines whether the proposed action would have a “significant economic impact on a substantial number of small entities.”

9.9.1 Problem Statement and Objectives

The purpose of action and the need for management are explained in Section 3.0.

9.9.2 Management Alternatives and Rational

Proposed management alternatives and their rational are explained in Section 5.0

9.9.3 Description and Number of Small Entities to which the Rule Applies

The RFA recognizes three kinds of small entities: small businesses, small organizations, and small governmental jurisdictions. The proposed action would only affect small businesses engaged in the harvesting fish. The small business size standard for businesses engaged in any fish-harvesting or hatchery business that is independently owned and operated and not dominant in its field of operation, with receipts of up to $4.0 million annually.

In practice, although some firms own more than one vessel, available data make it difficult to reliably identify ownership control over more than one vessel. For this reason, the number of permitted vessels is considered to be a proxy for the number of small business entities. The proposed action may affect any vessel that may be eligible to retain skates on any given fishing trip. During 2007 there were a total of 2,685 vessels that were issued a permit that would allow the operator to harvest skates for commercial sale. However, during 2007 there were only 542 vessels that participated in the skate fishery. That is, approximately 20% of the potential universe of regulated entities actually landed any skates for commercial sale.

The regulated fishing entities participating in the New England Skate fishery may all be classified as small entities for purposes of the RFA since no one vessels had gross sales that exceeded $4 million. Analysis of the economic impacts of the proposed action was conducted using trip level data which required reasonably complete information on trips that either landed skate wings or whole skates as well as sales of fishery products on trips that did not land skates. For this reason 43 of the 542 participating vessels had to be dropped from further analysis. The impact on these 43 vessels may be expected to be within the range of the remaining 499 vessels that were retained for further analysis.

Of the 499 participating vessels average, total sales were $296 thousand per vessel, of which, revenue from skate sales averaged $13 thousand; approximately 4% of total annual sales (Table 1).

Table 117. Skate fishery summary data for 2007 (source: VTR data)

Number of Vessels	499
Total annual revenue from skates	6,734,433
Average revenue from skates	13,415
Total annual revenue from all trips	148,939,613
Average annual revenue from all trips	296,692

9.9.4 Economic Impact of the Proposed Action

The combination of proposed action possession limits for the wing fishery and the whole/bait skate fishery would have no adverse impact on 372 (74.5%) of the 499 participating vessels included in the analysis (Table 2). That is, skate landings on trips taken by these vessels during 2007 were below the proposed possession limits. Aggregate impacts on the 127 vessels that would be adversely affected included a 14.9% reduction in skate revenues, but their total combined revenues would be reduced by 5.5%. These short-term decreases in revenue are essential in order to increase future skate biomass, yield and revenue. Without any action, the skate biomass is not expected to reach OY and therefore the loss of future yield and revenue may be greater than the short term revenue loss under any alternative.

Table 118. Impact on number of vessels, skate revenue and total revenue compared to 2007.

No of vessels affected	***127 (25.45 %)***
No of vessels with no impact	372 (74.55 %)
% change in skate Revenue	-14.93%
% change in total revenue	-5.49%

Total annual revenues were estimated to decline by 5.5% for the 127 adversely affected fishing entities. However, the impacts of the proposed alternative on any given fishing business may be expected to differ depending on how dependent the vessel owner is on skates. Dependency was calculated as the proportion of total annual sales of all fishery products that was from the sale of skate products. The economic impacts are analyzed by dependency group where dependency categories were constructed based on quartiles of the distribution of skate dependency. As shown in Table 119, almost 75% of the 499 participating vessels have a low dependency on skate fishery (less than 5 %). Among adversely affected entities the estimated impact on gross sales increases markedly with dependence on skates. That is, the change in gross fishing revenue was less than 1% among vessels in the lowest quartile (i.e. less than 1% dependence on skates). By contrast, fishing revenue losses for vessels at the upper end of the dependency spectrum totaled 27.8% of gross sales.

Table 119. Estimated impact of the preferred alternative on number of vessels and gross revenue by dependency on skate

Dependency Groups	**# of vessels affected**	**% change in annual gross revenue**
≤ 0.19% (n=125)	2	-0.75%
0.19% to 0.91% (n=125)	16	-1.76%
0.91% to 4.75% (n=124)	34	-6.94%
4.75% to 100% (n=125)	75	-27.75%

The small business size standard is expressed in terms of annual sales. For this reason, impacts on small entities were evaluated to examine differences by level of sales where categories were created based on quartiles of the distribution of the total revenue. Among adversely affected vessels the expected reduction in gross sales was approximately equivalent among vessels with gross sales of less than $103 thousand (9.1%) and vessels with gross sales of between $103 and $207 thousand (10.4%). Aggregate revenue losses were nearly twice as great for vessels with sales from $207 to $420 thousand (20.6%), but there were more than twice as many adversely affected vessels in this sales quartile than in either of the lower two quartiles. Overall, the largest number of adversely affected vessels were in the highest gross sales quartile, however, the aggregate loss in revenue was less than vessels in the third quartile and were similar to that of revenue losses among vessels in either the first or second quartile.

Table 120. Impact of the preferred alternative on number of vessels and gross revenue by revenue group

Revenue Groups (thousand dollars)	**# of vessels affected**	**% change in annual gross revenue for the vessels impacted**
$0 to $103 (n=125)	13	-9.14%
$103 to $207 (n=125)	17	-10.45%
$207 to $420 (n=124)	39	-20.57%
$420 and above (n=125)	58	-12.67%

9.9.5 Economic impacts of non-selected alternatives

All other alternatives that were considered would lead to a decline in revenue. The impacts of the alternatives under option 1 and 2 are displayed in Table 121 and Table 122 respectively. Although alternative 4 appears to have the least impact on revenue, the quantified economic effects for this alternative 4 are underestimated because it does not include the likely negative impacts of quota management for the skate bait fishery. These impacts could not be quantified because the timing and effects are unpredictable and will vary form year to year. Other than alternative 4, alternative 1 under option 1 is expected to have the least impact on revenues.

Table 121. Estimated effects number of vessels, skate and total revenue by alternative

	Alternatives 1A and 1B	**Alternatives 3A and 3B**	**Alternative 4**
# of vessels affected	128	145	99
Percent change in skate revenue	-13.91%	-16.54%	-7.70%
Percent change in total revenue	-5.11%	-6.08%	-2.83%

Table 122. Estimated effects on number of vessels, trips and revenue by alternative compared to status quo under option 2 (preferred alternative is in bold)

	Alternatives 1A and 1B	Alternatives 3A and 3B	Alternative 4
# of vessels affected	120	127	109
Percent change in skate revenue	-12.23%	-14.93%	-9.25%
Percent change in total revenue	-4.50%	-5.49%	-3.40%

9.10 COMPLIANCE WITH THE INFORMATION QUALITY ACT (IQA)

Pursuant to NMFS guidelines implementing Section 515 of Public Law 106-554 (the Information Quality Act), all information products released to the public must first undergo a Pre-Dissemination Review to ensure and maximize the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies. The following paragraphs address these requirements.

9.10.1 Utility

The information presented in this document is helpful to the intended users (the affected public) by presenting a clear description of the purpose and need of the proposed action, the measures proposed, and the impacts of those measures. A discussion of the reasons for selecting the proposed action is included so that intended users may have a full understanding of the proposed action and its implications. The intended users of the information contained in this document include individuals involved in the skate fishery, (e.g., fishing vessels, fish processors, fish processors, fishery managers), and other individuals interested in the management of the skate fishery. The information contained in this document will be helpful and beneficial to owners of vessels holding skate permits since it will notify these individuals of potential changes in skate management and applicable possession limits. This information will enable these individuals to adjust their management practices and make appropriate business decisions based upon this revision to the FMP.

Until a proposed rule is prepared and published, this EIS/RIR/IRFA is the principal means by which the information contained herein is available to the public. The information provided in this document is based on the most recent available information from the relevant data sources. The information contained in this document includes detailed and relatively recent information on the skate resource and, therefore, represents an improvement over previously available information. For example, the Affected Human Environment section of the EIS updated the information contained in the most recent (FY2002) Stock Assessment and Fishery Evaluation (SAFE Report) for the skate fishery (included in the EIS for the FMP). In addition, this document includes applicable information from the most recent skate stock assessment (July 2006). This EIS/RIR/IRFA will be subject to public comment through proposed rulemaking, as required under the Administrative Procedure Act and, therefore, may be improved based on comments received.

This document is available in several formats, including printed publication, and online through the NEFMC's web page (www.nefmc.org). The Federal Register notice that announces the proposed rule and the final rule and implementing regulations will be made available in printed publication, on the website for the Northeast Regional Office (www.nero.noaa.gov), and through the Regulations.gov website. The Federal Register documents will provide metric conversions for all measurements.

9.10.2 Integrity

Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction, to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information. All electronic information disseminated by NMFS Service adheres to the standards set out in Appendix III, "Security of Automated Information Resources," of OMB Circular A-130; the Computer Security Act; and the Government Information Security Act. All confidential information (e.g., dealer purchase reports) is safeguarded pursuant to the Privacy Act; Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business, and financial information); the Confidentiality of Statistics provisions of the Magnuson-Stevens Act; and NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics.

9.10.3 Objectivity

For purposes of the Pre-Dissemination Review, this document is considered to be a "Natural Resource Plan." Accordingly, the document adheres to the published standards of the Magnuson-Stevens Act; the Operational Guidelines, Fishery Management Plan Process; the Essential Fish Habitat Guidelines; the National Standard Guidelines; and NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act.

This information product uses information of known quality from sources acceptable to the relevant scientific and technical communities. Several sources of data were used in the development of Amendment 3. These data sources included, but were not limited to, historical and current landings data from the Commercial Dealer Weighout database, vessel trip report (VTR) data, effort data collected through the multispecies/monkfish/scallop DAS programs (including VMS), fisheries independent data collected through the NMFS bottom trawl surveys, and the July 2006 skate stock assessment. Therefore, the analyses contained in this document were prepared using data from accepted sources. Furthermore, these analyses have been reviewed by members of the Skate Plan Development Team.

Despite current data limitations, the conservation and management measures proposed for this action were selected based upon the best scientific information available. The analyses conducted in support of the proposed action were conducted using information from the most recent fishing years through FY2007. Specialists (including professional members of plan development teams, technical teams, committees, and Council staff) who worked with these data are familiar with the most current analytical techniques and with the available data and information relevant to the skate fishery. In addition, this action utilizes information from the July 2006 skate stock assessment updated with the 2006 and 2007 fisheries surveys, which are considered the best and most recent scientific information available concerning the status of the skate resource.

The policy choices are clearly articulated, in Section 5.0, as the management alternatives considered in this action. The supporting science and analyses, upon which the policy choices are based, are summarized and described in Section 8.0. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency.

The review process used in preparation of this document involves the responsible Council (the NEFMC), the Northeast Fisheries Science Center (Center), the Northeast Regional Office (NERO), and NMFS

Service Headquarters. The Center's technical review is conducted by senior level scientists with specialties in population dynamics, stock assessment methods, demersal resources, population biology, and the social sciences. The Council review process involves public meetings at which affected stakeholders have opportunity to provide comments on the document. Review by staff at the Regional Office is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. Final approval of any proposed regulatory action, including any implementing regulations, is conducted by staff at NMFS Service Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget. In addition, the information contained in this document concerning skate stock status (Northeast "Data Poor" Stocks Working Group: Skate) was peer reviewed according to standard methodology (Stock Assessment Review Committee; SARC). A future review by this group is planned in December 2008.

10.0 GLOSSARY

A glossary of terms and acronyms used in this document is contained in the SAFE Report as (Section 7.7).

11.0 LITERATURE CITED

In addition to the references (Section 7.8) included in the SAFE Report (Section 7.0), the following references to published literature are included in this document. For references not listed below, please also consult Section 7.8.

Gates, J.M. 2000."Input Substitution in a Trap Fishery," ICES Journal of Marine Science, 57: 89-108. . Agr. Exp. Sta. Cont. No. 3672.

Northeast Data Poor Stocks Working Group (DPWS). 2009a. Report by the Peer Review Panel for the Northeast Data Poor Stocks Working Group. 38 pp. Report available at: http://www.nefsc.noaa.gov/nefsc/saw/datapoor/Data Poor - Review Panel Report Final-1-20-09.pdf.

Northeast Data Poor Stocks Working Group (DPWS). 2009b. The Northeast Data Poor Stocks Working Group Report, December 8-12, 2008 Meeting. Part A. Skate species complex, Deep sea red crab, Atlantic wolfish, Scup, and Black sea bass. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 09-02; 496 p. Report available at: http://www.nefsc.noaa.gov/publications/crd/crd0902/.

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14.0 INDEX

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15.0 COMMENTS

15.3 Scoping Comments

Skate Amendment 3 Scoping Hearings
Staff summary of comments
May 22-24, 2007

The hearings were sparsely attended, the highest turnout was in Narragansett, RI by a processor and several fishermen that target skates for the lobster bait fishery. No fishermen that target skates for the wing fishery attended. All were in support of rebuilding skates in the context of an overall groundfish management policy and favored combining skates into groundfish management via Amendment 16. There were no comments on how that would be done, however, or whether skate fishermen would qualify for a groundfish permit, or whether groundfish fishermen would be able to target skates, or whether fishermen in the scallop or monkfish fisheries would be able to land skates, if the plans were combined.

Groundfish fishermen were against additional measures to protect and rebuild skates, which could constrain their access to the groundfish fishery, particularly for the healthier stocks. Some suggested reducing the skate possession limit for the wing fishery. They were generally opposed to area management for skates to reduce incidental catch.

Fishermen in the bait fishery opposed additional restrictions on that fishery if the problem was caused by incidental catch and large amounts of discarding elsewhere. They commented that the differential Days at Sea (DAS) accounting was preventing fishermen from targeting skates in areas where the differential accounting applied.

Skate Amendment 3 Scoping Hearing
Gloucester City Hall
Gloucester, MA
May 22, 2007

Mike Leary chaired the hearing and read an introduction which outlined the purpose for the amendment and the expected timeline for developing the amendment.

The meeting was attended by two NOAA Fisheries employees and one skate advisor.

Comments:

<u>Paul Perra (Resident City of Gloucester)</u>

- Glad that Council is developing and amendment to address the overfished condition of skate stocks.

<u>Chuck Casella. (Recreational Fisheries Alliance)</u>

- Skates are a part of the groundfish complex and the Council should recognize the importance of the long term goal for groundfish rebuilding.

- The Council should avoid taking actions that jeopardize rebuilding of our groundfish stocks, including skates.

Skate Amendment 3 Scoping Hearing
Narragansett City Hall
Narragansett, RI
May 23, 2007

Dave Preble chaired the hearing and read an introduction which outlined the purpose for the amendment and the expected timeline for developing the amendment.

He summarized the purpose for the amendment as follows: NMFS has determined that winter skates are overfished. Thorny skates also have been overfished since 2003. Little and smooth skate are in danger of becoming overfished. The data for this determination are derived from an index based survey. Twelve percent (12%) of skates are landed whole, 34% landed as wings, and 54% of the total skate catch in 2006 are discarded.

The timeline for this amendment requires that written scoping comments must be received by May 30th. A framework of potential management alternatives are to be reported to the Council at the June meeting. The PDT will analyze the alternatives and the Council will approve a draft amendment in September, which would go to public hearing late this year. The Council would approve a final alternative in January and submit the final amendment by the February 2008 deadline.

The meeting was attended by a skate processor, three fishermen, two students from SMAST, a person from URI, and a local reporter.

Comments:

<u>Bob Wescott – Part-time Judith skate and groundfish fisherman, skate advisor</u>

- How the Council manages a wing possession limit is a concern. He favored a possession limit on a per trip basis with a maximum number of trips a vessel could make in a week. Such an approach would keep people from making multiple trips in a week to offset a lower wing possession limit.

- The new skate plan should be incorporated in groundfish Amendment 16, due to the skate waste being discarded, mostly in the groundfish fishery.

<u>Andrea – Lobster bait company</u>

- The company buys whole skates, which are primarily little skates.

- The skate plan should be included in the upcoming groundfish Amendment 16.

- The data used to determine the risk of overfishing occurring with the little skate should be examined closely.

- The bait fishery has declined due to the more restrictive lobster regulations. She was concerned that vessels targeting skates would be penalized due to discards in other sectors. Most RI boats target skates for bait, and during parts of the year, winter skates are abundant in the size that can be cut for wings.

- She asked the Council to favor alternatives that would protect the directed bait fishery.

Glenn Wescott – an owner of the FV Ocean State

- Some regulations, like the 2:1 DAS counting area in Southern New England, prevent fishermen to go out to catch bait fish or even large skates [because the revenue from skate landings does not justify the cost of using a groundfish day-at-sea at a 2:1 ratio].

- There has been quite a drop in little skate/bait landings, because of the double day-at-sea counting.

Frank Gable – URI Coastal Institute

- The Skate and Monkfish FMPs should be included in Groundfish Amendment 16, which would allow the Council to pursue more ecosystem management. The species [regulated by the three plans] are generally caught together. The whiting amendment should be also combined into groundfish management to move management toward ecosystem-based approaches to fisheries.

Skate Amendment 3 Scoping Hearing
Massachusetts Maritime Academy
Buzzards Bay, MA
May 24, 2007

Rip Cunningham chaired the hearing and read an introduction which outlined the purpose for the amendment and the expected timeline for developing the amendment, then opened the hearing for comments.

The meeting was attended by a groundfish fisherman and representatives of the CCCHFA and the Fisheries Survival Fund.

Comments:

<u>Frank Mararchi – commercial fisherman from Scituate</u>

- The driver of productivity in the region is the groundfish fishery, which skates are a component. Other than that, there is some directed fishery for skates occurring inshore with large mesh gillnets.

- He is concerned that because of actions taken to rebuild skates, fishermen would loose the opportunity to fish for groundfish.

- Skates are among most mobile of fish caught. There is a large variation in catch rates, probably caused by water temperature and the availability of feed. Sometimes skates dominate the catch or virtually disappear. He is concerned about discards, including thorny which are a significant portion of the catch in the Gulf of Maine. Survivorship from discarding is a key factor.

- Skates, being the first test of ACLs and AMs, could require a conservative approach which may make it more difficult to have access to groundfish.

- The present measures in groundfish fishery are failing to protect skates and achieve target fishing mortality rates. But the groundfish fishery management program has to be fixed before the Council can fix skates. Overlays of skate protective areas won't work. Output based management system for groundfish should be considered, including the proposed point system.

<u>Ron Smolowitz – Fisheries Survival Fund</u>

- Opposed to closing areas to skate fishing to fisheries that have a high bycatch of skates. It is folly to bring skates up to the level suggested which may keep other species like yellowtail flounder suppressed (due to species interactions). The Council should strive to achieve levels of the 1960s when things were more in balance.

- Area management for skates will be like the skate tail wagging all the fisheries. It would cause a huge economic loss and area management is not the proper approach. The first step should be a target TAC looking at the landings of skates.

- The Council should manage skates in an ecosystem context.

Eric Brazer – Georges Bank cod hook and fixed gear sectors

- The association has clear support for hard TACs, ACLs, and output control management. Switching to accountable enforceable output controls will bring the mortality under control.

- Rather than managing by input controls, there should be more emphasis on enumeration of catch, including discarding.

- The current skate possession limit may be excessively high. The Council should consider a possible severe reduction in the possession limit to rebuild skates. Vessels very rarely achieve the 10,000 pound skate possession limit.

- Closing areas to rebuild skates is a touchy subject. Area management should include exemptions for gears proven not to interact with skates. Areas should be closed to gear that is accountable for the discard problem.

- Skate management should be folded into the Multispecies FMP. He was also concerned that requirements for skate rebuilding would cause fishermen to loose access to groundfish and healthy stocks.

15.4 Written Comments on the Draft Amendment and EIS

iFrom: chuck etzel [mailto:chucketzel@yahoo.com]
Sent: Thursday, April 12, 2007 8:47 PM
To: Joan O'Leary
Subject: skate amendment 3 comment

To whom it may concern,

Trawls must be designed to avoid flatfish, skates ,and monkfish while vessels and fishing on non das for other species. Raised footropes seem like an easy way to allow species that stay low on the bottom to pass between the net and footrope.

Attention:
Ms Patricia A. Kurkul
Reg. Administrator
NMFS

Dear Ms Kurkul:

There are three points I would like to stress in consideration of a workable plan:
1. Incorporate the Skate Management Plan with upcoming Amendment 16 (ground fish) Plan.
2. Cut the winter skate fishery catch quotas by 50% to address the overfishing.
3. It is a fact that boats are using "A" days to catch bait skates (little skates). The boats will fish in "1 for 1" areas first. There will be very little fishing pressure in the "2 for 1" areas. It is virtually a protected zone for yellowtail, flounder, cod, little and winter skates.

Thank you for your consideration of the above.

Regards,
Robert Westcott
Skate Advisor
Capt. F/V Ocean State

Advocates for Wild, Healthy Oceans
2029 K Street, NW
Washington, DC 20006

202.429.5609 Telephone
202.872.0619 Facsimile
www.oceanconservancy.org

May 31, 2007

Patricia A. Kurkul, Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

The Ocean Conservancy

Dear Ms. Kurkul:

On behalf of the Ocean Conservancy, we appreciate this opportunity to comment on the scoping document for Amendment 3 to the fishery management plan (FMP) for Northwest Atlantic skates.

As you know, the Ocean Conservancy was closely involved in the development of a skate management plan and pressed hard for a precautionary approach to management of these slow growing species, including stringent restrictions on their catch and mandatory requirements for species-specific data collection. We are therefore deeply dismayed to learn that four years after management began, data has not been reported as planned and the conservation status for these species looks no better and in many cases worse. Specifically, we are deeply disappointed that:

- Thorny skates have not increased and remain overfished despite a prohibition on landings;
- Winter skate biomass has declined by nearly 50% since FMP implementation;
- Little skates are likely to become overfished and experience overfishing in the near future;
- Smooth skates, taken primarily as bycatch, have not increased and are near the overfished threshold, despite decreases in groundfish fishing effort;
- Poor identification and insufficient monitoring continue to hamper collection of sorely needed species-specific data on skate catches;
- Discards have significantly exceeded landings, yet discard mortality remains unknown;
- Potential for bycatch reduction using gear modification is viewed as “limited”; and
- Scientists are still unable to project rebuilding scenarios.

We firmly agree with the conclusion that broad scale reductions in skate mortality are needed and offer our strongest support for Skate Plan Development Team (PDT) recommendations, including:

- Immediate action to reduce mortality of winter and little skates;
- Development of a rebuilding schedule for winter and thorny skates, consistent with the Magnuson-Stevens Act (MSA) and National Standard guidelines;
- Substantial reductions in skate discards;
- Annual monitoring of skate biomass including comparison with biomass rebuilding trajectories;

- Prompt, periodic adjustments in fishing effort or allowable catch as dictated by analysis;
- An adaptive management approach in order to ensure rebuilding;
- Emphasis on mortality reductions and increased size selection to allow rebuilding of older, mature skates;
- Establishment of annual catch limits and accountability measures, as mandated by the MSA.

With regard to measures outlined in the Council's scoping document, we favor:

- Hard limits on Total Allowable Catch (TAC) as a complement to Days at Sea restrictions;
- Substantial reduction of the wing possession limit;
- Establishment of a stringent bait fishery possession limit;
- Closure of bottom trawling and dredging areas that comprise 75% of the exploitable biomass distribution for protected skates;
- Thorough exploration of potential gear modifications to reduce skate catch in various fisheries; and
- Limits on skate catch by exempted fisheries.

We also urge fishery managers to consider:

- Prohibition on landings of winter skate; and
- Further incentives and/or penalties to ensure collection of species specific data.

We take this opportunity to remind you that skates are among the most biologically vulnerable species within the New England Council's purview. As evidenced by the deteriorating status of most species under existing management measures, skates require an especially cautious management approach. We urge the Council and the National Marine Fisheries Service to develop and implement meaningful and substantial improvements to the Skate FMP before further damage is done.

Thank you for this opportunity to express our views.

Sincerely,

Sonja Fordham
Director, Shark Conservation Program

John Williamson
Regional Fish Conservation Program Manager

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

OFFICE OF THE
REGIONAL ADMINISTRATOR

November 6, 2008

Patricia Kurkul
Regional Administrator
Northeast Regional Office
National Oceanic and Atmospheric Administration
1 Blackburn Drive
Gloucester, Massachusetts 01930

Re: Draft Amendment 3 to the Fishery Management Plan (FMP) for the Northeast Skate Complex and Draft Environmental Impact Statement (DEIS) (CEQ# 20080375)

Dear ~~Administrator~~ Pat Kurkul:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, we have reviewed the Draft Environmental Impact Statement (DEIS) for Draft Amendment 3 to the Fishery Management Plan (FMP) for the Northeast Skate Complex. Based on our review of the DEIS we have no objections to the project as described and we rate this EIS "LO-1 - Lack of Objections--Adequate" in accordance with EPA's national rating system, a description of which is attached to this letter.

We offer the following comments for your consideration as you work to develop the FEIS for the project:

- The DEIS states that no changes to skate EFH descriptions or designations are proposed. The environmental impacts of the different alternatives with regards to EFH are not developed in the DEIS and do not provide a clear basis for choice among alternatives. We encourage you to include this information in the FEIS.

- The DEIS states that discards/by-catch of other fish and shellfish have not been estimated and are unpredictable. We believe the FMP should be structured to minimize discards. While both the Target Tac approach and the Hard Tac approach have the potential to increase skate discards, EPA supports the Target Tac approach because it is anticipated to result in a less dramatic increase than the Hard Tac approach.

- EPA recommends Alternative 2 (Option 1) as the preferred alternative. This alternative includes: time/area closures which may be beneficial during spawning, migration, foraging and nursery activities; and a prohibition on using

Multispecies Category B DAS to fish for skates. Also, we recommend Alternative 2 (Option 1) because it could have a relatively smaller effect on sea turtles than Option 2. This option also appears to have a better potential to prevent overfishing of larger skates (e.g. winter skates).

Thank you for the opportunity to review the Northeast Skate Complex DEIS. Please contact Timothy Timmermann of EPA's office of Environmental Review at (617) 918-1025 with any questions or comments.

Sincerely,

Bob

Robert W. Varney
Regional Administrator

enclosure

Summary of Rating Definitions and Follow-up Action

Environmental Impact of the Action

LO--Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

OCT 15 2008

Paul J. Howard
Executive Director
New England Fishery Management Council
50 Water Street
Newburyport, MA 01950

RE: Northeast Fisheries Science Center (Center) Comments on the Draft Environmental Impact Statement (DEIS) for Amendment 3 to the Northeast Skate Complex Fishery Management Plan (Amendment 3)

Dear Paul,

The New England Fishery Management Council (Council) submitted the Amendment 3 DEIS to NOAA's National Marine Fisheries Service (NMFS) for review on August 20, 2008. In turn, I requested that the Center review the document to ensure it complied with all relevant scientific standards. On September 9, 2008, the Center provided comments that identified several concerns with the methods used by the Skate Plan Development Team (PDT) to calculate the acceptable biological catch (ABC) and associated catch limits and targets for the skate fishery that are proposed in Amendment 3 (see Attachment). These comments were promptly forwarded to Council staff for consideration before the DEIS was finalized.

The methods and analyses with which the Center expressed concern were the subject of a detailed peer review by the Council's Scientific and Statistical Committee (SSC) in April 2008. The SSC accepted the methods, analyses, and results prepared by the PDT, and advised the Council that the amendment was based on the best available science. The Center did not raise any concerns or issues with the scientific basis for the amendment or the SSC's peer review at that time, and, based on the advice of the SSC, the Council approved the PDT's work for inclusion in the draft amendment. In light of the SSC's review and its support for the methods and analyses in the DEIS, and the time constraints on completing Amendment 3, I recommended that the DEIS be filed with the Environmental Protection Agency and released for public review.

In spite of this, however, the Center's concerns, in light of the SSC's review, must be resolved. To this end, I have requested that the Center identify staff to work with the PDT to attempt to reconcile their concerns, and to ensure that the analytical basis for the amendment represents the best available science. I recommend that the PDT meet with Center staff as soon as practicable to resolve these concerns with Amendment 3. These issues will need to be resolved to the extent practicable prior to final Council action on Amendment 3 (presently

Fi

expected in November 2008). If the final amendment is submitted to NMFS without adequate reconciliation of the Center's comments, the document may be inconsistent with National Standard 2.

As you are aware, information on the skate complex will be the subject of a Data-Poor Stocks Working Group meeting in December 2008, and some of the Center's comments regarding the Amendment 3 DEIS may be best addressed in that forum. However, as I have previously indicated to the Council, due to the requirements and time constraints mandated by the Magnuson-Stevens Act, you should utilize the best information currently available as the basis for Amendment 3. Given the schedule for completing and submitting Amendment 3, you should not delay in moving forward on finalizing the Amendment. Therefore, any changes to the scientific information used in the management of the skate fisheries coming out of the Data-Poor Stocks Working Group meeting should be deferred to a future skate action.

Sincerely,

for Patricia A. Kurkul
Regional Administrator

cc: J. Pappalardo
C. Kellogg
A. Applegate
N. Thompson

Attachment

National Marine Fisheries Service New England
Fisheries Management Council Draft Amendment 3 To
The Northeast Skate Complex October 29, 2008

By: Andrea Incollingo, owner, The Bait Company est. 1984

The skate bait industry depends on the consistent supply of an adequate amount of skates to meet the market demands. Although the lobster industry operates year round, the bulk of activity in the Northwest Atlantic occurs during the months of July through October. The next highest demand occurs during March through June as the shift from herring as bait back to skates takes place. The third trimester, in this scenario, would be November through February, in which time weather being more of a factor in determining lobster catching activity, demand is at its lowest. Also at this time the use of herring for bait increases especially here in southern New England and specifically Point Judith, due to the availability of locally caught herring. With this in mind, Alternative 4 is the preferred alternative. We have seen this method of seasonal quota management in the herring fisheries and the squid fisheries. We have also seen this in the state managed fisheries;
i.e. fluke, scup, sea bass, etc.

While the need for reduction in the bait skate fishery is suspect, the need to address the overfished status ofthe winter skate is apparent. Because it has been determined that there is impact on the juvenile winter skate during fishing for the little skate, we are now required to do our part to meet the mandate outlined in the reauthorization of Magnuson Stevens. . I do not feel the impact is so great as to warrant significant reductions in the little skate fishery, so the 1995-2006 basis for allocation is the preferred time frame. What I would like to suggest is that there be continued science to more specifically identify the times and areas where this impact occurs. With this knowledge there could come a better view as to what can be done to help the winter skate biomass recover, while preserving the lobster bait and lobster industries.

I have to say my focus in this industry has always been the people. My employees, the dragger fishermen, the lobster fishermen and all the support industry men and women who make this a great industry. I have watched as these regulations have forced many men to leave the industry and others who have stayed to constantly adapt there businesses to survive. In the recent change in this country's economic climate, I would like to suggest that there be a moratorium on new regulations that inhibit the economic impact of this vital industry. In all ofthe fishing communities along this coast, the desire to work and create brand new revenue for the economy exists. We need to start doing a better job protecting this industry, protecting these jobs, protecting these communities and until they perfect that "replicator" (as seen on Star Trek) protecting the suppliers ofthe greatest source of natural protein on the planet!

My name is Greg Connors.My two gill net vessel F/V

fish. And, as a buyer, I rely on the steady boats that do

October 28, 2008

First, I would like to begin by saying that it is very imperative

year-round to provide what is needed. Thus, ifyou go to the

that we adopt the Alternative 4 ofthe skate possession limit

alternative that would allow 12-14,OOlbs trip limit per day, it

with three-seasonal quota periods to manage the bait industry

just wouldn't work. You would punish the boats that

and its 4,106 mt TAL. If it is not managed in this way, it will

fish for bait exclusively. This daily trip limit would disrupt and

have a detrimental impact on the little skate bait business

cripple the bait industry as we know it. We took the 40% cut

(whole skate). I will now provide some reasons why:

on the overall bait skate TAL that has been put in place onto an

First, the bait skate is not brought in by many boats because it

industry that has not been overfished, and is not being over

is an order-based business where only what is NEEDED is

caught, and sold. Also to keep a steady supply, the boats that

fished. With the demand ofbait skate

bait-skate now, do it as a business. This means, they provide

bait weekly, not being tempted to go after fluke, squid, and so

lessened because ofpot restrictions to the lobster boats, I

on. Boats that do not fish bait as their primary business will

chase other, more lucrative

feel the bait industry should not have to be hindered with a

we.

daily limit of 12-14,OOlbsper day. This is why-I'need

Alternative 4 on the skate possession limit with a three-

seasonal quota period. With this plan in place, we will be able

to manage the bait skate industry in a responsible way.

Thank you very much.

'~v.J ,e..l.. ~or't> S'TQ...0W'\

Synergistic and F/V Constance sea work out of Chatham MA.
I understand reductions to daily catch limits and DAS reductions are the only real regulatory option for this coming fishing year,but I strongly feel that when allocations come to the multispecies fishery they should also come to the skate fishery.The allocations should be based on the same landing years and criteria as the multispecies fishery as well.1996-2006 is a fair representation of a fisherman's reliance on a species for his or her livelihood.
I have been displaced from the dogfish fishery and watched as regulators give MY landings away to
state permitted bass boats and builders.while I am forced to discard thousands of pounds almost daily.
I left the codfish fishery when catch limits forced me into sometimes grotesque amounts of discards.
Please do not turn the skate/monk fishery into a by catch fishery as was done to dogfish and codfish.
I feel as though during my 20 years as a full time fisherman I have left enough history behind for others
to exploit please leave the skate/monk fishery to the skate/monk fishermen.

Greg Connors.
permit #230558
#146922
#149575
#150597

ASSOCIATED FISHERIES OF MAINE
PO Box 287, South Berwick, ME 03908 207-384-4854

November 7, 2008

Associated Fisheries of Maine is a trade association of fishing and fishing dependent businesses. Membership includes harvesters, processors, fuel/gear/ice dealers, marine insurers and lenders, and other public and private individuals and businesses with an interest in commercial fishing.

Ms. Patricia Kurkul, Regional Administrator
National Marine Fisheries Service 55 Great
Republic Drive Gloucester, MA 01930

Dear Pat:

COMMENTS ON SKATE AMENDMENT 3

Associated Fisheries of Maine (AFM) supports Alternative 3B for management of the skate fishery.

Catch and landings of skates by our member vessels occurs as a bycatch in the groundfish and scallop fisheries.

We find the skate time area closure measures unacceptably complicated, especially when overlaid on the large number of management areas that groundfish fishermen currently contend with (permanent closures, seasonal closures, differential DAS areas, US/CA areas, etc.). The time area closures proposed in Amendment 3 would place a difficult burden on fishermen and enforcement personnel, without providing a commensurate conservation benefit.

We understand that there is support for Alternative 4 by participants in the bait fishery. If so, then AFM would recommend a management approach that would apply the measures in Alternative 3B to the wing fishery and the measures in Alternative 4 to the bait fishery.

As always, we appreciate your consideration of our views.

Sincerely,

M. Raymond

Maggie Raymond

We would also ask these questions. Is there sufficient resource data to honestly support placing heavy restrictions on skate harvests? If the answer is somewhat "foggy", might it be reasonable to take a somewhat more gentle approach and proceed from there? Will the Council and NOAA Fisheries please take into consideration the needs of the industries that depend on this resource? If you feel some action is warranted, then the Alternative 4 with trimester or quarterly TAC's might just be the right approach. Our lobster fishermen need this source for bait.

We hope the Council and the Service will consider these points carefully and we trust that the right and reasonable decisions will be made.

Please feel free to contact us if we can be of further help in making your decisions.

Respectfully yours,

William A. Adler
Executive Director

WAA/med

15.5 Public Hearing Summaries

15.5.1 Hyannis, MA – October 27, 2008

New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

Skate Amendment 3 Public Hearing
Oral Comments
Hyannis, MA
October 27, 2008

The meeting was attended by six gillnet fishermen, one skate processor, a lobster fisherman, and a fishery sector manager. The skate fishermen, most of whom land wings, and the processor supported Alternative 3B, having no area closures. They thought the possession limit in Alternative 3B were too low for them to economically fish for skates but they were better than the area closures. The lobster fisherman supported Alternative 4 with the three seasonal quota periods. Most felt that the dealer should be responsible for reporting the trip type on the dealer report, rather than requiring IVR reporting of skate landings.

Mr. John Pappalardo, chair of the Council and the Skate Oversight Committee, gave a brief introduction which explained why the Council was taking action to reduce skate catches and initiate rebuilding of smooth, thorny, and winter skates. He asked if there were questions, before opening the hearing for public comments. Several questions were asked about the science and catch data. Of particular interest were the TALs and their allocation to the skate wing and bait fishery.

Mr. Greg Connors, a Chatham gillnetter, gave the following comments. He pointed out that when there was demand for bait, the bodies from the skate wing fishery are being also being landed, not going to waste. Therefore, the whole fish is being used. He asked why the TALs are aggregated by species and allocated to each fishery. The wing fishery should have its own allocation, because it is targeting mainly winter skate. He also asked whether alternative 4 for the bait fishery could be combined with Alternative 3 for the wing fishery, because many in the gillnet skate wing fishery preferred Alternative 3 but the bait fishermen wanted to be regulated with a quota.

He suggested reducing DAS to achieve skate mortality reductions, or in the Amendment triggering an increase in the skate possession limit if the Multispecies DAS are reduced by the Interim Action or Amendment 16, and fewer DAS are available to fish for skates. Mr. Connors preferred Alternative 3B, because the area closures would create gear conflicts between the trawl and gillnet fishermen. He pointed out that the 2:1 counting area has enabled the two gear types to fish separately because the trawl vessels don't fish as frequently where DAS are counted 2:1. He felt that more closed lines is not the answer. As for the TAL allocation, he preferred the 2005-07 basis, with the lower skate possession limits associated with Alternative 3B.

Mr. Jim Nash, a Chatham gillnetter, favored Alternative 3B, because it is the easiest of alternatives to comprehend. No more closed areas are needed. A glut in the market caused by quota management (Alternative 4) would be bad for the industry, he felt.

Mr. Bro Cote, a lobsterman from Hyannis supported Alternative 4 for the bait fishery, separating year into thirds to ensure a more steady supply of bait throughout the year. With the annual or semi-annual quota options in Alternative 4, a long closure period would be tough and costly for the lobster and bait fishery. He supported unlimited landings (no possession limit) in Alternative 4, because it would be economically feasible for vessels to fish for bait. Possession limits proposed in the other alternatives would be a significant disincentive to fish for skates for the bait market.

Tim Linneil, a gillnet fisherman from Chatham, asked if future day-at-sea (Amendment 16) are part of these alternatives, i.e. they have been taken into account. Mr. Pappalardo answered that Amendment 3 must proceed without waiting for Amendment 16 development. Although it didn't meet the objectives in the absence of A16, Mr. Linneil favored the status quo.

Mr. Andy Baler, a fish dealer, Nantucket Fish Co in Chatham pointed out that the skate fishery in Chatham has been an integral part for 10+ years. The Alternative 3A and 3B are the only acceptable ones, because otherwise the skate closed areas would cause too much gear interaction. On the other hand, the 2500 lb. limit is unacceptable and will not cover the fishing expenses. Why isn't a higher possession limit allowable if there is a TAL which would shut down the fishery when landings reach the TAL, he asked? It doesn't matter what the possession limit is. Is the point of the 2500 lbs. needed to make the fishery last the year? Instead, he suggested that the Council should adopt a 4,000 lb. limit with the TAL as a backstop to prevent the plan from exceeding the biological limits. Mr Baler said that it is important for the fishery that there be a higher skate possession limit without closed areas.

Mr. Dave Murdock, a Chatham gillnet fisherman, said that he cannot agree with any of the alternatives. None of them allow a viable skate fishery and would shift effort back to groundfish, targeting cod. Area closures are where the vessels fish for skates, he said. The fishery needs a 4,000 – 5,000 lb limit to remain economically viable.

Mr. Eric Brazier, a fixed gear sector manager, said that input controls make business less efficient. He urged the Council to start Amendment 4, using output based management plan. Is there a working group for data poor stock and to what extent do the group has a role in the outcome, he asked?

In response to one of the questions in the public hearing document, the general opinion of people at the hearing is that the dealer should report the trip type on their reports, so that the landings are attributable to the correct TAL.

15.5.2 New Bedford, MA – October 28, 2008

New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

Skate Amendment 3 Public Hearing
Oral Comments
New Bedford, MA
October 28, 2008

The meeting was attended by about six fishermen (most of whom fish in the skate bait fishery), three bait dealers, a PDT member, and a representative of MA DMF. The skate bait fishermen and dealers were unanimously against any alternative that included a skate bait possession limit. They supported Alternative 4, with three quota periods to minimize the duration of potential closures. They also supported the 1995-2006 allocation alternative because it allocated less landings to the wing fishery, which targets mostly overfished winter skates. Most felt that the dealer should be responsible for reporting the trip type on the dealer report, rather than requiring IVR reporting of skate landings.

Mr. Rodney Avila, a member of the Skate Oversight Committee, gave a brief introduction which explained why the Council was taking action to reduce skate catches and initiate rebuilding of smooth, thorny, and winter skates. He also outlined the TAL allocation options and the six alternatives in the amendment.

Mr. Danny Nordstrom, a bait skate dealer, read from a prepared statement (see below) and said it was imperative that the Council adopt Alternative 4 with three seasonal periods. If the skate bait fishery is not managed as outlined in Alternative 4, it will have a detrimental impact on the fishing industry. The skate bait fishery is and order-based business where what is needed is caught and sold, he explained. Bait is provided weekly, a 12-13,000 lb possession limit would be incompatible with the needs of the fishery. Little skate is not overfished and no overfishing is occurring, so the skate bait industry should not be hindered by a skate possession limit.

The SAFIS system already allows reporting of skate market, explained Mr. Nordstrom, so he favors the option to rely on reporting of trip type by the dealers. He also favors using the 1995-2006 as the basis for TAL allocation because more skate landings would be allowed for the bait fishery and little skates (targeted by the bait fishery) are not overfished. Therefore, allocation option 2 would reduce the allowable landings for the fishery that is targeting overfished winter skate.

Mr. Raymond Canasita, representing the New Bedford Display Auction and Northeast Seafood Coalition, supported alternatives using skate trip limits with no closed areas.

Mr. Albert Antonio, a bait trawl fisherman, favored adoption of Alternative 4.
October 28,2008, comments by Mr. Daniel Nordstrom

First, I would like to begin by saying that it is very imperative that we adopt the Alternative 4 of the skate possession limit with three-seasonal quota periods to manage the bait industry and its 4,106 mt TAL. If it is not managed in this way, it will have a detrimental impact on the little skate bait business (whole skate). I will now provide some reasons why:

First, the bait skate is not brought in by many boats because it is an order-based business where only what is NEEDED is caught, and sold. Also to keep a steady supply, the boats that bait-skate now, do it as a business. This means, they provide bait weekly, not being tempted to go after fluke, squid, and so on. Boats that do not fish bait as their primary business will chase other, more lucrative fish. And, as a buyer, I rely on the steady boats that do it year-round to provide what is needed. Thus, if you go to the alternative that would allow 12-14,000 lbs trip limit per day, it just wouldn't work. You would punish the boats that fish for bait exclusively. This daily trip limit would disrupt and cripple the bait industry as we know it. We took the 40% cut on the overall bait skate TAL that has been put in place onto an industry that has not been over fished, and is not being over fished. With the demand of bait skate lessened because of pot restrictions to the lobster boats, I feel the bait industry should not have to be hindered with a daily limit of 12-14,000 lbs./day. This is why we need Alternative 4 on the skate possession limit with a three-seasonal quota period. With this plan in place, we will be able to manage the bait skate industry in a responsible way.

Thank you very much.
Daniel Nordstrom

15.5.3 Narragansett, RI – October 29, 2008

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John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

Skate Amendment 3 Public Hearing
Oral Comments
Narragansett, RI
October 29, 2008

The hearing had a good turnout, which included about 20 skate bait and lobster fishermen, plus two bait dealers and a PDT member. Support was unanimous for Alternative 4 with the three quota season option. All people making comments felt that this option was the least onerous on the skate bait fishery, which targets predominantly little skate. Little skate is not currently overfished, nor subject to overfishing. All people making comments also supported the allocation option based on the longer 1995-2006 period. They felt that this option focused most of the catch reduction on winter skates and the 2005-2007 period was too short to base an allocation for a long-standing fishery.

Mr. Rodney Avila, a member of the Skate Oversight Committee, gave a brief introduction which explained why the Council was taking action to reduce skate catches and initiate rebuilding of smooth, thorny, and winter skates. He also outlined the TAL allocation options and the six alternatives in the amendment.

Mr. Danny Nordstrom, a skate bait dealer, supported Alternative 4, with a three season quota. The TAL option 1995-2006 base period reflects the true historic split of the fishery. A two-year base period is too short. His favorable comment for the 1995-2006 TAL allocation option was based data presented at the May 15, 2008 meeting. These data showed that around 2002, the wing and whole skate landings were about the same, but there has been a recent increase in wing landings from 8 to 14 million lbs., while the bait period dropped from 8 to 5 million lbs. He thought that this was an anomalous event and didn't represent the true historic split in fishery landings.

Mrs. Andrea Incollingo, owner of the The Bait Company in Point Judith, read from a prepared statement (see below) and said that the bait industry depends on a consistent supply to meet demand. Most of the demand occurs during July – Oct, with some bait sold during Mar – Jun after which a shift from herring to back to using skates for bait takes place. During Nov-Feb, the weather affects demand for bait and the use of herring for bait increases. For these reasons, Alternative 4 is preferred with a seasonal quota allocation. Seasonal quota management in herring in other fisheries works, she pointed out. She understood that a cap on landings as needed to address the overfished status of skates, and that the bait fishery had some impact on juvenile winter skate. But she did not believe that the impact is so great to warrant landings reductions in the bait fishery. She recommended using the 1995-2006 period as the basis for TAL allocation, until additional science is available to determine the impact of the little skate fishery on the overfished skate species. She also suggested that the Council consider a moratorium on new regulations and evaluate the economic impact of the skate bait fishery. The Council and NMFS should do a better job protecting the industry and communities, she added.

Mr. Jim Neronha, a skate fisherman in Newport, Ri, thought that a reduction in DAS of 42% should have resulted in much less incidental kill of skates, and the 2:1 counting also had a major effect. He thought it would be unlikely for the bait fishery to grow and fishing intensify, because the market for skate bait is a limited market. He thought that a control date is needed, and tha the Council should consider managing the skate fisheries with an ITQ system. If the landings had to be reduced to less than current amouths, it would not feasible to continue fishing. Some fishermen would instead begin targeting small mesh species. He has had observers onboard who have said that the skate fishery is the best because there is little bycatch of non-target species. He commented that a daily catch limit would end the bait business. The only option that is feasible, in his opinion is Alternative 4.

Mr. David Spencer, Atlantic Offshore Lobstermen's Association and an active lobster fisherman, commented that any socio-economic study must take into account the effect on the bait and the lobster fishery. There are large implication to both industries, caused by a reduction in the allowable landings. He supports Alternative 4 (quota management for the skate bait fishery), managed on a trimester basis (seasonal quotas). Skate possession limits would be financially infeasible for the bait and lobster fishermen. The seasonal option allows financial solvency. Prefer three seasonal quotas, a single quota would result in adverse effects on price and quality, and would cause derby-style fishing to develop. An annual quota system would cause spikes in supply and price. Insofar as the TAL allocation, he recommended that the Council take the longer outlook, 1995-2005. The shorter time frame (2005-2007) is vulnerable to anomalous spikes that don't reflect the trend. He commented that changes in the price of bait would have a major effect on his business. Alternative 4 with a three season would provide most flexibility and price stability.

Mr. Mike Sentorial, contested whether the Amendment 3 Environmental Impact Statement is a legal document. He understood that the Council had to take action due to the overfished status, but the proposal pits the bait and the wing fisheries against each other. There isn't a need to manage little and clearnose skates under the bait fishery. Ninety percent of what is landed in the skate bait fishery is little skate, which is not overfished. Why is a TAC needed, he asked? Effectively the bait market is capped, because the lobster industry is capped and there has been a gradual reduction in trap effort due to regulations in the lobster fishery. The economic impact statement pits the two fisheries against one another, and does not account for the [inaudible] factor. The document should address the imminent problem, the overfished status of winter skate. How are we going to keep track of the catch, he asked? Can a vessel get its own bait? Too many questions are left unanswered, he asserted. As a result, he questioned the legality of the document. He noted that the Council voted 16-2 not to tackle the issue.

Mr. Dennis Ingram, representing the RI Lobstermen's Association, supported the choice of Alternative 4 with a three-season quota. The effects on the inshore lobster business should be included in an economic impact study. Adverse effects on industry infrastructure may be irreversible.

Mr. John Swobota, a lobster fisherman and multispecies DAS permit holder, supported Alternative 4.

Mr. Glenn Westcott, Ocean State Fisheries and a skate bait fisherman, backed Alternative 4 with a trimester period split 20/60/20, with carry-overs among the periods. He recommended that the Council consider a two month delay on the skate amendment so that it can coincide with Multispecies Amendment 16, so its effects on skate fishing could be understood and taken into account. At present he uses valuable Category A DAS to catch skates in July to October and has very little groundfish bycatch. He thought that there might be a 9 DAS reduction in next fishing year, so the Council should allow use of B DAS to target skates.

No more comments were offered and Mr. Avila closed the hearing.

National Marine Fisheries Service New England
Fisheries Management Council Draft Amendment 3 To
The Northeast Skate Complex October 29, 2008

By: Andrea Incollingo, owner, The Bait Company est. 1984

The skate bait industry depends on the consistent supply of an adequate amount of skates to meet the market demands. Although the lobster industry operates year round, the bulk of activity in the Northwest Atlantic occurs during the months of July through October. The next highest demand occurs during March through June as the shift from herring as bait back to skates takes place. The third trimester, in this scenario, would be November through February, in which time weather being more of a factor in determining lobster catching activity, demand is at its lowest. Also at this time the use of herring for bait increases especially here in southern New England and specifically Point Judith, due to the availability of locally caught herring. With this in mind, Alternative 4 is the preferred alternative. We have seen this method of seasonal quota management in the herring fisheries and the squid fisheries. We have also seen this in the state managed fisheries;
i.e. fluke, scup, sea bass, etc.

While the need for reduction in the bait skate fishery is suspect, the need to address the overfished status of the winter skate is apparent. Because it has been determined that there is impact on the juvenile winter skate during fishing for the little skate, we are now required to do our part to meet the mandate outlined in the reauthorization of Magnuson Stevens. . I do not feel the impact is so great as to warrant significant reductions in the little skate fishery, so the 1995-2006 basis for allocation is the preferred time frame. What I would like to suggest is that there be continued science to more specifically identify the times and areas where this impact occurs. With this knowledge there could come a better view as to what can be done to help the winter skate biomass recover, while preserving the lobster bait and lobster industries.

I have to say my focus in this industry has always been the people. My employees, the dragger fishermen, the lobster fishermen and all the support industry men and women who make this a great industry. I have watched as these regulations have forced many men to leave the industry and others who have stayed to constantly adapt there businesses to survive. In the recent change in this country's economic climate, I would like to suggest that there be a moratorium on new regulations that inhibit the economic impact of this vital industry. In all of the fishing communities along this coast, the desire to work and create brand new revenue for the economy exists. We need to start doing a better job protecting this industry, protecting these jobs, protecting these communities and until they perfect that "replicator" (as seen on Star Trek) protecting the suppliers of the greatest source of natural protein on the planet!

15.5.4 Portsmouth, NH – Octoer 30, 2008

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Skate Amendment 3 Public Hearing
Oral Comments
Portsmouth, NH
October 30, 2008

He meeting was attended by a bait dealer, a skate marketer (wings and bait), a member of the NH Fish and Game Commission, and representatives of two industry organizations. Most of the comments were in favor of Alternative 4 for the bait fishery, with a three-season quota option and the 1995-2006 basis for allocating the TALs. Many comments were informative and focused on the relationship between foreseeable Multispecies effort reductions and their effects on the availability of DAS to fish for skates. There was also mention of using a trigger to relax the skate regulations if the future groundfish regulations reduced the availability of DAS to target skates and/or reduced skate bycatch.

Mr. Doug Grout, a member of the Skate Oversight Committee, gave a brief introduction which explained why the Council was taking action to reduce skate catches and initiate rebuilding of smooth, thorny, and winter skates. He also outlined the TAL allocation options and the six alternatives in the amendment.

Mr. Danny Nordstrom, Nordstrom Seafood Traders, reported that he sells little skate to fishermen in NH. From his perspective it is important to have a steady supply of bait. He supports Alternative 4, with three seasonal quota periods and prefers using the 1995-2006 basis as a more accurate account of historic fishery conditions. He referred to a PDT graph from the May 15, 2008 meeting (showing landings by vessels on a groundfish DAS). The data in the graph showed the wing and bait fishery at 8 million lbs. until 2002, when the landings by the wing fishery nearly doubled by 2007 and bait landings declined. The skate boats he unloads do not bring in wings, because they are on a Skate Bait Letter of Authorization. He asked if it would be possible for a vessel's trip declaration to be valid for the entire year, consistent with the Bait Letter of Authorization, maintaining the difference between the fisheries?

Mr. Nordstrom emphasized that there is only one option where the bait industry survives, Alternative 4. The 14,200 lbs. per day won't work for the bait industry.

Mrs. Bonnie Spinnazola, representing the American Offshore Lobstermen's Association, commented that the skate fishery should be managed as a quota, rather than by possession limits. Her organization therefore supports Alternative 4, broken into thirds. The association members would not want seasonal area closures, because the accountability measures would take care of the overage. Their rationale for supporting a quota system with three periods is because it would minimize the amount of time between potential closures. The 1995-2006 is the only time period that is practical. The 2005-2007 option time period is too short as a basis for TAL allocation, she said.

Mrs. Spinnazola said that the alternatives have a huge effect on the lobster fishery. There cannot be tunnel-visioned management that fails to account for the effect on the skate bait fishery and the lobster fishery. The possession limits would favor smaller boats and for the larger boats it would not be economic to fish under such a system. Alternative 4 is conservation equivalent to the other alternatives and works for the fishermen.

Mrs. Maggie Raymond, representing the Associated Fisheries of Maine, asked why there was a target catch, or ACT, when the Council comments on the proposed guidelines said that such a target was unnecessary. She also asked about how the area closures would apply. Her members had no preference for the allocation options, but there should be a preference for the food fishery over the bait fishery. The wing fishery is only avoidable to a certain extent by vessels that are targeting other species. If a hard TAC results in closures for the groundfish fishery, that would create problems. She noted that the skate fishery is dependent on the DAS in the groundfish fishery. What happens when many vessels are in groundfish sectors and not fishing on a DAS, she asked?

Mr. Larry Lingren, Seafresh USA in Portland ME and in RI, reported that all operations inhis business use skates in one way or another, both bait and wing fishery. Portland packs for the domestic fresh and the export frozen market. People are concerned about Amendment 16 and keeping up with Amendment 13 goals. There is a lot of information and data that we don't have, he thought. How will the reductions in DAS have an affect on the skate fishery? This will cause a reduction in fishing effort for skates. He thought that the skate amendment may cause a double layer of management.

Many felt that Amendment 3 is a done deal, which is disappointing, Mr. Lingren said. With both sets of reductions, many skippers will simply tie up and not fish. Many boats will be displaced from the fishery. We don't know whether the skates will come back from the reduced catch. But the industry needs a supply of skates to maintain a foreign market niche. There should be an economic analysis of the effect on the world marketing of skates captured in the US. The boats and markets may not be available when skates recover. He thought that the document does not address or analyze the dynamic changes in the skate fishery. Some bait fishermen are now landing skates for the wing fishery, in response to changes in price, which blurs the distinction between the wing and bait fishery. His business has made investments in equipment to produce skates for export. The business needs landings volume to process to make the investment worthwhile. New Bedford as about 60 skilled employees, his processing plant has about 25 employees. If there is a closure many employees will find other lines of work rather than wait out the closure period These effects need to be considered in the EIS.

A hard TAC would be almost devastating to the processing sector, Mr. Lingren predicted. It is difficult to recommend one option over the other, but he felt that the longer time period is a better option. Historically what happened may be out of sync with the reference points, however.

Mr. Lingren reported that in some cases, skates have been the main target with an incidental catch of monkfish and winter flounder. The latest increase in the skate price has been related to the strength of the Euro, a situation that has begun reversing due to the declining value of the Euro. He thought the Council should consider using triggers in the Skate FMP that would be invoked if Amendment 16 reduces the availability of DAS to fish for skates. If this were the outcome, the Skate FMP would reduce the restrictions within it to allow some fishing on skates.

15.6 Response to Comments

The Council received many comments from a broad range of the public. Many comments focused on key elements of the alternatives and therefore had common characteristics. For the sake of simplicity and ease of understanding, the following list is representative of these frequent comments having common themes. Collectively, all the comments received on the DEIS are summarized below and responses are given that reflect the Council's decisions on selecting proposed measures in the final alternative.

1. Skate bait fishermen and bait wholesalers strongly support Alternative 4 with trimester or quarterly quotas. They believe that this alternative will provide a more consistent supply of bait, stabilize prices, and prevent development of derby-style fishing practices.

   Response: Low skate possession limits for the bait fishery would prevent vessels from supplying the lobster bait market efficiency and buyers would not be able to rely on market orders they place for bait, because they would have to rely on more than one trip or more than one vessel to supply enough bait. Because of these concerns, the Council adopted Alternative 4 for the proposed action. Although the above concerns outweighed concerns about seasonal closures of the bait fishery, the Council set a high 20,000 lbs. whole weight possession limit for the bait fishery to discourage derby style fishing behavior when landings approach the TAL trigger.

2. Skate bait fishermen and bait wholesalers unanimously support using the 1995-2006 period to allocate landings to the skate wing and bait fisheries, which is currently estimated to provide a 3,867 mt TAL. This option would be more conservative for overfished skate species since the allocation to a fishery that targets overfished winter skate would have a lower quota.

   Response: Of the two allocation options, the 1995-2006 basis for allocating landings between the wing and bait fisheries gives relatively more of the total TAL to the bait fishery compared to the other option using the 2005-2007 period. It also shifts relatively more of the conservation to the wing fishery which targets winter skates. This policy makes sense and outweighs the potential greater value of wing landings, since winter skate is in poorer condition than little skate, compared to the minimum biomass threshold. Thus the Council chose the 1995-2006 allocation option for the proposed action.

3. Skate bait fishermen and bait wholesalers do not support any alternative with possession limits calculated to achieve the TAL, because the possession limits would favor small vessels over large and prevent large vessels from landing large volumes of skates needed to supply the offshore lobster fishery.

   Response: Although the new discard estimates caused the Council to reduce the TALs to keep catch below the ABC, it did not re-estimate lower possession limits to achieve the needed reduction in landings. It did however include a bait skate fishery possession limit of 20,000 lbs. because the lower TAL will make it more likely that the bait fishery closes when it reaches the seasonal quota, and it will be more likely to happen earlier in each period than anticipated in the DEIS. The possession limit will however affect large vessels that land large volumes of skate bait, more than smaller vessels that have lower landings on a trip.

4. Lower skate bait landings would impact not only the offshore lobster fishery, but would also impact the inshore lobster fishery since it would then compete with the offshore lobster fishery for herring bait.

   Response: This effect is recognized in the discussion of Economic Impacts. One of the short term costs of conserving skates and reducing landings is higher prices for lobster bait, which could have broader effects than the direct effects on the offshore Southern New England lobster fishery. Over the longer term, increases in skate biomass will allow landings to increase to optimum yield, potentially supplying more bait to the lobster fishery and reducing prices. Furthermore, any increases in the price of herring bait would primarily translate into a transfer of income from one fishery (lobster) to another (herring).

5. Many skate bait fishermen and bait wholesalers commented that the EIS needs to fully address the impacts on not only the skate bait fishery, but also the lobster fishery.

   Response: The effects on the lobster fishery are estimated in Sections 8.7.3.2, 8.7.3.3, and 8.8.

6. Skate wing fishermen support Alternative 3B and do not support using additional time/area closures to reduce winter and thorny skate mortality, even though the Alternative 3B possession limits are lower than Alternatives 1B and 4. Many saw the time/area closures as an unnecessary complication and burden on fishermen and enforcement.

   Response: The Council did not include skate time/area closures in the proposed action because the benefits to the skate fishery did not outweigh the costs.

7. Nearly everyone supports reducing or eliminating the use of Multispecies Category B DAS to target skates, because they are being used to target overfished winter skate.

   Response: The use of Multispecies Category B DAS to target skates will be discouraged by the proposed action. Like the rules that currently apply to trawl vessels on a Category B DAS, any vessel on a Category B DAS would be able to land no more than 220 lbs. of skate wings or 500 lbs. of whole skate. The Council considered raising this to the incidental skate possession limit to be consistent across fisheries, but raising the skate possession limit for trawl vessels would require action for the Multispecies FMP. The 500 lbs. whole skate limit was not only chosen to limit skate catches, but to discourage fishermen from using nets configured to catch flounders (with a non-target catch of skates).

8. A few fishermen support No Action/Status Quo until more data can be collected and more analysis can be completed, even though No Action/Status Quo does not initiate rebuilding of smooth, thorny, or winter skates.

   Response: Adoption of No Action would be unacceptable since it would violate the Magnuson Act and not take action to rebuild thorny skate, satisfactorily prevent overfishing, and would risk several stocks of skates becoming overfished.

9. The EPA commented in favor of Alternative 2, Option 1 because it could have a relatively smaller effect on sea turtles.

   Response: Since Alternative 2 applies skate time/area closures as an in-season accountability measure, there is not obvious reason why Alternative 2, Option 1 would have a relatively smaller effect on sea turtles. The proposed action is unlikely to cause a large redirection of effort into seasons and areas where sea turtles are more prevalent. However, some large vessels in the bait fishery may redirect effort onto other species like herring and mackerel, probability in the spring and fall when sea turtles are not as abundant in Southern New England waters.

10. The EPA gave the DEIS an LO-1 rating ("Lack of Objections – Adequate"), the highest rating possible, although "the environmental impacts of the different alternatives with regards to EFH are not developed . . . and do not provide a clear basis for choice among alternatives."

    Response: The effects of the alternatives on EFH are described in Section 8.6. The Council's comparative analysis is that there was not a strong positive or negative impact of any of the alternatives, because the skate time/area closures were unlikely to shift fishing effort into areas with greater EFH importance, especially since several EFH areas are currently closed to fishing.

11. The method used for assigning species composition to landings and discards was technically inconsistent with the survey statistical design.

    Response: The method the PDT chose was a shortcut which was shown at the DPWS to have a relatively minor impact on the estimates. Nonetheless, stratified mean exploitable biomass by species was estimated for each three digit statistical area and assigned to the catch. This method is now consistent with the design of the survey and the new catch time series was used to re-evaluate the relationship between exploitation rates and changes in skate biomass.

12. The FMP [and amendment] should be structured to minimize discards. While both TAC approaches have the potential to increase skate discards, the Target TAC approach is supported because it is anticipated to result in a less dramatic increase than the Hard TAC approach.

    Response: In Section 5.1.2, the Council chose a Target TAC approach for precisely this reason. Furthermore, the TAL triggers were modified and the incidental skate possession limit that would apply when the landings met the triggers was adjusted. Raising the incidental skate possession limit to 500 lbs. of wings or 1135 lbs of whole skates was estimated to reduce skate discards without jeopardizing rebuilding or causing overfishing. To accommodate this change, in Section 5.1.3.2 the Council chose TAL triggers in the lower end of the range included in the DEIS.

13. The accountability measures (AMs) rely on the Council to take action by Framework Adjustment, which does not provide for an automatic adjustment and is therefore unapprovable.

    Response: The Council modified the AMs in the proposed action to allow automatic adjustments to the ACT buffer and the TAL triggers for overages. This authorizes the Regional Administrator to make adjustments in the ACT and TAL triggers for catch overages in previous years, but retains some authority for the Council to change these parameters via Framework Adjustment if conditions change (e.g. if scientific and management uncertainty is less problematic).