DRAFT
Framework Adjustment 2
To the
Northeast Skate Complex FMP
Draft Management Measures

DRAFT
January 17, 2014

NEW ENGLAND
FISHERY MANAGEMENT COUNCIL

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

New England Fishery Management Council
50 Water Street
Newburyport, MA 01950

1.0 Executive Summary

In New England, the New England Fishery Management Council (NEFMC) is charged with developing management plans that meet the requirements of the Magnuson-Stevens Act (M-S Act). The Northeast Skate Complex Fishery Management Plan (FMP) specifies the management measures for seven skate species (barndoor, clearnose, little, rosette, smooth, thorny and winter skates) off the New England and Mid-Atlantic coasts. The FMP has been updated through a series of amendments, framework adjustments and specification packages. Amendment 3 to the FMP established a control rule for setting the Skate Allowable Biological Catch (ABC) based on survey biomass indices and median exploitation ratios.

This framework action would implement changes to specifications based on updated data and research and would revise the VTR and dealer reporting codes.

The *need* for this action is to set specifications for FY 2014 and FY 2015 that are consistent with the best available science and to revise the VTR and dealer reporting codes to be consistent with the goals of the original FMP. There are several *purposes*: to adopt specifications, to adopt possession limits and to modify the VTR and dealer reporting codes.

Proposed Action

Under the provision of the M-S Act, the Council submits proposed management actions to the Secretary of Commerce for review. The Secretary of Commerce can approve, disapprove, or partially approve the action proposed by the Council. In the following alternative descriptions, measures identified as Preferred Alternatives constitute the Council's proposed management action.

If the Preferred Alternatives identified in this document are adopted, this action would implement a range of measures designed to achieve mortality targets and net benefits from the fishery. Details of the measures summarized below can be found in Section 4.0.

The Preferred Alternatives include:

- *Updates to Annual Catch Limit*
  - *Specifications*
- *Skate Wing Possession Limit Alternatives*
  - *Possession Limit*
- *Skate Bait Possession Limit Alternatives*
  - *Possession Limit*
- *Skate VTR and Dealer Reporting Codes*

Summary of Environmental Consequences

The environmental impacts of all of the alternatives under consideration are described in Section 7.0. Biological impacts are described in Section 7.1, impacts on essential fish habitat are described in Section 7.3, impacts on endangered nd other protected species are described in Section 7.4, the economic impacts are described in Section 7.5, and social impacts are described in Section 7.6. Summaries of the impacts of the Preferred Alternatives are provided in the following paragraphs. As required by NEPA, the Preferred Alternatives are compared to the No Action alternative.

Biological Impacts

Essential Fish Habitat (EFH) Impacts

Impacts on Endangered and Other Protected Species

Economic Impacts

Social Impacts

Alternatives to the Proposed Action

If the Proposed Action is based on the Preferred Alternatives there are a number of alternatives that would not be adopted. These alternatives are briefly described below.

- *Updates to Annual Catch Limit*
  - *Specifications*
- *Skate Wing Possession Limit Alternatives*
  - *Possession Limit*
- *Skate Bait Possession Limit Alternatives*
  - *Possession Limit*
- *Skate VTR and Dealer Reporting Codes*

Impacts of Alternatives to the Proposed Action

Biological Impacts

Essential Fish Habitat (EFH) Impacts

Impacts on Endangered and Other Protected Species

Economic Impacts

Social Impacts

2.0 TABLE OF CONTENTS

2.1 List of Tables

2.2 List of Figures

2.3 List of Maps

2.4 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 INTRODUCTION AND BACKGROUND

3.1 Management Background

The primary statute governing the management of fishery resources in the Exclusive Economic Zone (EEZ) of the United States is the Magnuson-Stevens Fishery Conservation and Management Act (M-S Act). In brief, the purposes of the M-S Act are:

(1) to take immediate action to conserve and manage the fishery resources found off the coasts of the United States;

(2) to support and encourage the implementation and enforcement of international fishery agreements for the conservation and management of highly migratory species;

(3) to promote domestic and recreational fishing under sound conservation and management principles;

(4) to provide for the preparation and implementation, in accordance with national standards, of fishery management plans which will achieve and maintain, on a continuing basis, the optimum yield from each fishery;

(5) to establish Regional Fishery Management Councils to exercise sound judgment in the stewardship of fishery resources through the preparation, monitoring, and revisions of such plans under circumstances which enable public participation and which take into account the social and economic needs of the States.

In New England, the New England Fishery Management Council (NEFMC) is charged with developing management plans that meet the requirements of the M-S Act.

The Northeast Skate Complex Fishery Management Plan (FMP) specifies the management measures for seven skate species (barndoor, clearnose, little, rosette, smooth, thorny and winter skate) off the New England and Mid-Atlantic coasts. The seven species are managed as a unit stock. The FMP has been updated through a series of amendments and framework adjustments.

Amendment 3 implemented a new ACL management framework that capped catches at specific levels determined from survey biomass indices and median exploitation ratios. Framework Adjustment 1 set a seasonal skate wing possession limits to keep the fishery open year round. Specifications for FY 2012 and FY 2013 were set in the 2012 Specifications package that resulted in an increase in ABC for the complex.

This framework is primarily intended to set specifications for FY 2014 and FY 2015 and to remove the unclassified VTR code for the skate wing fishery.

3.2 Purpose and Need for the Action (EA, RFA)

The purpose of this action is to analyze changes in stock condition, update scientific information on skates, and make necessary adjustments to management measures (including catch limits) to 1) set an Annual Catch Limit (ACL) that is consistent with conditions and scientific uncertainty and 2) achieve optimum yield. Following procedures using the median exploitation ratio (catch/survey biomass) as a conservative reference point (biomass tends to increase more frequently when catches are at or below this level) to set the ABC and ACL, the catch limits are expected to prevent overfishing. Overfishing of skates, unlike other stocks, is measured as an outcome, a rate of change in biomass which cannot be predicted with existing skate population models.

The need for this action is to set the annual catch limit specifications (ABC, ACL, ACT, and TALs) to maintain the skate fisheries while adequately minimizing the risk of overfishing the seven skate stocks. Without these catch limits and management measures, unregulated fishing for skates would increase to the point that could ultimately cause stocks to become overfished and depleted. In addition, two stocks (thorny and winter skates) are currently experiencing overfishing; thorny skate is overfished. Since it had been overfished, barndoor skate is in a rebuilding program but has not yet met the target. Annual catch limits (and associated in-season and post-season accountability measures) prevent fishing from increasing to unsustainable levels. Revised discard mortality rate estimates for trawl gear are available for little, smooth, thorny and winter skates and are incorporated into the specifications.

This action also proposes to change the skate bait VTR codes by removing the unclassified code and the codes for species not landed in the fishery – little, little/winter, rosette and smooth skate. The unclassified code was removed for the bait fishery. This is expected to improve skate landings by species, which is a requirement of the FMP.

3.3 Brief History of the Northeast Skate Complex Management Plan

Table 1 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 1. Species description for skates in the management unit.

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
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.

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 is 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 6.4.1.

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. The NEFMC was designated as the responsible body for the development and management of the seven species included in the Northeast Skate Complex. The FMP initially set limits on fishing related to the amount of groundfish, scallop, and monkfish DAS and measures in these and other FMPs to control the catch of skates. Initially, it was thought that barndoor, smooth, rosette, and thorny skates were overfished and that overfishing of winter skate was occurring.

Amendment 3 became effective on July 16, 2010, implementing a new ACL management framework that capped catches at specific levels determined from survey biomass indices and median exploitation ratios. In addition to the ACL framework and accountability measures, the amendment also included technical measures that reduced the skate wing possession limit from 20,000 (45,400 whole weight) to 5,000 (11,350 whole weight) lbs. of skate wings, established a 20,000 lb. whole skate bait limit for vessels with skate bait letters of authorization, and allocated the skate bait quotas into three seasons proportionally to historic landings.

Framework Adjustment 1 evaluated alternatives for setting a lower skate wing possession limit to keep landings below the 9,209 mt TAL and keep the fishery open year around. As a result of the Framework Adjustment 1 analysis, the Council set a 2,600 lbs. skate wing possession limit from May 1 to Aug 30, 2011 and a 4,100 lbs. skate wing possession limit from Sep 1, 2011 to Apr 30, 2011.

During the end of the 2010 fishing year (Jan – Apr), the Skate PDT developed the analyses needed to update the ABCs with new data, including calibrations of the survey tow data collected by the new FSV Bigelow in 2009-2011 and recent discard mortality research for little and winter skates captured by vessels using trawls.

The Council requested in June 2011 that the Regional Administrator (RA) initiate an Emergency Action to adjust the 2011 ACL specifications, based on the new analysis and calibrated survey data through spring 2011. A proposed rule was published on August 30, 2011 (FR 76(168) p53872; http://www.nero.noaa.gov/nero/regs/frdoc/11/11SkatePR.pdf) to raise the ACL specifications accordingly.

Specifications for FY 2012 and FY 2013 were set following the Amendment 3 ACL framework; the assumed discard rate was updated using the 2008-2010 dead discards. The re-estimated discard rate also incorporates new discard mortality estimates for little (20%) and winter (12%) skates captured by trawls.

3.4 Maximum Sustainable Yield (MSY) and Optimum Yield (OY)

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).

Due to changes in the median catch/biomass exploitation ratio, the value of MSY, originally estimated in the Amendment 3 FEIS (NEFMC 2009) had to be re-estimated. The estimated catch when skates are at the biomass target and landings of all skates are allowed is 46,192 mt (Table 2). 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 2008-2010 average fall biomass for barndoor, clearnose, rosette, smooth, thorny, and winter skates and the 2009-2011 average spring biomass for little skate, the current yield that does not exceed the median exploitation ratio is 50,435 mt and was approved in June 2011 by the Council's SSC as the allowable biological catch, or ABC. The Amendment 3 FEIS estimate using previous estimates of the median exploitation ratio and 2006-2008 biomass was 41,080 mt.

Table 2. Exploitation ratios and survey values for managed skates, with estimates of annual catch limits, and maximum sustainable yield that take into account the 2010-2012 discard rate using DPWS catch data using the selectivity ogive method to assign species to catch[1].

	Catch/biomass index (thousand mt catch/kg per tow)	Stratified mean survey weight (kg/tow)	
Species	Median	2010-2012	MSY Target
Barndoor	2.64	1.22	1.57
Clearnose	3.98	0.97	0.66
Little	2.14	7.11	6.15
Rosette	2.57	0.033	0.048
Smooth	2.80	0.23	0.27
Thorny	1.27	0.18	4.13
Winter	1.83	6.68	5.66
Annual Catch Limit (ACL/ABC)		35,479	
MSY			36,414

[1] The survey biomass value for little skate is the arithmetic average of the 2011-2013 spring surveys.

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."

Although the Skate FMP had not quantitative estimate of MSY, it defined optimum yield as equating "to the yield of skates that results from effective implementation of the Skate FMP." Amendment 3 changed this circular logic and defined the estimate of optimum yield as 75% of MSY. Thus using the updated catch/biomass exploitation ratios and adjusted survey biomass values, the revised estimate of optimum yield is 36,414 mt.

At current skate biomass, the ACT will be set at 26,609 mt, allowing a 25% buffer to account for scientific and management uncertainty. Deducting the 2010-2012 discard rate to account for bycatch sets the aggregate TAL at 16,385 mt.

3.5 ABC and ACL Specifications

ABC and ACL specifications are derived from the median catch/biomass exploitation ratio for time series up to 2012 and the three year average stratified mean biomass for skates, using the 2011-2013 spring survey data for little skate and the 2010-2012 fall survey data for other managed skate stocks. For skates, the Council set the ACL to be equal to the ABC because the skate ABC is inherently conservative and the associated exploitation ratio is less than that which is risk neutral (and theoretically be equivalent to F_{msy}). TALs are set according to Amendment 3 procedures that assume that future discards will be equivalent to the average rate from the most recent three years (2010-2012), and that state landings will approximate 7% to the total landings.

The updated specifications are presented in Section 4.1.1 and the analysis of the data is presented in Section 7.0. The new data include survey biomass tow data collected by the FSV Bigelow, which have been calibrated to the FSV Albatross IV units using peer reviewed methods. The catch data include new estimates of discard mortality for little and winter skates captured by trawl gear and also include recently discovered information about transfers at sea for bait, reported on VTRs.

3.6 Stock Status

Stock status is described in more detail in Section 6.1.2. Based on survey data through spring 2013 and catch data through calendar year 2012, winter, little, and clearnose skate biomass are above the target, rosette skate biomass is between the threshold and target, smooth skate biomass is slightly above the threshold, and barndoor skate is rebuilding with biomass between the threshold and target. Thorny skate biomass is well below the threshold and is therefore overfished, a status that has existed since 1987 (if overfishing had been defined at that time). Overfishing is occurring on thorny and winter skates.

3.7 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.

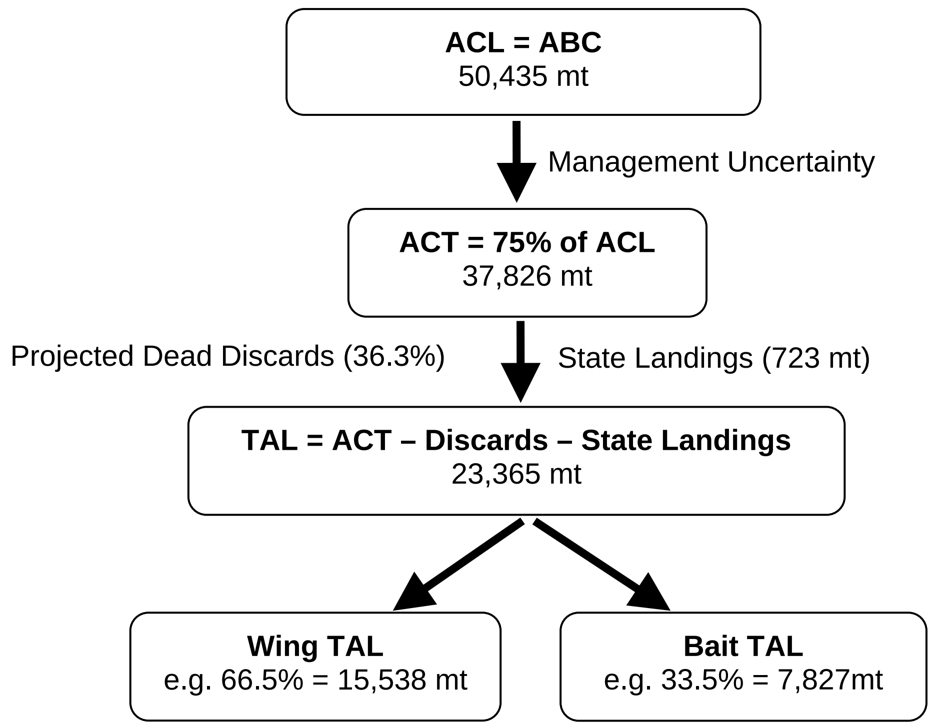
This specification document proposes no changes to skate EFH descriptions or designations, but Amendment 2 to the Skate FMP will be approved as a part of a developing Omnibus EFH Amendment that will re-evaluate skate EFH.

4.0 Alternatives Under Consideration

4.1 Updates to Annual Catch Limits

4.1.1 Option 1: No Action

The ACL parameters and limits would remain unchanged from the final ACL specifications for the 2012-2013 fishing years (see diagram below) in the final regulations for the specifications package and would incorporate no new scientific data and information.



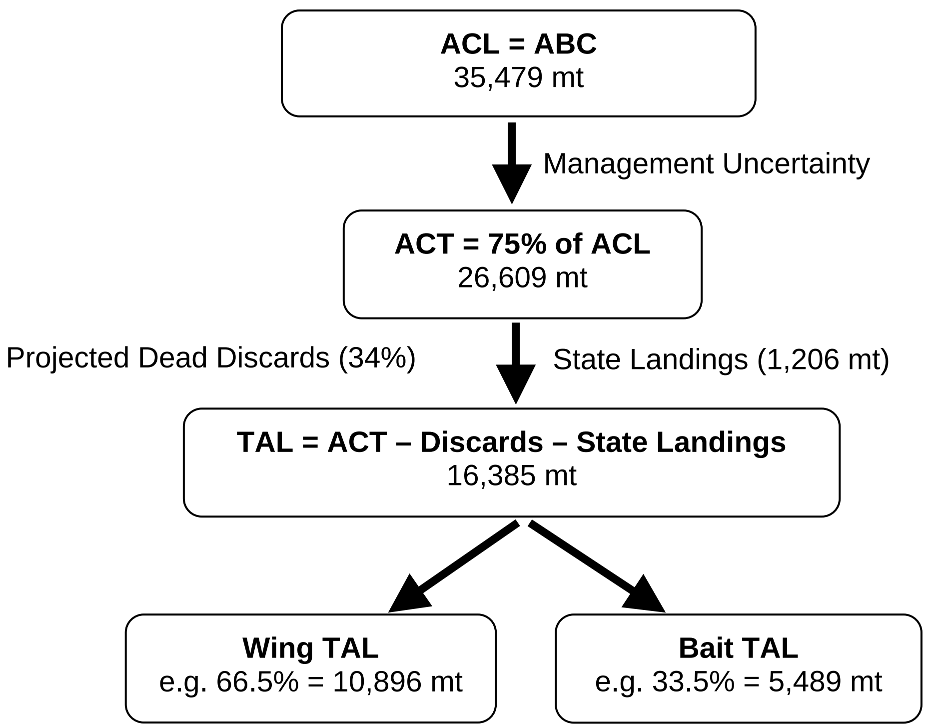
Rationale: The No Action alternative would not incorporate the best available science in terms of updated survey biomass indices and discard mortality rate estimates. The ABC would be maintained at a higher level than the revised data would allow. The No Action would be inconsistent with the Act, with the FMP's optimum yield (Section 3.4), and with the Information Quality Act (Section 8.12).

4.1.2 Option 2: Revised Annual Catch Limit Specifications

ABC and ACL specifications are derived from the median catch/biomass exploitation ratio for time series up to 2012 and the three year average stratified mean biomass for skates, using the 2011-2013 spring survey data for little skate and the 2010-2012 fall survey data for other managed skate species. For skates, the Council set the ACL to be equal to the ABC because the skate ABC is inherently conservative and the associated exploitation ratio is less than that which is risk neutral (and theoretically equivalent to F_{msy}). TALs are set according to Amendment 3 procedures that assume that future discards will be equivalent to the average rate from the most recent three years (2010-2012), and that state landings will approximate 7% to the total landings.

The ABC and ACL specifications would be adjusted to be consistent with new scientific information and the approved ACL framework procedures in Amendment 3. The aggregate skate ABC and ACL would decrease from 50,435 to **35,479** mt. The ACL is a limit that would trigger AMs if catches exceed this amount. The ACT would likewise decrease from 37,826 to **26,609** mt. After deducting amounts for projected dead discards (based on the average 2010-2012 discard rate), the TAL would decrease from 23,365 to **16,385** mt. The TAL is proportionally a smaller change than the ABC and ACT, compared to the 2012-2013 specifications, because the proportion of dead discards in the catch declines from 36.3% to **34%**, primarily due to the application of new science that indicates that discard mortality for little, thorny and winter skates captured by trawls is lower than had been assumed in Amendment 3; the revised smooth skate discard mortality rate estimate used in this FW was higher than that assumed in Amendment 3.

A3 estimated state landings to be 3%, however, state landings have been shown to be higher in recent years – reaching a high of 12.6% in FY 2010. This alternative increases the assumed state landings to 7% from 3% of total skate landings as state landings have been approximately at this level for a number of fishing years.



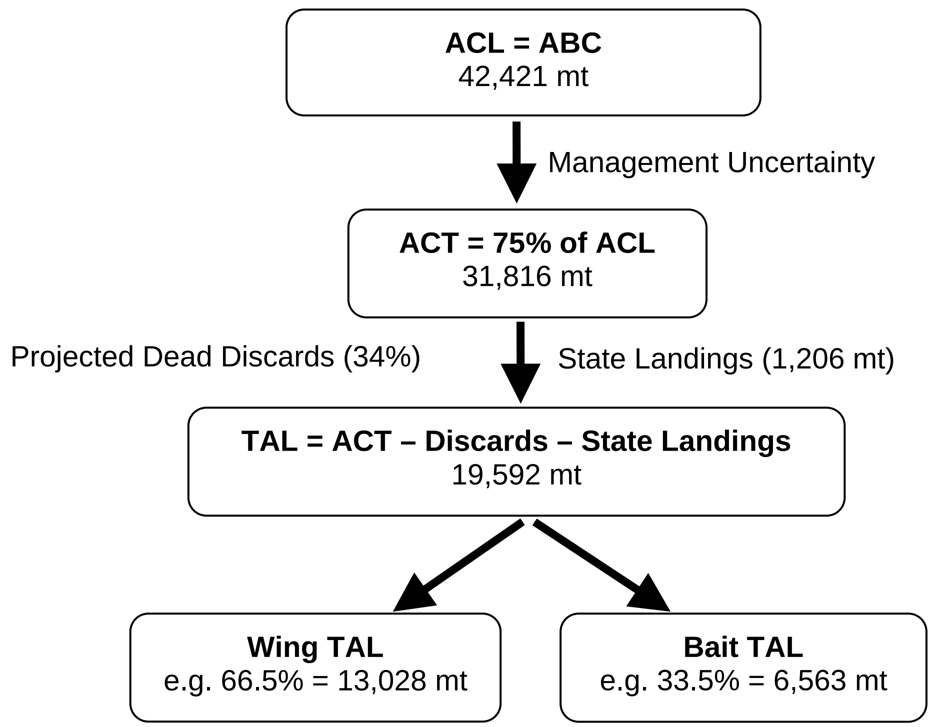
Rationale: This alternative would make the specifications (catch and landings limits) consistent with the procedures approved in Amendment 3 and with new science that has been analyzed by the Skate PDT and peer reviewed by the SSC. Framework 2 is not intended to develop alternative ABC calculation methodologies; instead it enacts the existing methodology in the FMP. The SSC reviewed the revised catch/biomass medians and those used in the previous specifications package and approved the use of the revised medians as they were consistent with previous decisions by the SSC to incorporate the best available science for discard mortality rate estimates. According to the Amendment 3 procedures, it would allow the fishery to achieve optimum yield, nearly all derived from catches of little and winter skates. This alternative meets the requirements to prevent overfishing. Biomass of little and winter skates have decreased from the 2008-2010 period and contribute the majority of landings in the skate bait and skate wing fisheries, respectively.

4.1.3 Option 3 – Revised Annual Catch Limit based on old catch/biomass medians

ABC and ACL specifications are derived from the median catch/biomass exploitation ratio for time series up to 2007 and the three year average stratified mean biomass for skates, using the 2011-2013 spring survey data for little skate and the 2010-2012 fall survey data for other managed skate species. For skates, the Council set the ACL to be equal to the ABC because the skate ABC is inherently conservative and the associated exploitation ratio is less than that which is risk neutral (and theoretically equivalent to F_{msy}). TALs are set according to Amendment 3 procedures that assume that future discards will be equivalent to the average rate from the most recent three years (2010-2012), and that state landings will approximate 7% to the total landings.

The ABC and ACL specifications would be adjusted only with the new survey data. The aggregate skate ABC and ACL would decrease from 50,435 to **42,421** mt. The ACL is a limit that would trigger AMs if catches exceed this amount. The ACT would likewise decrease from 37,826 to **31,816** mt. After deducting amounts for projected dead discards (based on the average 2010-2012 discard rate), the TAL would decrease from 23,365 to **19,592** mt. The TAL is proportionally a smaller change than the ABC and ACT, compared to the 2012-2013 specifications, because the proportion of dead discards in the catch declines from 36.3% to **34%**, primarily due to the application of new science that indicates that discard mortality for little, thorny and winter skates captured by trawls is lower than had been assumed in Amendment 3; the revised smooth skate discard mortality rate estimate used in this FW was higher than that assumed in Amendment 3.

A3 estimated state landings to be 3%, however, state landings have been shown to be higher in recent years – reaching a high of 12.6% in FY 2010. This alternative increases the assumed state landings to 7% from 3% of total skate landings as state landings have been approximately at this level for a number of fishing years.



Rationale: This alternative would be inconsistent with the Magnuson-Stevens Act and would not use the best available science in setting the specifications.

4.2 Skate Wing Possession Limit Alternatives

4.2.1 Option 1: No Action

The No Action alternative would maintain the Framework Adjustment 1 skate wing possession limits. These limits begin with a **2,600** lbs. possession limit from May 1 to Aug 31 and then increase to **4,100** lbs. possession limit from Sep 1 to Apr 30, or until the 85% TAL trigger has been met and it appears that without adjustment the fishery will exceed the annual TAL. This alternative would not alter the 85% trigger for the incidental trip limit.

Rationale for alternative: This is a less conservative limit than Option 2. Weekly landings were lower in FY2012 compared to FY2011, which is consistent with the decrease in survey biomass. In FY2012 the wing fishery achieved 70.5% of its TAL, maintaining the current trip limits would allow the fishery to achieve more of its TAL and reduce potential impacts on other fisheries.

4.2.2 Option 2: Revised Skate Wing Possession Limit

The seasonal skate wing possession limit for May 1 to Aug 31 would decrease from 2,600 lbs. to **1,500** lbs. The seasonal skate wing possession limit for Sep 1 to Apr 30 would likewise decrease from 4,100 lbs. to **2,400** lbs. This alternative would not alter the 85% trigger for the incidental trip limit.

Rationale for alternative: This is a more conservative choice with a greater chance that the skate wing fishery will remain open for the entire fishing year, even if the landings rate and fishing effort increases beyond those estimated here based on historical (2010 and 2011) data (Section 7.1.2). Fishermen and processors have indicated that keeping the fishery open for the entire fishing year creates economic stability, retains important foreign markets, and reduces discards. FW1 possession limit analysis associates these lower limits with a smaller TAL; lower trip limits may unnecessarily restrict the fishery. The change in discard mortality rate estimates allows for a higher wing TAL (per level of skate biomass) than in previous fishing years as it is assuming fewer dead discards.

4.2.3 Option 3: Revised Skate Wing Possession Limit

This alternative would raise the trip limit to 5,000 lbs, which would be constant throughout the fishing year. This alternative is likely to shut the fishery down before the end of the fishing year as there is no seasonality to the trip limits, which was designed to reduce the likelihood that the incidental trip limit would be triggered. This alternative would not alter the 85% trigger for the incidental trip limit.

Rationale: This alternative is included for analysis to meet NEPA standards and is not intended to be an alternative for consideration.

4.3 Bait Possession Limit Alternatives

4.3.1 Option 1: No Action

This alternative would maintain the skate bait possession limit at 25,000 lbs. Vessels that obtain a Skate Bait Letter of Authorization from the NMFS Regional Office would be able to retain up to 25,000 lbs. of whole skates provided that they comply with related rules and size limits.

Rationale: This alternative is included to meet MSA requirements.

4.3.2 Option 2: Revised Skate Bait Possession Limit

This alternative would reduce the skate bait possession limit from 25,000 lbs. to **20,000** lbs. Vessels that obtain a Skate Bait Letter of Authorization from the NMFS Regional Office would be able to retain up to 20,000 lbs. of whole skates provided that they comply with related rules and size limits.

Rationale: This alternative is included to meet MSA requirements.

4.4 Skate VTR and Dealer Reporting Codes

4.4.1 Option 1: No Action

The No Action alternative would maintain the skate VTR and dealer reporting codes as established in the original FMP. The original FMP included the following:

1. Winter Skate
2. Little Skate
3. Little/Winter Skate
4. Barndoor Skate
5. Smooth Skate
6. Thorny Skate
7. Clearnose Skate
8. Rosette Skate
9. Unclassifiable Skate

Rationale for alternative: The No Action alternative is not expected to impact skate catch or fishing behavior. It would not improve the quality of skate landings reporting, which is inconsistent with the FMP.

4.4.2 Option 2: Revised Skate VTR and Dealer Reporting Codes

This alternative would remove the unclassified skate bait VTR reporting code. This is an administrative alternative and is not expected to impact skate catch or fishing behavior. The following VTR and dealer codes would be available for vessels reporting skate bait landings:

1. Winter Skate
2. Little Skate
3. Little/Winter Skate
4. Barndoor Skate
5. Smooth Skate
6. Thorny Skate
7. Clearnose Skate
8. Rosette Skate

This alternative would also remove the unclassified and species that are not landed in the wing fishery due to size restrictions, i.e. little skate, little/winter skate, smooth skate, and rosette skate. The following VTR and dealer codes would be available for vessels reporting skate wing landings:

1. Winter Skate
2. Barndoor Skate
3. Thorny Skate
4. Clearnose Skate

Rationale for alternative: The FMP requires landings to be reported by species. This has largely been unheeded with the majority of skate wing landings reported as unclassified. This alternative would remove the unclassified code (and non-relevant codes for the wing fishery) and allow fishermen to report landings by species, in compliance with the FMP.

5.0 Considered and Rejected Alternatives

The following management issues arose during the development of this specifications package, but were not adopted as alternatives by the Council.

6.0 AFFECTED ENVIRONMENT (SAFE report /EA)

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 Environmental Assessment (EA) for the 2012-2013. Since the document serves as Section 7 of the EA 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 Environmental Assessment associated with the 2012-2013 specifications package.

Table 1 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.

6.1 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

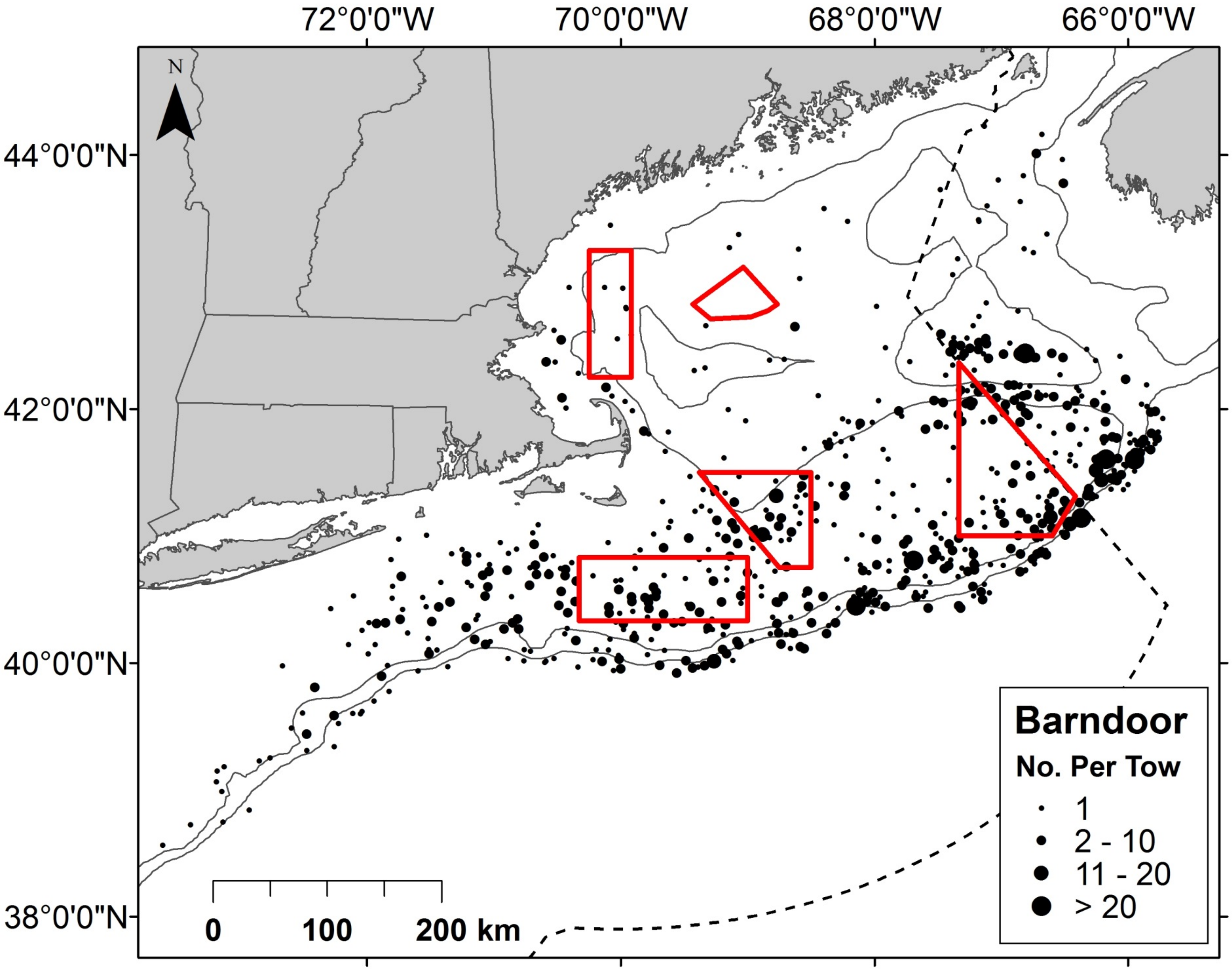
Graphical representations of percent occurrence of prey from NEFSC trawl survey data

6.1.1 Species Distribution

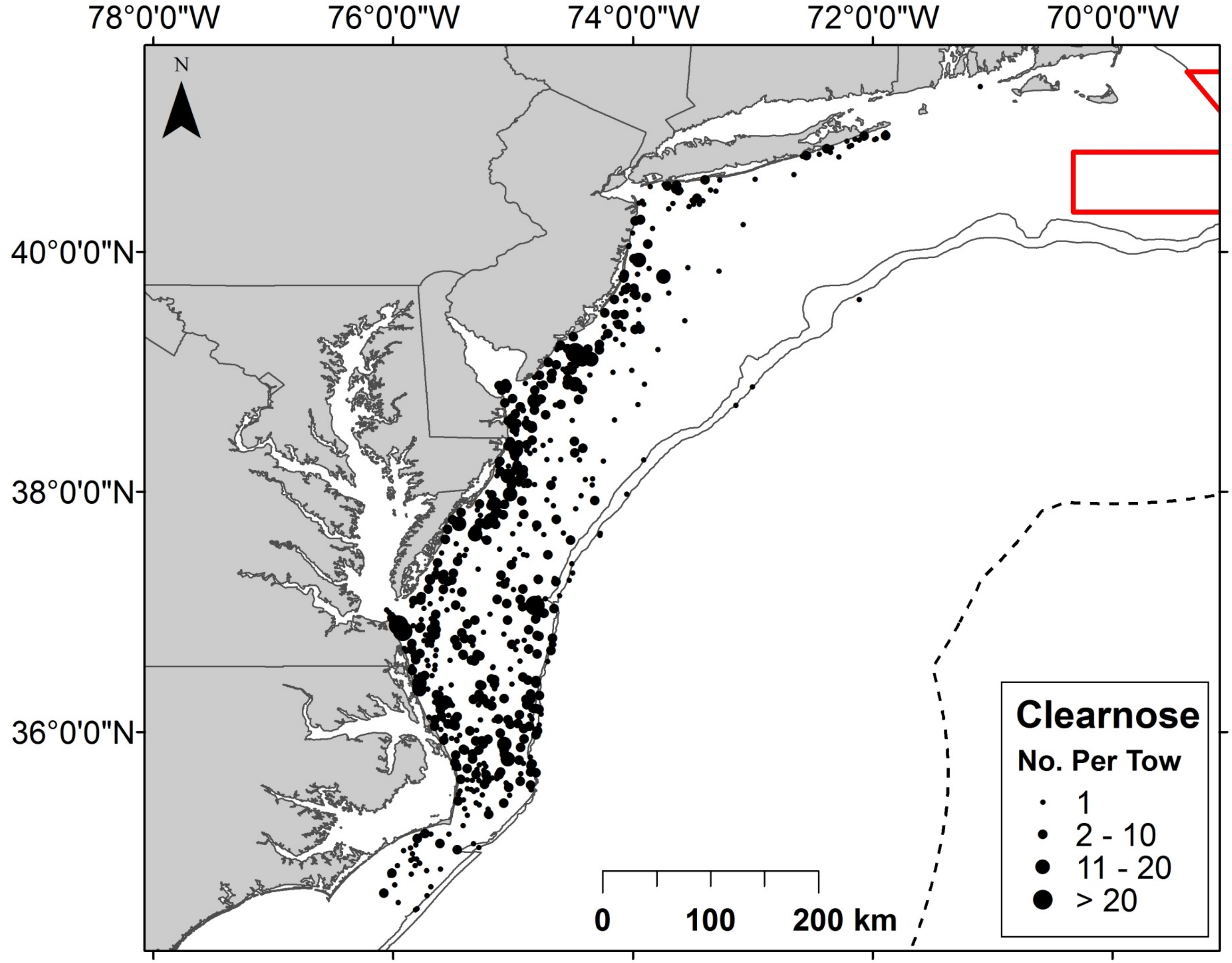
In general, barndoor skate are found along the deeper portions of the Southern New England continental shelf and the southern portion of Georges Bank (Map 1), extending into Canadian waters. They are also caught by the survey as far south as NJ during the spring. Clearnose skates are caught by the NMFS surveys in shallower water along the Mid-Atlantic coastline (Map 2), but are known to extend into unsurveyed shallower areas and into the estuaries, particularly in Chesapeake and Delaware Bays. These inshore areas are surveyed by state surveys and the Mid-Atlantic NEAMap Survey (http://www.vims.edu/research/departments/fisheries/programs/multispecies_fisheries_research/neamap/index.php). The Skate PDT examined the relationship between the trends in abundance and biomass in the NMFS spring and fall surveys with available state and NEAMap surveys (see Appendix I of this document). It is difficult to relate the NEAMap to the NMFS survey due to the relatively short NEAMap time series (2007-2010), particularly since it mostly overlaps the FSV Bigelow survey (2009-present) which does not sample as many inshore strata as its predecessor, the FSV Albatross IV.

Little skate are found along the Mid-Atlantic, Southern New England, and Gulf of Maine coastline (Map 3), in shallower waters than barndoor, rosette, smooth, thorny, and winter skates. Rosette, smooth, and thorny are typically deepwater species. The survey catches rosette skate along the shelf edge in the Mid-Atlantic region (Map 4), while smooth and thorny are found in the Gulf of Maine and along the northern edge of Georges Bank (Map 5 and Map 6). Winter skate are found on the continental shelf of the Mid-Atlantic and Southern New England regions, as well as Georges Bank (Map 7) and into Canadian waters. Winter skate are typically caught in deeper waters than little skate, but partially overlap the distributions of little and barndoor skates.

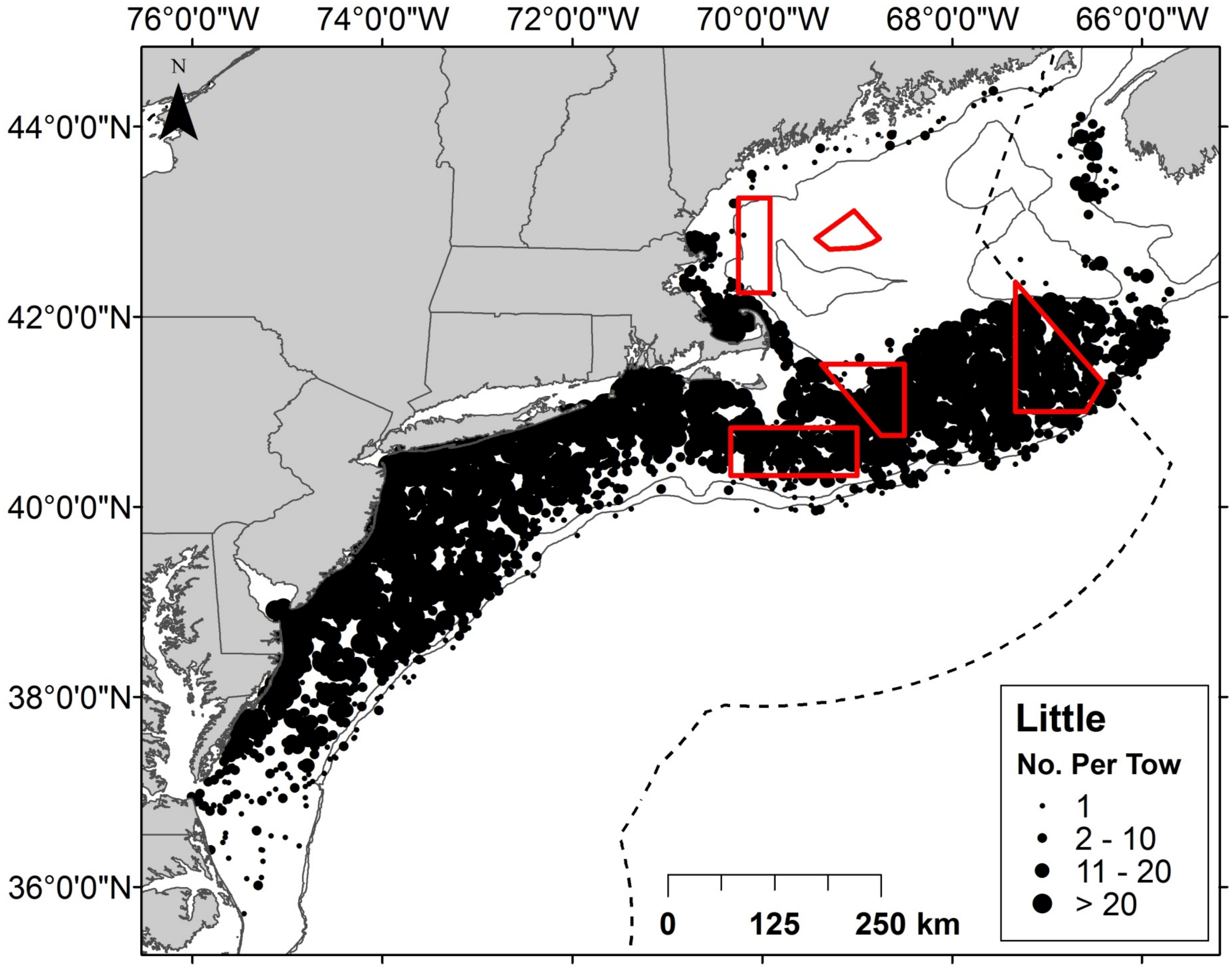
Map 1. Barndoor skate biomass distribution in the winter and spring trawl survey (2001-2011).



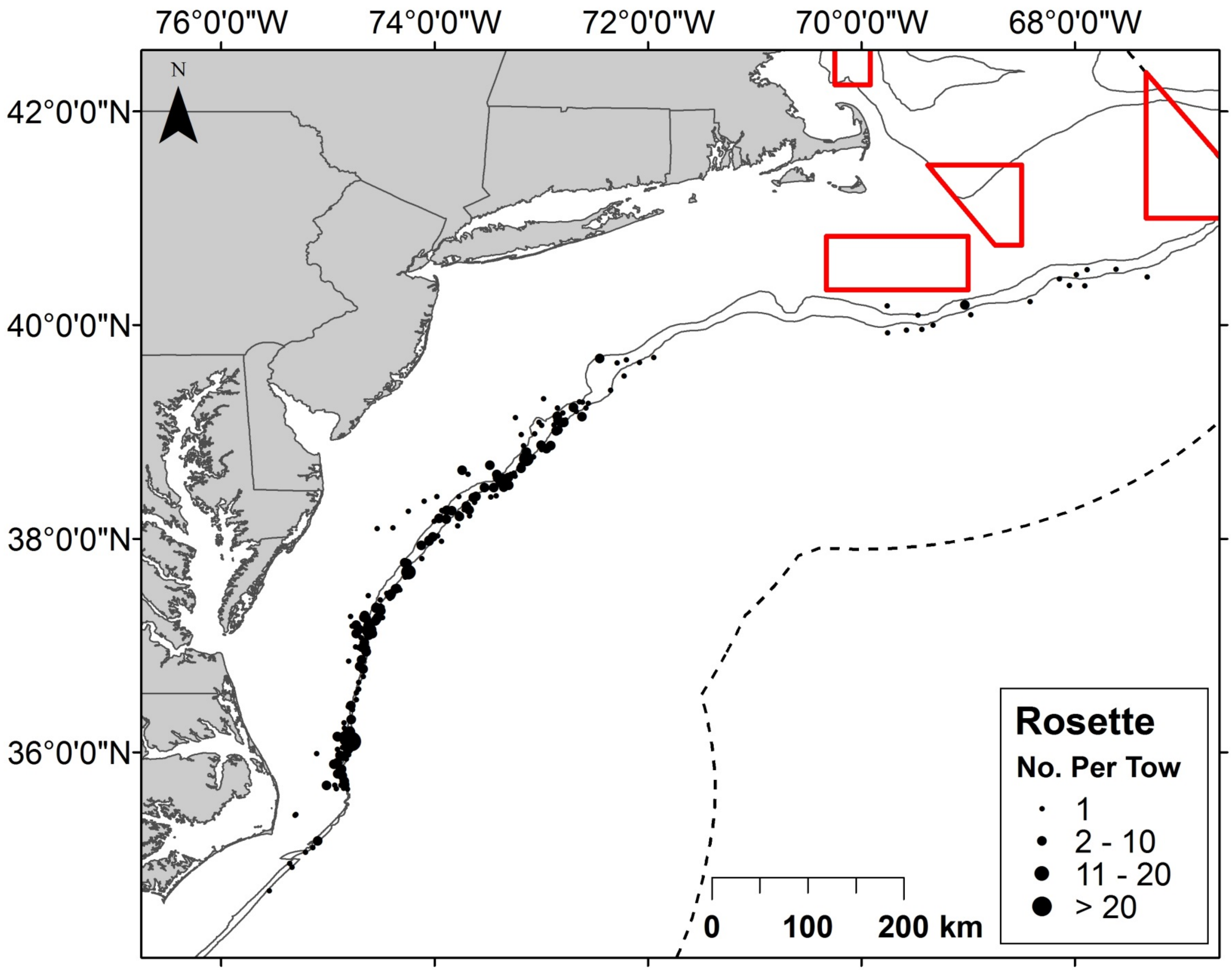
Map 2. Clearnose skate biomass distribution in the winter and spring trawl survey (2001-2011).



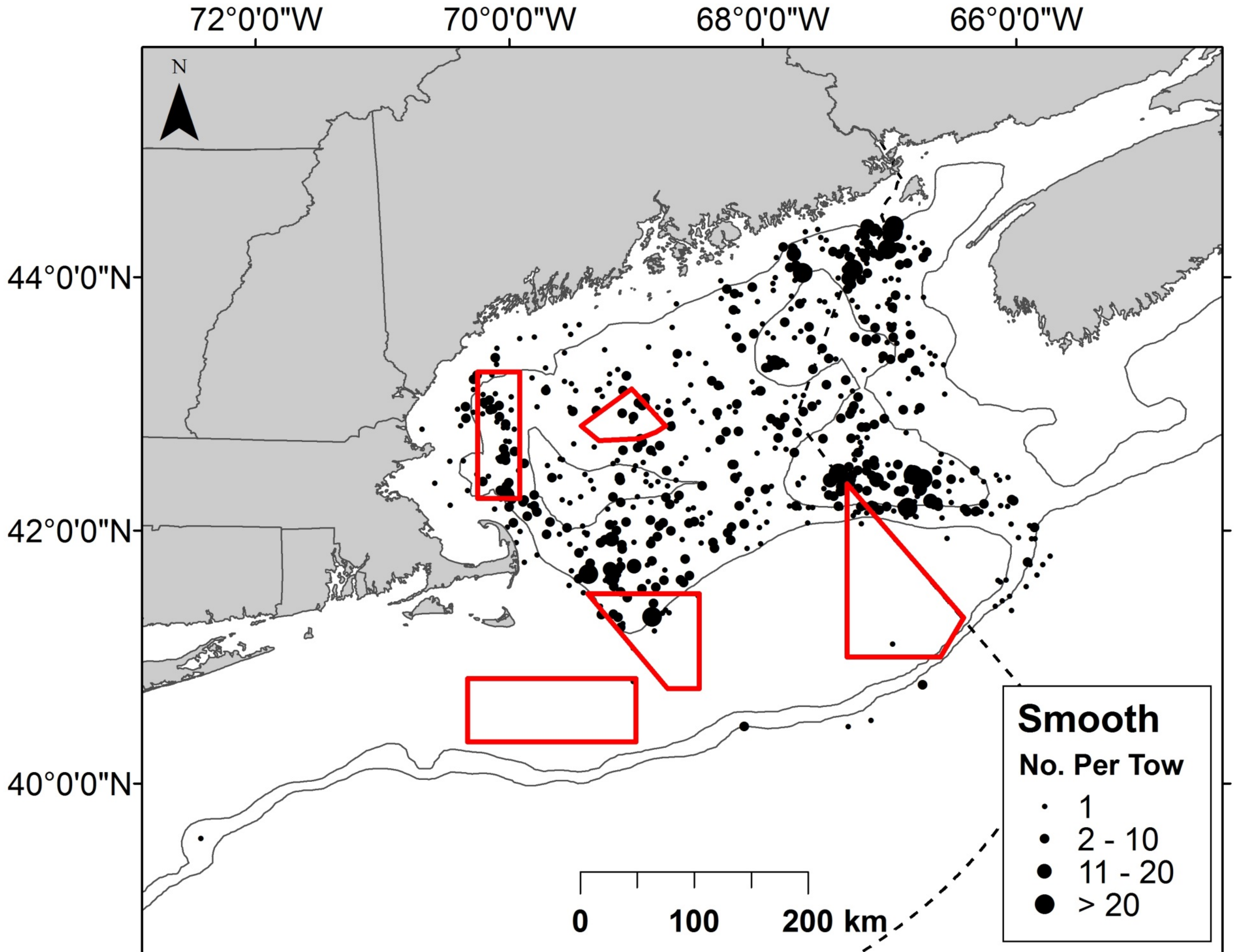
Map 3. Little skate biomass distribution in the winter and spring trawl (2001-2011) surveys.



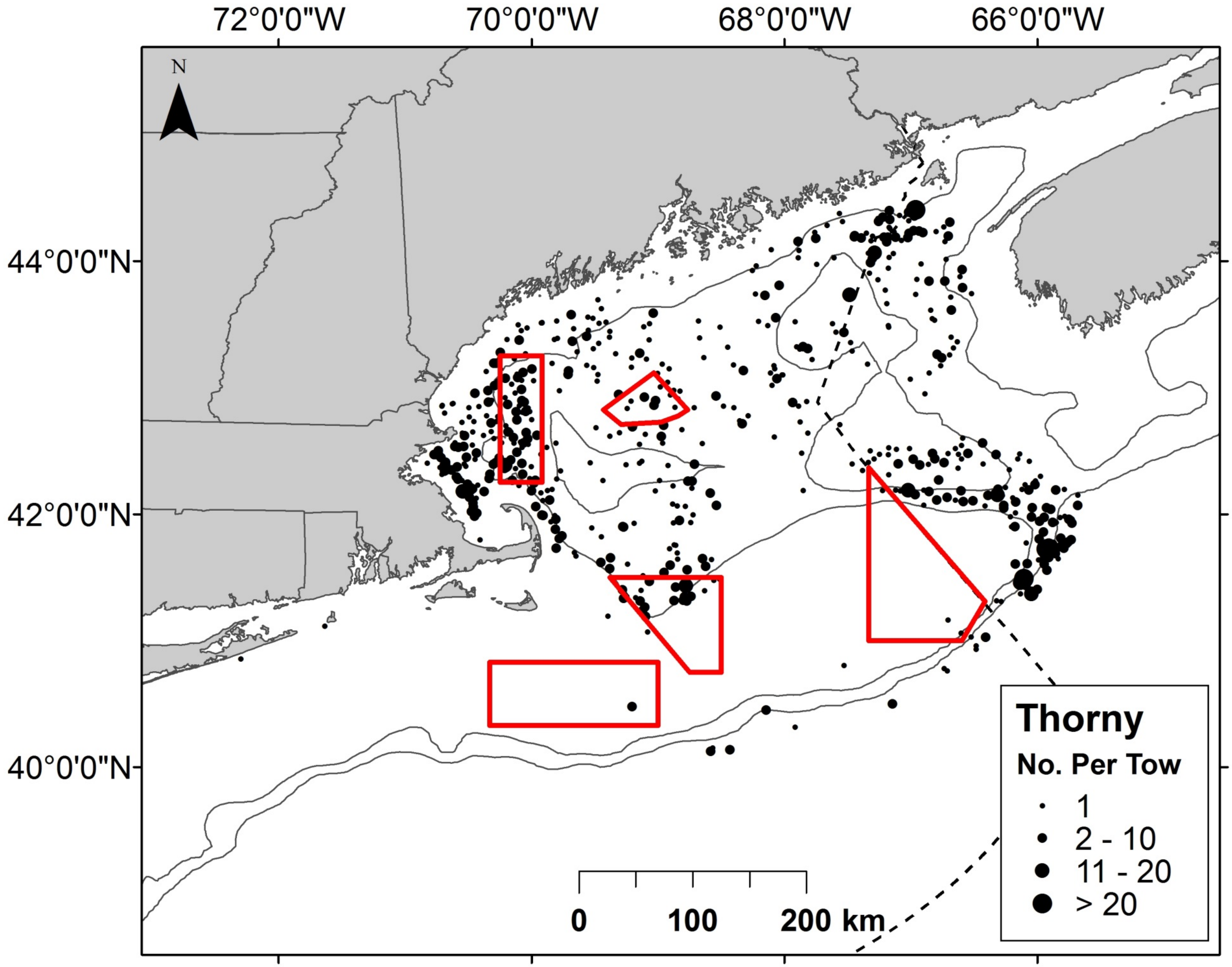
Map 4. Rosette skate biomass distribution in the winter and spring trawl (2001-2011) surveys.



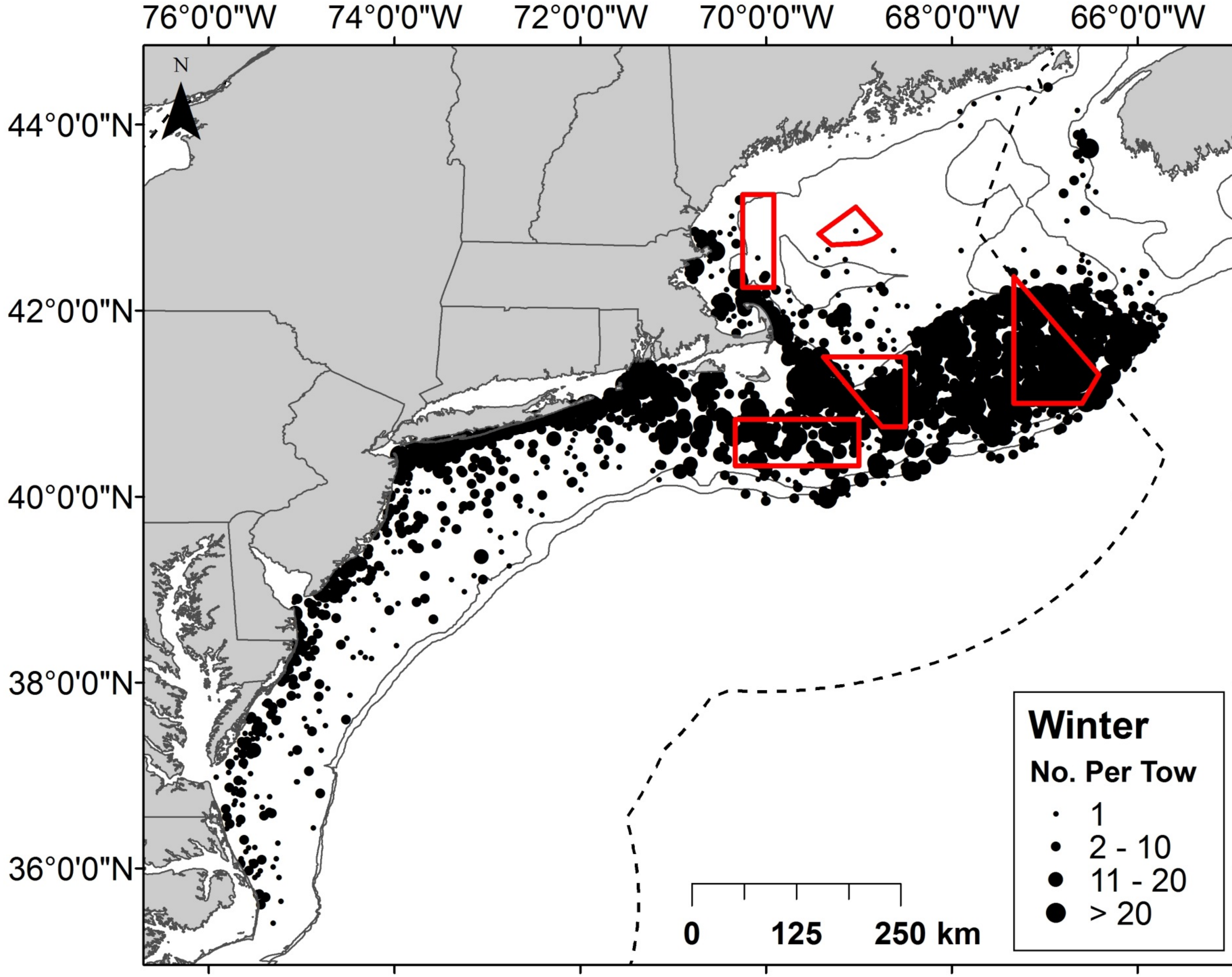
Map 5. Smooth skate biomass distribution in the winter and spring trawl survey (2001-2011).



Map 6. Thorny skate biomass distribution in the winter and spring trawl survey (2001-2011).



Map 7. Winter skate biomass distribution in the winter and spring trawl survey (2002-2012)



6.1.2 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.

The stock status relies entirely on the annual NMFS trawl survey. Except for little skates, the abundance and biomass trends are best represented by the fall survey, which has been updated through 2010. Little skate abundance and biomass trends are best represented by the spring survey, which has been updated through 2011. Details about long term trends in abundance and biomass are given in the SAW 44 Report (NEFSC 2007a) and in the Amendment 3 FEIS (Section 6.1.3???). These descriptions are not repeated here, but are updated in Table 3.

Table 3 - 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 1-3-, 34-40	Autumn 1975-2007 Offshore 61-76, Inshore 17, 20, 23, 26, 29, 32, 35, 38, 41, 44	Spring 1982-2008 Offshore 1-30, 34-40, 61-76, Inshore 2,5,8,11,14,17,20, 23,26,29,32,35,38, 41,44-46,56,59-61,64-66	Autumn 1967-2007 Offshore 61-76	Autumn 1963-2007 Offshore 1-30, 34-40	Autumn 1963-2007 Offshore 1-30, 34-40	Autumn 1967-2007 Offshore 1-30, 34-40, 61-76
2004	1.33	0.80	5.95	0.048	0.22	0.72	4.08
2005	1.05	0.49	3.13	0.064	0.13	0.20	2.65
2006	1.17	0.48	3.33	0.059	0.21	0.74	2.52
2007	0.76	0.90	4.01	0.068	0.09	0.32	3.74
2008	1.11	1.23	6.29	0.029	0.10	0.20	9.62
2009	1.13	0.89	6.62	0.064	0.21	0.25	11.33
2010	1.10	0.68	10.63	0.028	0.18	0.28	8.09
2011	1.02	1.32	6.88	0.034	0.30	0.18	6.65
2012	1.54	0.93	7.54	0.040	0.21	0.08	5.29
2013			6.90				
2006-2008 3-yr average	1.01	0.87	4.54	0.052	0.14	0.42	5.29
2007-2009 3-yr average	1.00	1.01	5.64	0.053	0.13	0.26	8.23
2008-2010 3-yr average	1.11	0.93	7.85	0.040	0.16	0.24	9.68
2009-2011 3-yr average	1.08	0.96	8.04	0.042	0.23	0.24	8.69
2010-2012 3-yr average	1.22	0.97	8.35	0.033	0.23	0.18	6.68
2011-2013 3-yr average			7.11				
Percent change 2009-11 compared to 2008-10	-2.8	+3.0	+2.5	+4.6	+42.4	-2.4	-10.2
Percent change 2010-12 compared to 2009-11	+12.6	+1.3	+3.8	-21.7	+0.8	-24.1	-23.2
Percent change 2011-13 compared to 2010-12			-14.9				
Percent change for overfishing status determination in FMP	-30	-40	-20	-60	-30	-20	-20
Biomass Target	1.57	0.66	6.15	0.048	0.27	4.13	5.66
Biomass Threshold	0.78	0.33	3.07	0.024	0.13	2.06	2.83
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	Not Overfished Overfishing is Not Occurring	Overfished Overfishing is Occurring	Not Overfished Overfishing is Occurring

6.1.3 Biological and Life History Characteristics

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. And a detailed summary of the biological and life history characteristics was included in the FEIS for Amendment 3 (NEFMC 2009).

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.

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_∞ = 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.

Barndoor skates are benthivorous and piscivorous, a 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. The amount of food consumed was related to the size of the skate. Immature skates (<60 cm TL) consumed approximately 5 kg per year of prey items, while mature skates (>100 cm TL) 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.

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).

Clearnose skates are benthivorous, a large portion of the diet comprised of benthic megafauna (crabs and miscellaneous crustaceans). 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. Immature skates (45 - 50 cm TL consumed approximately 1 - 2 kg per year of prey items, while mature skates (60 - 65 cm TL) 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 mature skates.

Little Skate

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). Palm et al. (2011) estimated an average fecundity of 46 eggs per captive female over the course of one year; the highest number of eggs was laid in June; the minimum occurred in March. Egg viability was 74.1%. Size at hatching varied with month; spring hatchlings were larger than other times of the year. Little skate are capable of reproducing year round but no reproductive peaks were observed (Williams et al. 2013).

Cicia et al. (2012) showed temperature influences survivlability in little skate when exposed to air; little skates in summer exhibited higher mortalty rates for air exposure times compared to winter.

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. This diet may overlap but not necessarily compete directly with flounders.

The amount of food consumed was related to the size of the skate. Immature skates consumed approximately 500 g per year of prey items, while mature 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 mature skates.

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.

Swain et al. (2013) modeled the mortality rate of small and large smooth skate and showed decreased mortality for small skate and an increase for larger skates (larger juveniles only) between the 1970s and 2000s in 4T and 4VW areas. The changes in mortality rates differed with area examined; an increase in natural mortality was hypothesized in the 4T and 4VW areas for large skates.

Smooth skates are benthivorous, a large portion of the diet comprised of benthic megafauna (pandalids and euphausiids). 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. The amount of food consumed was related to the size of the skate. Immature skates (20-25 cm TL) consumed approximately 0.5 - 1 kg per year of prey items, while mature skates (50 cm TL) 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.

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, as is information on the fecundity and egg survival.

Rosette skates are benthivorous, a large portion of the diet comprised of benthic macrofauna (amphipods and polychaetes) and benthic megafauna (crabs and shrimps). 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. Immature skates (22 cm TL) consumed approximately 200 g per year of prey items, while mature skates (38 cm TL) 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 mature skates.

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). 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). 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).

Swain et al. (2013) modeled the mortality rate of small and large thorny skate and showed decreased mortality for small skate and an increase for larger skates (adults and larger juveniles) between the 1970s and 2000s in 4T and 4VW areas. The changes in mortality rates differed with area examined; an increase in natural mortality was hypothesized in the 4T and 4VW areas for large skates.

Thorny skates are benthivorous and their piscivorous, a 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. The amount of food consumed was related to the size of the skate. Small skates (20 cm TL) consumed approximately 500 g per year of prey items, while medium (45 cm TL) and large skates (80 cm TL) 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.

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). In the southern Gulf of St Lawrence, winter skate reached a maximum size of 68 cm total length; males and females were mature between 40 and 41 cm TL or around 5 years (Kelly and Hanson, 2013).

Winter skates are capable of reproducing year-round but exhibit one peak in the annual cycle (Sulikowski et al. 2004). Peak reproductive activity occurs during June – August. Size at maturity has been shown to vary with latitude. 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. Fecundity in the southern Gulf of St Lawrence was estimated to be low (Kelly and Hanson, 2013).

Swain et al. (2013) modeled the mortality rate of small and large winter skate and showed decreased mortality for small skate and an increase for larger skates (adults only) between the 1970s and 2000s in 4T and 4VW areas. The changes in mortality rates differed with area examined; an increase in natural mortality was hypothesized in the 4T and 4VW areas for large skates. Benoit et al. (2011) attribute the increase in natural mortality on winter skate to be due to grey seal predation.

Frisk et al (2010) investigated the increase in winter skate abundance in the 1980s and concluded that it was likely due to an increase in recruitment combined with adult migration. A stock assessment model was developed for the stock, however, the five parameter base model did not fit the observed data well.

Winter skate tend to inhabit warmer waters, when possible (Kelly & Hanson, 2013) and may migrate to deeper waters in winter to avoid colder temperatures in the southern Gulf of St. Laurence.

Winter skates are benthivorous and piscivorous, a 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. The amount of food consumed was related to the size of the skate. Medium sized (~45 cm TL) skates consumed approximately 2 kg per year of prey items, while large skates (~80 cm TL) 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. In the southern Gulf of St Lawrence, winter skate less than 40 cm TL ate mainly shrimp and gammarid amphipods; larger skates ate more fishes and Atlantic rock crab (Kelly and Hanson, 2013).

6.1.4 Discards and discard mortality

Since skate discards are high across many fisheries, the estimates of total skate catch are sensitive to the discard mortality rate assumption, and have direct implications for allowable landings in the skate fisheries. Data on immediate- and delayed (i.e. post-release) mortality rates of discarded skates and rays is extremely limited. Only six published studies have estimated discard mortality rates in these species; five of which are outlined in Table 4. Benoit (2006) estimated acute discard mortality rates of winter skates caught in Canadian bottom trawl surveys, the SSC in 2009 decided to use a 50% discard mortality rate assumption for all skates and gears for the purposes of setting the Skate ABC, based on this paper.

Since the Council adopted a 50% discard mortality assumption for setting ABCs in Amendment 3, based on a literature review by the Skate PDT and advice from the Council's SSC, more relevant research data and analysis has been collected on skate mortality by trawl vessels in the Gulf of Maine. When Amendment 3 was developed, this discard mortality assumption was largely derived from published studies, most of which were for species and locations different from those covered in the FMP because no other data existed.

The 2012 specifications package revised the assumed discard mortality rate for little and winter skate based on an experiment in progress examining discard mortality for these species in trawl gear. While the data were preliminary, the Council's SSC reviewed the methodology and the preliminary results of the new discard mortality research and determined the new discard mortality values for little skate (0.20) and winter skate (0.12) to be the best scientific information available compared to the literature review; the new values were applied to little and winter skates captured by trawls and discarded under normal commercial practices. These new data were applied to estimate total discard mortality by gear and species (see Appendix II) and the last three years of data were used to project a 36.3% dead discard mortality rate (dead discards divided by total catch) for the 2012-2013 specification cycle.

Mandelman et al. (2013) examined the immediate and short-term discard mortality rate of little, smooth, thorny and winter skates in the Gulf of Maine. Tow durations lasted 15-20 min (control), 2 h (moderate) and 4 h (extended). The PDT recommended using the pooled moderate and extended tow times as they most closely reflected commercial practices. Full details of the study can be found in the paper by Mandelman et al. (2013) and were presented to the SSC. The SSC approved revising the discard mortality rate estimates for little (22%), smooth (60%), thorny (23%) and winter (9%) skates for otter trawl, consistent with their previous recommendation to use the preliminary estimates from this study. The SSC did not support using this study to revise the assumed 50% discard mortality rate for gillnet gear.

6.1.4.1 Literature Review

Table 4 summarizes the results of the five studies on skate/ray discard mortality rates that were used to estimate an assumed discard mortality rate for the stock complex across gear type. The study locations, fisheries, species, and gears varied across these studies, however most used some type of trawl gear. Only one study (Benoit 2010) estimated the skate discard mortality rate in scallop dredge gear (10% for winter skate). Discard mortality rates for skates have not been estimated in any other gear types (e.g., gillnet, hook gear). Due to the differences in study objectives, methods, and sample sizes across these investigations, it is difficult to directly compare these results, but they may inform the range of reasonable mortality rate assumptions for the Northeast Skate Complex.

Overall, discard mortality rates of skates and rays in trawl gears ranged from 10-100%. Mortality rates varied greatly between species. However, across this broad range of species, the mean discard mortality rate was approximately 50% (±1 standard deviation = 24%). While there are some significant assumptions associated with applying this information to the Northeast Skate Complex, it appears that the current scientific literature supports the use of an assumed 50% discard mortality rate for skates in trawl gear. However, more research is clearly needed on this subject area.

Despite the Benoit (2010) estimate of winter skate discard mortality rates in scallop dredge gear (10%), the Skate PDT determined that this 10% discard mortality estimate is not applicable to the Northeast Skate Complex. The Benoit study was conducted in the Gulf of St. Lawrence using at-sea observer data, and the dredge gear (small bucket scallop dredges) are not considered comparable to the New Bedford style dredges used in the New England scallop fishery. Given the magnitude of skate discards by scallop dredge vessels (Table 6), research on discard mortality rates in this gear should be a high priority.

Table 4. Summary of published skate and ray discard mortality rate studies.

Source	Location	Gear Type	Skate/Ray Species	Discard Mortality Rate (%Dead)
Stobutzki et al. (2002)	N. Australia	Prawn Trawl	56 elasmo species	**56% (range = 10-82%)**
			All rays	**61%**
			Dasyatidae	**59%**
			Gymnuridae	**41%**
			Rhynchobatidae	**10%**
Laptikhovsky (2004)	Falkland Islands	Squid Trawl	*Bathyraja albomaculata*	**28.6%**
			B. brachiurops	**45.4%**
			B. griseocauda	**100%**
			B. macloviana	**100%**
			B. magellanica	**40%**
			Bathyraja sp.	**25%**
			Psammobatis sp.	**40%**
Benoit (2006)	Gulf of St. Lawrence	Bottom Trawl	*Leucoraja ocellata*	**50%**
Enever et al. (2009)	Bristol Channel, UK	Bottom Trawl	4 skate species	**mean = 45%**
			Leucoraja naevus	**67%**
			Raja microocellata	**49%**
			Raja brachyura	**45%**
			Raja clavata	**41%**
Benoit (2010)	Gulf of St. Lawrence	Scallop Dredge	*Leucoraja ocellata*	**10%**
			MEAN TRAWL	**50%**

Benoit et al. (2013) examined the discard mortality of a number of species, including skates, using condition factors prior to discarding to estimate survival. Short-term survival of skates was found to be high. Skates were only identified to the family level and cannot be applied to specific species.

6.1.5 Estimated discards by gear

Another way to evaluate the potential interactions between skate fishing and barndoor, smooth, and thorny skate distributions is to examine estimated discards. Discards were estimated for calendar year 2012 by gear and half-year (). Discards are estimated for a calendar year, rather than the fishing year, because they rely on the NMFS area allocation landings tables to expand observed discard/kept-all ratios to total based on landings by gear, area and quarter. The observed D/K-all ratios were derived from the Sea Sampling Observer and the At Sea Monitoring programs and included both sector and non-sector vessels, but were not stratified on that basis. The projected discard rate is calculated using a three-year average of the discards of skates/landings of all species.

Total estimated discards for 2012 were 36,275 mt (Table 5). Discards decreased by 8.5% over the 2011 estimates. The assumed discard rate for 2014 is 34%. Total dead discards are estimated to be 11,507 mt. Based upon SSC recommendations in 2008, an assumed discard mortality rate of 50% is applied for all gears and species, except for otter trawl gear, which has been updated based on Mandelman et al. 2013. The Skate Committee tasked the Skate PDT with determining whether the revised discard morality rate estimates for trawl gear could be applied to gillnet gear but the PDT has found no supporting evidence for this. Skates are caught in most gear types. Table 6 - Table 9 provide discards by species from 1968 – 2012 for longline, otter trawl, sink gillnet and scallop dredge respectively.

Table 5 – Estimated discards (mt) of skates (all species) by gear type, 1964 - 2012

	Half 1						Half 2						
Year	Line Trawl	Otter Trawl	Shrimp Trawl	Sink Gill Net	Scallop Dredge	Total Half 1	Line Trawl	Otter Trawl	Shrimp Trawl	Sink Gill Net	Scallop Dredge	Total Half 2	Grand Total
1964	441	54,171	0	12	5,883	60,506	471	35,752	0	7	7,027	43,258	103,763
1965	491	59,067	0	17	4,414	63,989	609	39,381	0	5	7,829	47,824	111,812
1966	373	63,304	0	26	6,078	69,781	572	34,031	0	7	5,502	40,112	109,893
1967	319	57,348	0	22	2,944	60,631	379	33,081	0	8	4,035	37,504	98,135
1968	252	56,808	0	37	3,807	60,904	345	31,931	0	10	4,123	36,409	97,313
1969	273	55,730	0	32	2,359	58,395	524	27,736	0	6	2,607	30,873	89,268
1970	299	44,621	0	22	1,628	46,570	479	25,480	0	7	2,341	28,308	74,878
1971	460	35,165	0	21	1,860	37,506	715	19,920	0	8	2,199	22,842	60,348
1972	464	32,764	0	31	1,982	35,241	766	18,774	0	13	2,193	21,746	56,988
1973	566	34,973	0	31	2,206	37,776	754	19,785	0	15	1,666	22,220	59,996
1974	627	36,856	0	58	1,752	39,293	703	17,226	0	24	2,377	20,331	59,624
1975	695	25,513	280	61	2,389	28,937	726	16,923	37	26	4,050	21,762	50,699
1976	470	22,845	66	99	3,902	27,382	418	19,943	0	37	7,019	27,417	54,798
1977	343	27,301	39	169	6,710	34,561	342	21,317	0	47	8,497	30,203	64,764
1978	754	35,675	0	189	7,999	44,617	564	22,772	0	66	12,026	35,428	80,045
1979	838	39,000	26	156	8,822	48,843	785	27,382	0	67	11,326	39,559	88,402
1980	1,009	40,300	21	189	9,808	51,326	338	29,024	0	96	9,288	38,746	90,072
1981	527	43,614	99	258	9,389	53,887	272	25,671	0	93	10,461	36,496	90,383
1982	427	43,877	124	91	7,285	51,805	173	37,260	7	83	10,584	48,108	99,913
1983	396	49,891	115	116	8,658	59,176	182	32,350	22	69	10,066	42,690	101,867
1984	386	48,904	152	123	8,694	58,260	76	30,674	53	94	8,337	39,234	97,494
1985	315	40,693	225	115	6,791	48,140	143	23,149	70	81	7,888	31,331	79,471
1986	421	37,367	252	170	7,308	45,518	149	25,975	83	87	10,257	36,551	82,069
1987	626	36,459	288	140	12,518	50,031	288	23,377	46	85	15,924	39,720	89,752
1988	626	35,635	183	162	14,382	50,987	247	22,370	46	90	16,259	39,012	89,999
1989	536	37,663	73	48	19,609	57,930	211	20,264	17	92	16,377	36,961	94,890
1990	385	50,465	208	347	18,338	69,743	216	35,720	71	73	19,813	55,893	125,636
1991	1,174	22,882	243	99	18,508	42,906	323	29,856	44	113	15,850	46,185	89,091

1992	1,646	13,153	247	269	14,558	29,874	1,105	19,609	0	107	18,088	38,909	68,783
1993	69	7,994	35	212	9,869	18,180	27	21,791	1	110	12,168	34,097	52,277
1994	20	65,500	11	265	6,099	71,896	28	16,301	1	228	5,056	21,613	93,509
1995	28	22,993	8	443	8,733	32,205	30	11,701	1	350	19,845	31,927	64,132
1996	28	15,598	26	419	8,360	24,431	27	25,801	8	131	11,467	37,433	61,864
1997	30	6,633	34	392	11,061	18,151	30	6,784	4	91	6,334	13,243	31,393
1998	25	26,723	6	217	6,819	33,790	34	20,136	0	252	8,444	28,866	62,656
1999	23	3,810	3	599	7,194	11,628	24	9,627	0	249	7,955	17,854	29,482
2000	14	6,917	4	181	5,208	12,324	26	17,040	0	792	4,709	22,568	34,892
2001	20	21,144	0	404	3,767	25,335	22	8,439	0	204	3,249	11,914	37,249
2002	21	12,176	1	391	6,088	18,677	107	9,663	0	2,464	7,696	19,931	38,608
2003	38	17,915	8	522	7,913	26,397	10	18,061	0	443	8,068	26,582	52,980
2004	9	14,423	4	450	5,232	20,118	11	21,684	0	498	4,078	26,271	46,389
2005	91	14,186	2	1,037	6,079	21,395	54	19,196	0	559	4,613	24,421	45,816
2006	195	10,594	0	860	5,728	17,377	17	12,316	1	362	4,935	17,631	35,008
2007	46	14,755	0	1,041	5,796	21,640	27	16,771	0	771	7,222	24,791	46,431
2008	111	10,667	2	1,320	5,073	17,173	65	12,703	0	708	4,939	18,415	35,588
2009	132	10,530	1	1,451	4,053	16,165	176	15,080	0	537	3,237	19,030	35,195
2010	269	9,433	0	1,058	8,082	18,841	209	11,869	0	1,344	5,284	18,706	37,547
2011	86	11,768	0	1,976	5,615	19,444	61	14,760	0	1,205	4,025	20,051	39,495
2012	46	10,173	3	1,612	4,294	16,129	54	14,306	0	984	4,802	20,147	36,275

Table 6 - Estimated discards by species for the longline fishery, 1964 - 2012

Year	Winter	Little	Barndoor	Thorny	Smooth	Clearnose	Rosette	Total
1968	216	110	18	235	19	0	0	597
1969	343	189	17	237	12	0	0	797
1970	332	124	3	304	16	0	0	779
1971	289	213	18	605	51	0	0	1175
1972	370	140	14	646	60	0	0	1230
1973	362	147	0	732	77	0	0	1320
1974	396	206	2	625	102	0	0	1330
1975	391	259	2	735	34	0	0	1421
1976	320	140	5	379	44	0	0	888
1977	253	81	0	315	35	0	0	684
1978	592	311	1	234	39	132	9	1317
1979	827	389	0	301	32	70	3	1623
1980	687	341	0	213	40	51	15	1347
1981	284	219	0	185	18	87	7	799
1982	276	224	0	90	5	5	0	601
1983	334	174	0	40	7	24	0	578
1984	300	110	0	30	1	15	5	462
1985	253	157	0	35	2	12	0	458
1986	343	112	0	43	4	68	0	570
1987	672	165	0	48	3	21	5	914
1988	675	145	0	41	5	2	4	873
1989	560	120	0	56	5	6	1	747
1990	367	132	0	78	8	14	1	600
1991	905	306	1	222	21	41	1	1497
1992	1463	806	17	365	31	54	14	2751
1993	41	28	0	25	3	0	0	97
1994	13	15	0	17	2	0	0	48
1995	40	6	4	5	1	1	0	58
1996	39	7	5	3	1	2	0	55
1997	36	8	9	4	1	3	0	60
1998	39	9	5	3	1	2	0	59
1999	33	7	5	1	0	1	0	47
2000	24	6	7	2	1	1	0	40
2001	24	8	7	1	1	2	0	42
2002	82	20	17	1	2	6	0	128
2003	29	9	6	2	2	1	0	48
2004	12	3	4	0	1	1	0	20
2005	70	19	39	6	11	0	0	145
2006	116	32	50	4	10	0	0	212
2007	36	11	23	1	2	0	0	73
2008	63	53	39	1	4	15	0	176
2009	181	79	29	1	3	15	0	307

2010	243	89	121	3	15	7	0	478
2011	68	29	36	1	11	1	0	147
2012	61	22	9	2	3	4	0	100

Table 7 - Estimated discards for all skate species by otter trawl gear, 1964 - 2012

Year	Winter	Little	Barndoor	Thorny	Smooth	Clearnose	Rosette	Total
1968	29746	35747	4116	17610	1423	35	62	88739
1969	29240	36787	1343	14412	895	780	9	83466
1970	21483	30043	884	15936	930	794	30	70101
1971	15430	20556	582	16328	1783	399	7	55085
1972	19276	16530	561	12950	1282	902	36	51538
1973	18019	19966	83	14378	1801	475	35	54758
1974	20645	17359	103	12949	2591	405	30	54082
1975	14048	16189	36	11682	643	122	33	42753
1976	13259	17041	146	10151	1119	837	301	42854
1977	19902	15173	1	11619	1110	796	55	48657
1978	29013	15807	27	9880	1734	1844	144	58447
1979	30018	23290	12	10310	1206	1504	68	66408
1980	38105	16454	2	11863	1919	759	242	69345
1981	39178	16476	2	11483	1037	1109	99	69384
1982	40881	30555	7	9051	502	243	31	81269
1983	46678	23986	1	8819	964	1909	22	82378
1984	41143	27779	5	8300	373	1572	613	79784
1985	34981	19051	3	9090	444	558	11	64137
1986	38507	11655	12	6690	587	6183	43	63677
1987	30425	19848	12	5314	365	3336	870	60170
1988	32188	19164	10	3938	583	247	2103	58234
1989	26173	26266	23	3527	367	1501	161	58017
1990	37105	36204	18	6548	700	5432	458	86464
1991	17261	17806	39	3619	376	13767	155	53025
1992	10596	15732	130	1497	119	3433	1502	33009
1993	9578	15577	241	3402	368	424	232	29821
1994	16180	57575	254	2958	216	4430	200	81814
1995	16022	13707	230	466	437	3786	55	34704
1996	14602	20837	27	153	161	5449	205	41433
1997	6516	5814	65	327	222	491	19	13455
1998	21160	21146	171	789	396	3110	94	46867
1999	5867	6138	365	264	171	615	20	13440
2000	9158	11932	508	329	348	1583	104	23962
2001	15464	9334	2339	867	417	1156	6	29584
2002	12077	5504	1914	778	440	1124	2	21840
2003	16244	15465	1090	956	929	1287	14	35985
2004	20064	11871	1183	650	1440	868	37	36113
2005	14175	13214	2874	668	1601	808	45	33385
2006	10983	7220	2829	428	920	504	28	22912

2007	15493	9669	3542	355	705	1748	14	31527
2008	11220	6268	3258	90	591	1915	31	23373
2009	15734	6991	1492	179	591	600	24	25610
2010	14084	3637	2544	268	577	185	7	21302
2011	15062	5081	4370	149	637	1217	12	26528
2012	13688	5858	3413	326	596	591	10	24483

Table 8 - Estimated discards by species from sink gillnet gear from 1964-2012

Year	Winter	Little	Barndoor	Thorny	Smooth	Clearnose	Rosette	Total
1968	0	1	2	42	2	0	0	46
1969	1	0	5	30	2	0	0	38
1970	1	0	0	26	2	0	0	29
1971	0	1	0	25	4	0	0	29
1972	4	1	0	36	4	0	0	45
1973	1	0	0	40	5	0	0	46
1974	1	1	0	67	14	0	0	82
1975	2	0	0	80	4	0	0	87
1976	2	2	1	113	18	0	0	135
1977	6	0	0	190	20	0	0	216
1978	4	1	0	205	45	0	0	255
1979	50	4	0	144	26	0	0	223
1980	55	12	0	184	33	0	0	285
1981	36	12	0	270	33	0	0	350
1982	40	17	0	112	6	0	0	175
1983	43	4	0	122	16	0	0	185
1984	65	11	0	136	5	0	0	217
1985	35	10	0	145	6	0	0	196
1986	60	8	0	174	14	0	0	257
1987	49	6	0	160	9	0	0	225
1988	45	44	0	141	21	0	0	252
1989	65	7	0	62	5	0	0	140
1990	48	33	0	300	40	0	0	421
1991	46	9	1	140	16	0	0	212
1992	66	147	18	138	8	0	0	376
1993	96	132	1	81	11	0	0	321
1994	89	221	1	136	25	18	2	492
1995	435	286	8	25	16	23	0	793
1996	324	188	2	8	3	23	1	550
1997	189	263	1	4	1	25	1	484
1998	163	261	1	4	6	32	2	469
1999	282	514	3	5	3	40	1	847
2000	651	247	12	29	16	19	0	973
2001	347	150	39	13	5	52	1	608
2002	2426	101	204	22	5	96	0	2856

2003	548	225	89	18	20	64	0	965
2004	501	248	134	15	25	25	0	948
2005	803	331	297	23	52	89	1	1596
2006	663	104	392	14	13	34	0	1222
2007	1184	315	172	10	20	108	3	1812
2008	650	295	742	3	18	320	0	2028
2009	1407	286	188	8	23	75	0	1988
2010	1471	122	764	6	15	23	0	2402
2011	1222	150	1660	4	25	119	0	3181
2012	1252	301	965	8	20	51	0	2596

Table 9 - Estimated discards from the scallop fishery from 1968-2012

Year	Winter	Little	Barndoor	Thorny	Smooth	Clearnose	Rosette	Total
1968	4033	2592	88	711	67	402	37	7930
1969	1893	1886	52	684	33	415	3	4966
1970	1740	972	10	863	44	327	12	3969
1971	994	1229	55	1304	145	327	4	4059
1972	1094	1285	37	1410	159	184	7	4175
1973	1162	962	1	1493	188	64	2	3872
1974	983	1298	3	953	177	674	40	4129
1975	814	3209	5	1915	82	400	15	6439
1976	2373	4695	22	1390	151	1745	545	10921
1977	6070	5076	1	1935	128	1772	225	15206
1978	7750	5505	6	1820	173	4468	304	20025
1979	8742	6499	7	2260	215	2313	111	20148
1980	7894	5193	1	3929	691	1069	318	19096
1981	11129	4131	1	3432	327	777	53	19850
1982	9669	6476	2	1431	84	188	20	17869
1983	7781	6794	0	1621	202	2301	26	18725
1984	7927	5517	2	1295	46	1757	487	17031
1985	6489	6130	1	1222	47	780	11	14680
1986	9984	2912	10	886	90	3661	22	17565
1987	12266	10899	7	849	54	3517	851	28442
1988	15736	10907	6	1305	194	621	1872	30640
1989	19790	12712	7	1419	162	1725	170	35986
1990	25519	6877	44	2129	180	3149	253	38151
1991	17490	9545	15	2434	207	4573	94	34358
1992	18091	8846	90	1794	195	2849	783	32646
1993	6497	12525	109	1762	203	702	239	22037
1994	2229	5939	48	1419	217	1161	142	11155
1995	9186	18712	59	109	113	241	159	28578
1996	5587	13517	90	173	166	90	205	19828
1997	4018	12444	305	155	217	212	46	17396

1998	3444	10989	122	219	227	145	116	15263
1999	2679	11971	117	132	75	96	78	15149
2000	1901	7637	74	94	68	71	73	9918
2001	1108	5600	32	23	50	72	127	7011
2002	1889	11300	160	38	87	236	75	13785
2003	2051	13436	92	127	213	43	21	15982
2004	3053	5536	79	32	96	496	17	9310
2005	3174	6686	397	59	152	168	56	10691
2006	3717	6079	395	92	151	208	22	10663
2007	3711	8579	324	70	122	185	29	13019
2008	2398	6613	290	31	250	383	40	10006
2009	2485	4228	335	18	48	153	23	7290
2010	4325	8446	303	22	52	196	21	13366
2011	3460	5199	570	22	128	235	25	9640
2012	3008	5295	503	73	172	37	9	9097

6.1.6 Evaluation of Fishing Mortality and Stock Abundance

Benchmark assessment results from SAW 44 are given in NEFSC 2007a and 2007b. Because the analytic models that were attempted did not produce reliable results, the status of skate overfishing is determined based on a rate of change in the three year moving average for survey biomass. These thresholds vary by species due to normal inter-annual survey variability. Details about the overfishing reference points and how they were chosen are given in NEFSC 2000.

The latest results for 2012 (2013 spring survey for little skate) are given in Table 3. At this time, overfishing is not occurring on any skate species.

6.1.7 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***
North Atlantic 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.

6.1.7.1 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, North Carolina. Turtles generally 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). A reversal of this trend occurs in the fall when water temperatures cool. Turtles pass Cape Hatteras by December and return 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 typically occur as far north as Cape Cod whereas the more cold-tolerant leatherbacks occur in more northern Gulf of Maine waters in the summer and fall (Shoop and Kenney 1992, STSSN database http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp).

On March 16, 2010, NMFS and USFWS published a proposed rule (75 FR 12598) to divide the worldwide population of loggerhead sea turtles into nine DPSs, as described in the 2009 Status Review. Two of the DPSs were proposed to be listed as threatened and seven of the DPSs, including the Northwest Atlantic Ocean DPS, were proposed to be listed as endangered. NMFS and the USFWS accepted comments on the proposed rule through September 13, 2010 (75 FR 30769, June 2, 2010). On March 22, 2011 (76 FR 15932), NMFS and USFWS extended the date by which a final determination on the listing action will be made to no later than September 16, 2011. This action was taken to address the interpretation of the existing data on status and trends and its relevance to the assessment of risk of extinction for the Northwest Atlantic Ocean DPS, as well as the magnitude and immediacy of the fisheries bycatch threat and measures to reduce this threat. New information or analyses to help clarify these issues were requested by April 11, 2011.

On September 22, 2011, NMFS and USFWS issued a final rule (76 FR 58868), determining that the loggerhead sea turtle is composed of nine DPSs (as defined in Conant et al., 2009) that constitute species that may be listed as threatened or endangered under the ESA. Five DPSs were listed as endangered (North Pacific Ocean, South Pacific Ocean, North Indian Ocean, Northeast Atlantic Ocean, and Mediterranean Sea), and four DPSs were listed as threatened (Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean). Note that the Northwest Atlantic Ocean (NWA) DPS and the Southeast Indo-Pacific Ocean DPS were original proposed as endangered.

The NWA DPS was determined to be threatened based on review of nesting data available after the proposed rule was published, information provided in public comments on the proposed rule, and further discussions within the agencies. The two primary factors considered were population abundance and population trend. NMFS and USFWS found that an endangered status for the NWA DPS was not warranted given the large size of the nesting population, the overall nesting population remains widespread, the trend for the nesting population appears to be stabilizing, and substantial conservation efforts are underway to address threats.

The September 2011 final rule also noted that critical habitat for the two DPSs occurring within the U.S. (NWA DPS and North Pacific DPS) will be designated in a future rulemaking. Information from the public related to the identification of critical habitat, essential physical or biological features for this species, and other relevant impacts of a critical habitat designation was solicited.

This proposed action only occurs in the Atlantic Ocean. As noted in Conant et al. (2009), the range of the four DPSs occurring in the Atlantic Ocean are as follows: NWA DPS – north of the equator, south of 60° N latitude, and west of 40° W longitude; Northeast Atlantic Ocean (NEA) DPS – north of the equator, south of 60° N latitude, east of 40° W longitude, and west of 5° 36’ W longitude; South Atlantic DPS – south of the equator, north of 60° S latitude, west of 20° E longitude, and east of 60° W longitude; Mediterranean DPS – the Mediterranean Sea east of 5° 36’ W longitude. These boundaries were determined based on oceanographic features, loggerhead sightings, thermal tolerance, fishery bycatch data, and information on loggerhead distribution from satellite telemetry and flipper tagging studies. Sea turtles from the NEA DPS are not expected to be present over the North American continental shelf in U.S. coastal waters, where the proposed action occurs (P. Dutton, NMFS, personal communication, 2011). Previous literature (Bowen et al. 2004) has suggested that there is the potential, albeit small, for some juveniles from the Mediterranean DPS to be present in U.S. Atlantic coastal foraging grounds. These data should be interpreted with caution however, as they may be representing a shared common haplotype and lack of representative sampling at Eastern Atlantic rookeries. Given that updated, more refined analyses are ongoing and the occurrence of Mediterranean DPS juveniles in U.S. coastal waters is rare and uncertain, if even occurring at all, for the purposes of this assessment we are making the determination that the Mediterranean DPS is not likely to be present in the action area. Sea turtles of the South Atlantic DPS do not inhabit the action area of this subject fishery (Conant et al. 2009). As such, the remainder of this assessment will only focus on the NWA DPS of loggerhead sea turtles, listed as threatened.

In general, sea turtles are a long-lived species and reach sexual maturity relatively late (NMFS SEFSC 2001; NMFS and USFWS 2007a, 2007b, 2007c, 2007d). Sea turtles are injured and killed by numerous human activities (NRC 1990; NMFS and USFWS 2007a, 2007b, 2007c, 2007d). Nest count data are a valuable source of information for each turtle species since the number of nests laid reflects the reproductive output of the nesting group each year. A decline in the annual nest counts has been measured or suggested for four of five western Atlantic loggerhead nesting groups through 2004 (NMFS and USFWS 2007a), however, data collected since 2004 suggests nest counts have stabilized or increased (TEWG 2009). Nest counts for Kemp's ridley sea turtles as well as leatherback and green sea turtles in the Atlantic demonstrate increased nesting by these species (NMFS and USFWS 2007b, 2007c, 2007d).

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.

6.1.7.2 Large Cetaceans (Baleen Whales and Sperm Whale)

The most recent Marine Mammal Stock Assessment Report (SAR) (Waring et al. 2012), covering the time period between 2005 and 2009, reviewed the current population trend for each of these cetacean species within U.S. Economic Exclusion Zone (EEZ) waters. The SAR also estimated annual human-caused mortality and serious injury. Finally, it described the commercial fisheries that interact with each stock in the U.S. Atlantic. The following paragraphs summarize information from the SAR.

The western North Atlantic baleen whale species (North Atlantic right, humpback, fin, sei, and minke whales) follow a general annual pattern of migration. They migrate from high latitude summer foraging grounds, including the Gulf of Maine and Georges Bank, to low latitude winter calving grounds (Perry et al. 1999, Kenney 2002). However, this is a simplification of species movements as the complete winter distribution of most species is unclear (Perry et al. 1999, Waring et al. 2012). 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). Blue whales are most often sighted along the east coast of Canada, particularly in the Gulf of St. Lawrence. They occur only infrequently within the U.S. EEZ (Waring et al. 2002).

North Atlantic right whales are federally listed as endangered under the ESA and a revised recovery plan was published in June 2005. Available information suggests that the North Atlantic right whale population increased at a rate of 2.4 percent per year between 1990 and 2007. The total number of North Atlantic right whales is estimated to be at least 396 animals in 2006 (Waring et al. 2012). The minimum rate of annual human-caused mortality and serious injury to right whales averaged 2.4 mortality or serious injury incidents per year during 2005 to 2009 (Waring et al. 2012). Of these, fishery interactions resulted in an average of 0.8 mortality or serious injury incidents per year, all in U.S. waters. The potential biological removal (PBR) level for this stock is 0.8 animals per year (Waring et al. 2012). The Potential Biological Removal (PBR) level is the maximum number of animals, not including natural mortalities, which may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

Humpback whales are also listed as endangered under the ESA, and a recovery plan was published for this species in 1991. The North Atlantic population of humpback whales is conservatively estimated to be 7,698 (Waring et al. 2012). The best estimate for the GOM stock of humpback whale population is 847 whales and current data suggest that the Gulf of Maine humpback whale stock is steadily increasing in size (Waring et al. 2012). The minimum rate of annual human-caused mortality and serious injury to humpback whales averaged 5.2 mortality or serious injury incidents per year during 2005 to 2009 (Waring et al. 2012). Of these, fishery interactions resulted in an average of 3.8 mortality or serious injury incidents per year (3.4 from U.S. waters and 0.4 from Canadian waters). The PBR for this stock is 1.1 animals per year (Waring et al. 2012).

Fin, sei, and sperm whales are all federally listed as endangered under the ESA, with recovery plans currently in place. Based on data available for selected areas and time periods, the minimum population estimates for these western North Atlantic whale stocks are 3,269 fin whales, 208 sei whales (Nova Scotia stock) (Waring et al. 2012), and 3,539 sperm whales (Waring et al. 2007). Insufficient information exists to determine population trends for these large whale species.

The minimum rate of annual human-caused mortality and serious injury to fin whales averaged 2.6 mortality or serious injury incidents per year during 2005 to 2009 (Waring et al. 2012). Of these, fishery interactions resulted in an average of 0.8 mortality or serious injury incidents per year (0.6 from U.S. waters and 0.2 from Canadian waters). The PBR for this stock is 6.5 animals per year (Waring et al. 2012). For sei whales, the minimum rate of annual human-cause mortality and serious injury averaged 1.2 per year, of which 0.6 were a result of fishery interactions. PBR for the Nova Scotia sei whale stock is 0.4 (Waring et al. 2012). For both fin and sei whales, these estimates are likely biased low due to the low detection rate for these species. The most recent SAR for the North Atlantic sperm whale stock is from 2007 (covering the years 2001-2005) and during that time period, there were no recorded mortality or serious injury incidents due to entanglements (Waring et al. 2007). PBR for this stock is 7.1 animals per year.

Minke whales are not ESA-listed but are protected under the MMPA, with a minimum population estimate of 6,909 animals for the Canadian east coast stock; however, a population trend analysis has not been conducted for this stock (Waring et al. 2012). The minimum rate of annual human-caused mortality and serious injury averaged 5.9 per year during 2005 to 2009, and of these, 3.5 animals per year were recorded through observed fisheries and 0.8 per year were attributed to U.S. fisheries using stranding and entanglement data (Waring et al. 2012). PBR for this stock is 69 animals per year.

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.

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

There is fishing related mortality of numerous small cetacean species (dolphins, pilot whales, and harbor porpoises) associated with Northeast Multispecies fishing gear. Seasonal abundance and distribution of each species off the coast of the Northeast U.S. varies with respect to life history characteristics. Some species such as white-sided dolphins and harbor porpoises primarily occupy continental shelf waters.

Other species such as the Risso's dolphin occur primarily in continental shelf edge and slope waters. Still other species like the common dolphin and the spotted dolphin occupy all three habitats. Waring et al. (2012) summarizes information on the distribution and geographic range of western North Atlantic stocks of each species.

The most commonly observed small cetaceans recorded as bycatch in multispecies fishing gear (e.g., gillnets and trawls) are harbor porpoises, white-sided dolphins, common dolphins, and pilot whales. These species are described in a bit more detail here. Harbor porpoises are found seasonally within New England and Mid-Atlantic waters. In the Mid-Atlantic, porpoises are present in the winter/spring (typically January through April) and in southern New England waters from December through May. In the Gulf of Maine, porpoises occur largely from the fall through the spring (September through May) and in the summer are found in northern Maine and through the Bay of Fundy and Nova Scotia area. White-sided dolphin distribution shifts seasonally, with a large presence from Georges Bank through the Gulf of Maine from June through September, with intermediate presence from Georges Bank through the lower Gulf of Maine from October through December. Low numbers are present from Georges Bank to Jeffrey's Ledge from January through May (Waring et al. 2012). Common dolphins are widely distributed over the continental shelf from Maine through Cape Hatteras, North Carolina. From mid-January to May they are dispersed from North Carolina through Georges Bank, and then move onto Georges Bank and the Scotia shelf from the summer to fall. They are occasionally found in the Gulf of Maine (Waring et al. 2012). Pilot whales are generally distributed along the continental shelf edge off the northeastern U.S. coast in the winter and early spring. In late spring, the move onto Georges Bank and into the Gulf of Maine and remain until late fall. They do occur along the Mid-Atlantic shelf break between Cape Hatteras, North Carolina and New Jersey (Waring et al. 2012). Since pilot whales are difficult to differentiate at sea, they are generally considered Globicephala sp. when they are recorded at sea (Waring et al. 2012).

6.1.7.4 Pinnipeds

Harbor seals have the most extensive distribution of the four species of seal expected to occur in the area. Harbor seals sighting have occurred far south as 30° N (Katona et al. 1993, Waring et al. 2012). Their approximate year-round range extends from Nova Scotia, through the Bay of Fundy, and south through Maine to northern Massachusetts (Waring et al. 2012). Their more seasonal range (September through May) extends from northern Massachusetts south through southern New Jersey, and stranding records indicate occasional presence of harbor seals from southern New Jersey through northern North Carolina (Waring et al. 2012). Gray seals are the second most common seal species in U.S. EEZ waters. They occur from Nova Scotia through the Bay of Fundy and into waters off of New England (Katona et al. 1993; Waring et al. 2011) year-round from Maine through southern Massachusetts (Waring et al. 2012). A more seasonal distribution of gray seals occurs from southern Massachusetts through southern New Jersey from September through May. Similar to harbor seals, occasional presence from southern New Jersey through northern North Carolina indicate occasional presence of gray seals in this region (Waring et al. 2012). Pupping for both species occurs in both U.S. and Canadian waters of the western North Atlantic. The majority of harbor seal pupping is thought to occur in U.S. waters. While there are at least three gray seal pupping colonies in U.S., the majority of gray seal pupping likely occurs in Canadian waters. Observations of harp and hooded seals are less common in U.S. EEZ waters. Both species form aggregations for pupping and breeding off eastern Canada in the late winter/early spring. They then travel to more northern latitudes for molting and summer feeding (Waring et al. 2006). Both species have a seasonal presence in U.S. waters from Maine to New Jersey, based on sightings, stranding, and fishery bycatch information (Waring et al. 2012).

6.1.7.5 Atlantic Sturgeon

Atlantic sturgeon is an anadromous species that spawns in relatively low salinity, river environments, but spends most of its life in the marine and estuarine environments from Labrador, Canada to the Saint Johns River, Florida (Holland and Yelverton 1973, Dovel and Berggen 1983, Waldman et al. 1996, Kynard and Horgan 2002, Dadswell 2006, ASSRT 2007). Tracking and tagging studies have shown that subadult and adult Atlantic sturgeon that originate from different rivers mix within the marine environment, utilizing ocean and estuarine waters for life functions such as foraging and overwintering (Stein et al. 2004a, Dadswell 2006, ASSRT 2007, Laney et al. 2007, Dunton et al. 2010). Fishery-dependent data as well as fishery-independent data demonstrate that Atlantic sturgeon use relatively shallow inshore areas of the continental shelf; primarily waters less than 50 m (Stein et al. 2004b, ASMFC 2007, Dunton et al. 2010). The data also suggest regional differences in Atlantic sturgeon depth distribution with sturgeon observed in waters primarily less than 20 m in the Mid-Atlantic Bight and in deeper waters in the Gulf of Maine (Stein et al. 2004b, ASMFC 2007, Dunton et al. 2010). Information on population sizes for each Atlantic sturgeon DPS is very limited. Based on the best available information, NMFS has concluded that bycatch, vessel strikes, water quality and water availability, dams, lack of regulatory mechanisms for protecting the fish, and dredging are the most significant threats to Atlantic sturgeon.

Comprehensive information on current abundance of Atlantic sturgeon is lacking for all of the spawning rivers (ASSRT 2007). Based on data through 1998, an estimate of 863 spawning adults per year was developed for the Hudson River (Kahnle et al. 2007), and an estimate of 343 spawning adults per year is available for the Altamaha River, GA, based on data collected in 2004-2005 (Schueller and Peterson 2006). Data collected from the Hudson River and Altamaha River studies cannot be used to estimate the total number of adults in either subpopulation, since mature Atlantic sturgeon may not spawn every year, and it is unclear to what extent mature fish in a non-spawning condition occur on the spawning grounds. Nevertheless, since the Hudson and Altamaha Rivers are presumed to have the healthiest Atlantic sturgeon subpopulations within the United States, other U.S. subpopulations are predicted to have fewer spawning adults than either the Hudson or the Altamaha (ASSRT 2007). It is also important to note that the estimates above represent only a fraction of the total population size as spawning adults comprise only a portion of the total population (e.g., this estimate does not include subadults and early life stages).

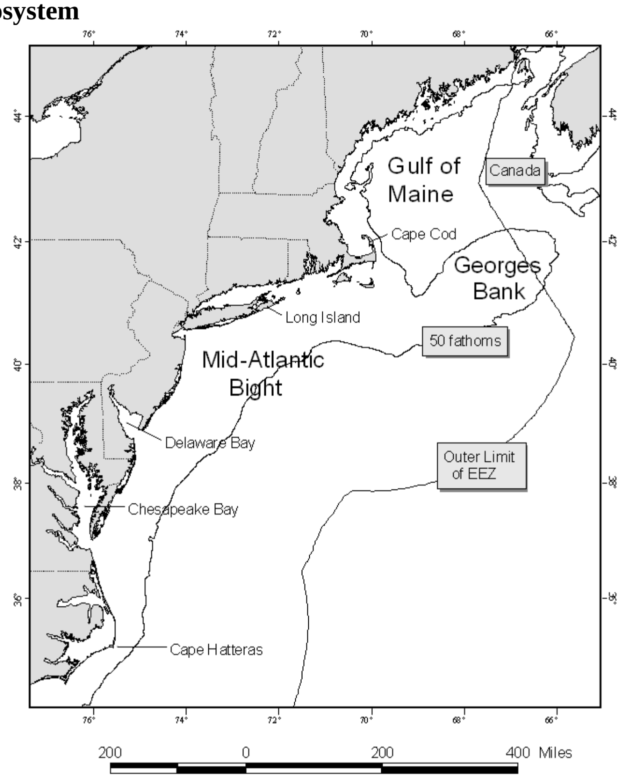
6.2 Physical Environment

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. 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 (see Map 8 and Map 9).

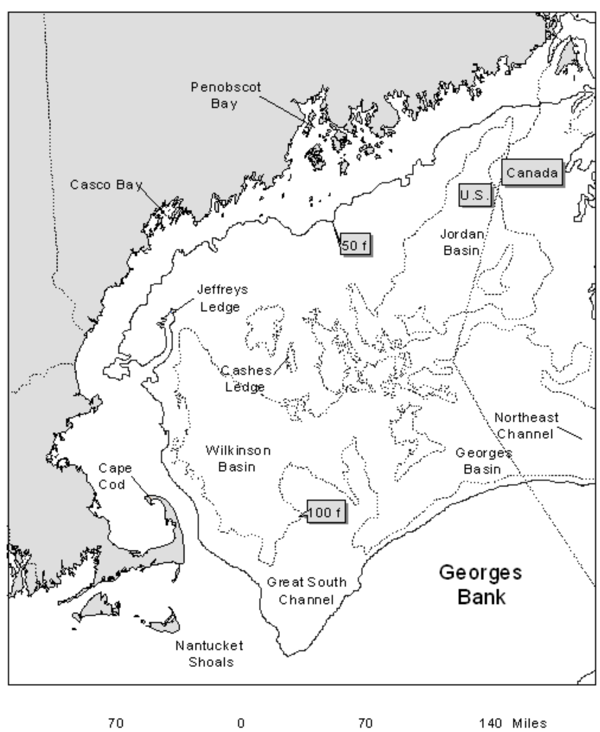
The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern 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 characteristics of the sub-regions that could potentially be affected by this action are described in this section. Information included in this document was extracted from Stevenson et al. (2004).

Map 8. Northeast shelf ecosystem



Map 9. Gulf of Maine.



Gulf of Maine

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. 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. Depths in the basins exceed 250 meters (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. 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.

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.

Georges Bank

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 and Lough 1991).

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.

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, 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 traveling 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.).

<u>Mid-Atlantic Bight</u>
The Mid-Atlantic Bight includes the shelf and slope waters from Georges Bank south to Cape Hatteras, and east to the Gulf Stream. 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.

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. The primary morphological features of the shelf include shelf valleys and channels, shoal massifs, scarps, and sand ridges and swales. 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. Shoal retreat massifs were produced by extensive deposition at a cape or estuary mouth. Massifs were also formed as estuaries retreated across the shelf.

Some sand ridges 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. 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. On the slope, silty sand, silt, and clay predominate.

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. Tidal currents in this area slow significantly, which allows silts and clays to settle out. The mud is mixed with sand, and is occasionally resuspended by large storms. This habitat is an anomaly of the outer continental shelf.

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.

6.3 Essential Fish Habitat

EFH descriptions and maps for the skate species can be found in the FMP for the Skate Complex and for the other NEFMC-managed species in the NEFMC's 1998 Omnibus EFH amendment. Skate EFH maps are also available for viewing via the Essential Fish Habitat Mapper: http://sharpfin.nmfs.noaa.gov/website/EFH_Mapper/map.aspx. The current EFH text descriptions are linked from this location.

A more detailed discussion of habitat types, as well as biological and physical effects of fishing by various gears in the skate fishery is provided in the 2008 SAFE Report, or Section 7.4.6 of Skate Amendment 3 (NEFMC 2009). 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.

6.4 Human Communities/Socio-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.

6.4.1 Overview of the Skate Fishery

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 the 2008 SAFE Report, Section 7.0 of Amendment 3 (NEFMC 2009).

Skates are harvested in two very different fisheries, one for lobster bait and one for wings for food. Small, whole skates are among the preferred baits for the regional American lobster (*Homarus americanus*) fishery. 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 is difficult to differentiate due to their nearly identical appearance.

The bait fishery is largely based out of Rhode Island with other ports (New Bedford, Martha's Vineyard, Block Island, Long Island, Stonington, Chatham and Provincetown) also identified as participants in the directed bait fishery. 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. 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. 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. 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.

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.

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.

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. 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. 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 (90 day finding for Thorny Skate). The assumed effectiveness of prohibition regulations is thought to be 98% based on recent work that examined port sampling data (90 day finding for Thorny Skate). That means 98% or more of the skates being landed for the wing market are winter skates, so regulations for the wing fishery primarily have an impact on that species.

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.

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.

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.

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).

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 and the NMFS SAW assessment process (http://www.nefsc.noaa.gov/nefsc/saw/) have continued to update the status determinations for the skate species based on the biomass reference points used during SAW 30[2].

The development of the FMP in 2002 and a description of issues that the Council encountered is described in Section 3.2 of the Amendment 3 document (NEFMC 2009). Early problems included a lack

[2] These biological reference points have since been updated by Amendment 3 and revised to account for strata consistently sampled by the FSV Albatross IV and the newer FSV Henry B. Bigelow.

of information about the biology of skates, population dynamics, and the fishery. The FMP initially set limits on fishing related to the amount of groundfish, scallop, and monkfish DAS and measures in these and other FMPs to control the catch of skates. Initially, it was thought that barndoor, smooth, rosette, and thorny skates were overfished and that overfishing of winter skate was occurring.

Amendment 3 became effective on July 16, 2010, implementing a new ACL management framework that capped catches at specific levels determined from survey biomass indices and median exploitation ratios. The amendment established a two-year specification cycle and set specifications for the 2010 and 2011 fishing years. After the 2010 fishing year is complete, the amendment tasks the Council and Skate PDT with analyzing the results, updating the indices, and recommending new specifications for the 2012 and 2013 fishing years. These 2012-2013 specifications would also include adjustments to account for prior overages, as accountability measures. This specification document addresses these issues using the process established by Amendment 3.

In addition to the ACL framework and accountability measures, the amendment also included technical measures that reduced the skate wing possession limit from 20,000 (45,400 whole weight) to 5,000 (11,350 whole weight) lbs. of skate wings, established a 20,000 lb. whole skate bait limit for vessels with skate bait letters of authorization, and allocated the skate bait quotas into three seasons proportionally to historic landings.

The ACL specifications for the 2010 and 2011 fishing years were set using a three year (2006-2008) skate biomass average applied to the median exploitation ratio (the length of the time series varies by skate species) to set an ABC, reduced by 25% to an ACT that accounts for scientific and management uncertainty, reduces the ACT by the estimated discard rate in 2006-2008 (2009 discard estimates were not yet available), and allocates the remainder to allowable landings which were split 66.5/33.5% between the skate wing and bait fisheries, respectively. A small amount (3%) was set aside for skate landings by vessels fishing in state waters without a federal skate permit.

Framework Adjustment 1 evaluated alternatives for setting a lower skate wing possession limit to keep landings below the 9,209 mt TAL and keep the fishery open year around. Landings and discards for 2009 were however updated and included in the Framework Adjustment 1 analysis. New daily landings data for 2010 were also included to estimate an appropriate possession limit. The industry also advised that a lower limit in May-Aug would enhance economic value in Sep-Apr when prices and skate quality were better. And for various reasons, the skate wing landings in 2010 were higher than projected they would be with both a 20,000 lbs. possession limit before July 16, 2010 and a 5,000 lbs. possession limit after Amendment 3 implementation.

While the 20,000 lb. skate wing possession limit was effective before July 16, 2010 the skate wing landings nearly doubled compared to the same period in 2009. Furthermore, the daily landings of skate wings only declined by 19% when the 5,000 lb. skate wing possession limit was in effect from July 16 to September 3, 2010, compared to the same time period in 2009. Once the 500 lbs. incidental skate wing limit became effective on September 3, 2010 the daily wing landings dropped and it appears that the skate wing TAL will be exceeded only by a small amount, despite the high landings under the 20,000 lb. possession limit early in the fishing year. Discards on some trips have undoubtedly increased, but the reduced possession limit will prevent boats from making trips to target skates, the reduced mortality possibly offsetting most or all of this anticipated increase in discards on trips targeting non-skate species. Therefore the effect on total discards is unknown at this point.

As a result of the Framework Adjustment 1 analysis, the Council set a 2,600 lbs. skate wing possession limit from May 1 to Aug 30, 2011 and a 4,100 lbs. skate wing possession limit from Sep 1, 2011 to Apr 30, 2011.

During the end of the 2010 fishing year (Jan – Apr), the Skate PDT developed the analyses needed to update the ABCs with new data, including calibrations of the survey tow data collected by the new FSV Bigelow in 2009-2011 and recent discard mortality research for little and winter skates captured by vessels using trawls.

Specifications 2012

Even without consideration of this change in survey methodology, substantial increases in skate biomass had been observed in 2008-2010 compared with the 2006-2008 period used in Amendment 3 to set 2010-2011 specifications. In particular, the three year average biomass for little skate increased from 5.04 kg/tow (unadjusted strata) to 7.848 kg/tow and for winter skate from 5.230 kg/tow (unadjusted strata) to 9.684 kg/tow (see table below).

The Amendment 3 ACL framework allows the Council to set an aggregate skate ABC that is the product of a three year average stratified mean biomass and the median exploitation ratio (catch/biomass) through 2007. These parameters were chosen to be somewhat conservative and hence take into account scientific uncertainty. From this ABC value, the FMP specification process deducts a 25% buffer to account for management uncertainty to set an ACT and then deducts an assumed discard rate (updated to the 2008-2010 dead discards) to set a TAL, allocated between the skate bait and wing fisheries, according to historic share established by Amendment 3. The re-estimated discard rate also incorporates new discard mortality estimates for little (20%) and winter (12%) skates captured by trawls.

6.4.1.1 Catch

The skate fishery caught 56% of the overall ACL in FY 2012; this was a decrease on FY 2011 landings. No AMs were triggered in FY 2012 as there was no overage. The wing fishery caught 70.5% of the wing TAL; the bait fishery caught 76.2% of the bait TAL. State landings in FY 2012 were 1,407 mt. Total discards in FY 2012 were 11,179 mt.

Table 10 – Catch in FY 2011 and 2012

	2011		**2012**	
Management Specification	Specification Amount	Catch/Landings (mt)	Specification Amount	Catch/Landings
ABC/ACL	50,435	32,187	50,435	28,203
ACT	37,826	32,187	37,826	28,203
Assumed Discards + State Landings	16,265	16,265	14,461	12,586
TAL (Bait + Wing)	21,561	15,922	23,365	15,617
TAL Bait	7,223	4,132	7,827	5,504
TAL Wings	14,338	11,790	15,538	10,113

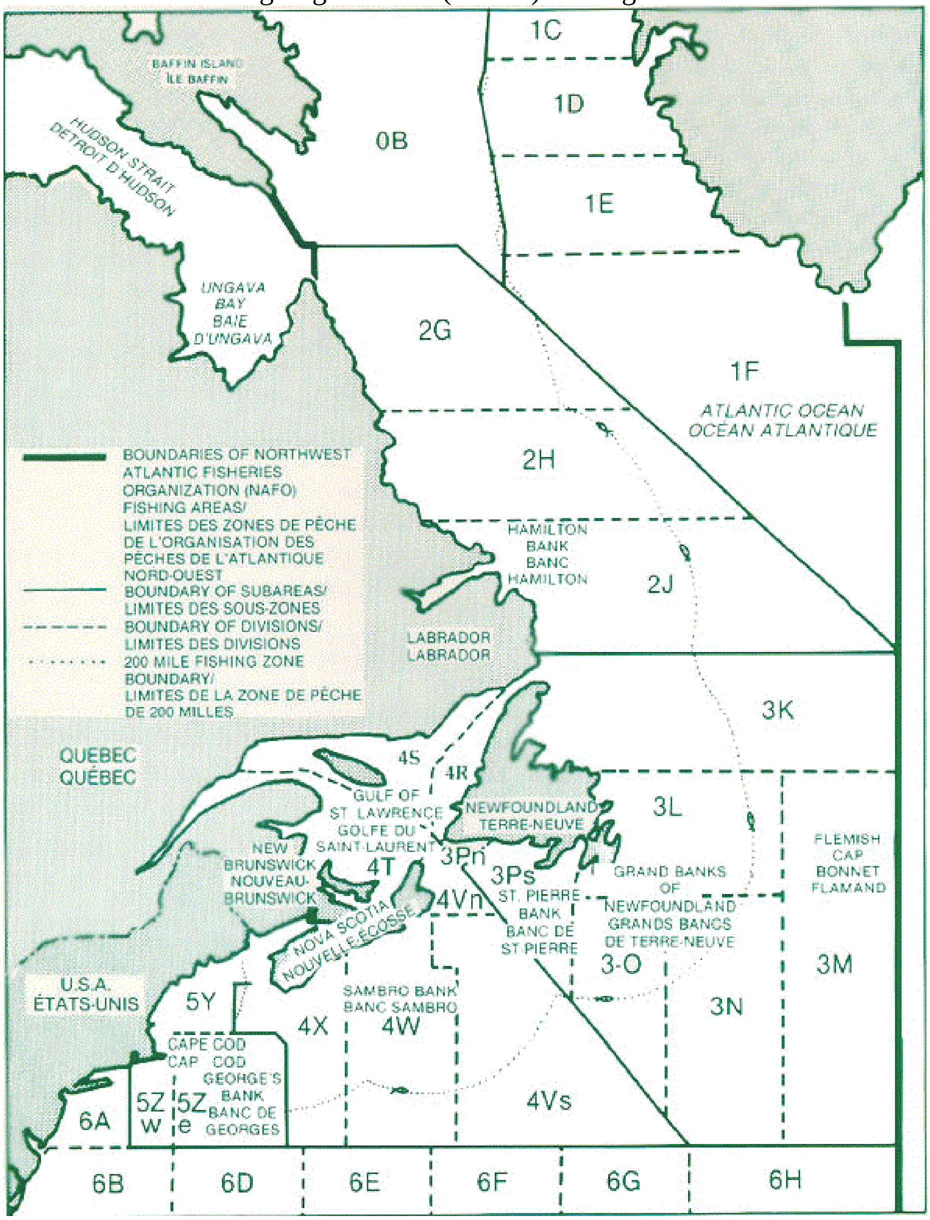
6.4.1.2 Canadian skate landings

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 4200 mt in 1994, to 1100 mt in 2006 (Kulka et al. 2007).

The directed skate fishery evolved on the eastern Scotian Shelf, in NAFO Divisions 4Vs and 4W (Map 10) 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 11). 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). NAFO skate catches by division are shown in Figure 1.

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 10. Northwest Atlantic Fishing Organization (NAFO) Fishing Areas

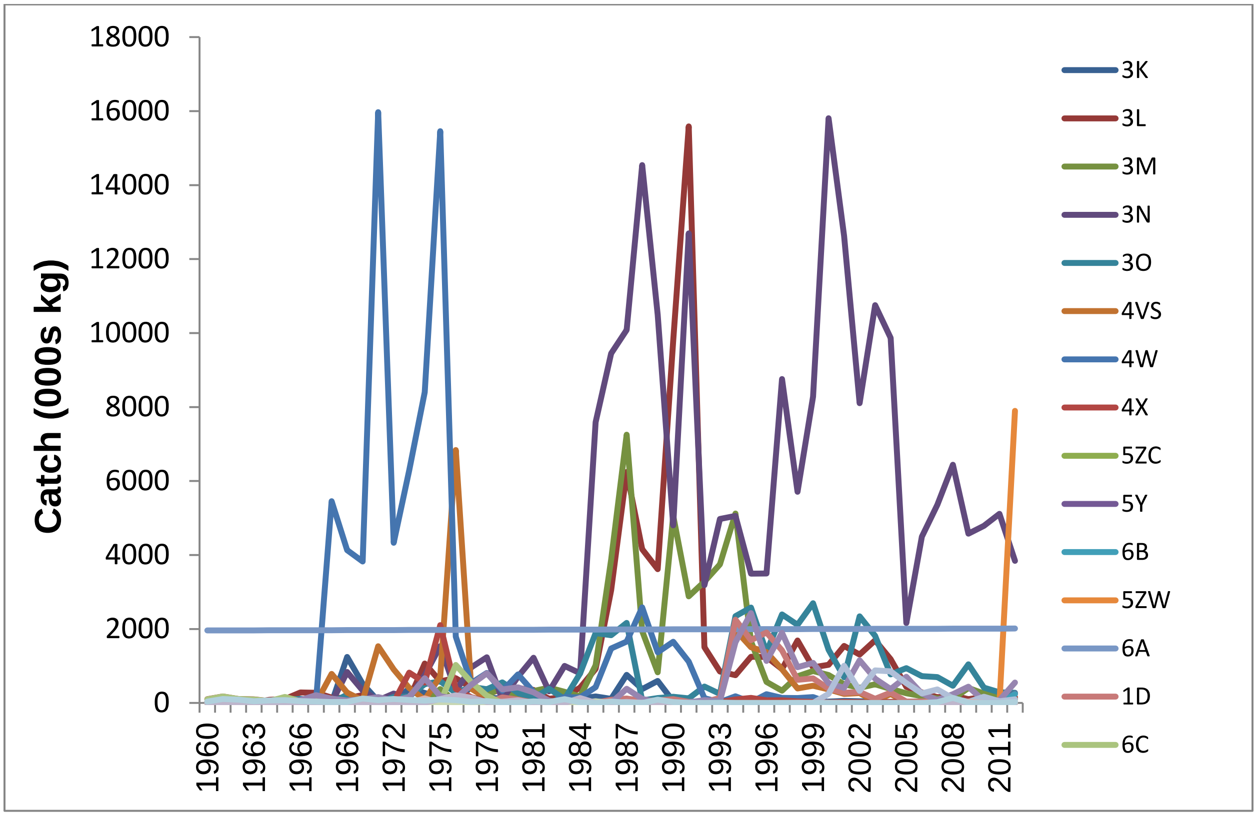


Map Source: Nova Scotia Department of Fisheries and Aquaculture, http://www.gov.ns.ca/fish/

Table 11. Estimated winter skate removals (tons) from NAFO Areas 4VsW, 1999-2004 (Swain et al. 2006).

Calendar year	Skate catch (mt)
1999	592
2000	358
2001	235
2002	278
2003	39
2004	233

Figure 1 - NAFO Skate Catch by division, 1960-2012



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 10. Table 12 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 12. 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)

Total Canadian landings had a similar trend as described above, but since 1997 most of the landings happened in Newfoundland and Labrador. Total skate landings (see table below) since last updated in Kulka et al. (2007) remained relatively stable, between 1,000 and 1,500 mt, nearly all in the Newfoundland and Labrador province, probably having little in common with the skate stocks along the US coastline. Skate landings in the contiguous Nova Scotia province and in particularly from the Scotia/Fundy region declined from 250 – 800 mt during 1998-2007 to negligible amounts in 2008 and 2009.

Table 13. Canadian skate landings (mt, whole) by calendar year, province, and region. Source: Canada Dept. of Fisheries and Oceans: http://www.dfo-mpo.gc.ca/stats/commercial/sea-maritimes-eng.htm.

	NS			NB			PE	QC	NL	Atlantic
	S-F	Gulf	Total	S-F	Gulf	Total	Total	Total	Total	Total
1990	112	1	113	-	-	-	-	1	12	125
1991	1,109	3	1,112	-	-	-	-	1	22	1,135
1992	377	1	378	0	-	0	0	1	117	496
1993	238	-	238	-	1	1	8	0	76	323
1994	2,704	29	2,733	-	1	1	14	15	3,630	6,393
1995	1,797	0	1,797	0	1	1	27	4	4,419	6,249
1996	2,090	0	2,090	0	0	0	19	14	1,777	3,901
1997	1,497	0	1,497	0	-	0	5	10	2,862	4,373
1998	678	0	678	0	0	0	0	11	2,297	2,986
1999	765	0	765	0	0	0	4	8	2,325	3,101
2000	479	0	479	0	0	0	0	6	1,580	2,065
2001	453	0	453	0	0	0	0	4	2,171	2,628
2002	490	0	490	0	0	0	0	6	2,488	2,984
2003	380	0	380	0	0	0	0	11	2,210	2,601
2004	503	0	503	0	0	0	0	26	1,402	1,931
2005	257	0	257	0	0	0	0	22	1,510	1,789
2006	105	0	106	0	0	0	0	6	1,162	1,274
2007	254	0	254	0	0	0	0	5	1,278	1,538
2008	64	0	64	0	0	0	0	4	995	1,063
2009	36	0	37	0	0	0	0	8	1,085	1,129
2010	Not yet available									

Provinces
NS = Nova Scotia
NB = New Brunswick
PE = Prince Edward
QC= Quebec
NL = Newfoundland and Labrador

Regions
S-F = Scotia-Fundy
Gulf = Gulf of St. Laurence

6.4.1.3 Recreational skate catches

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 MRIP is presented in Table 14. Recreational skate catches between 2009 and 2012 ranged from 61,102 lbs. in 2009 to 4,062 in 2012 (Table 14).

Recreational *harvest* of skates (MRFSS A+B1 data), where skates were retained and/or killed by the angler, vary by species and state (Table 15-Table 18). The vast majority of skates caught by recreational anglers are therefore considered released alive, but do not account for post-release mortality caused by hooking and handling.

New Jersey, New York, Rhode Island, and Virginia reported the largest recreational skate catches over the time series (Table 15 - Table 18). Recreational fishers in Maine did not report catching any skates between 2009 and 2013. Landings by species varied by state; clearnose skate was caught by more states further south (Table 17).

Reliability of skate recreational catch estimates from MRFSS is a concern. Many summaries given in the table below include estimates with a proportional standard error (PSE) of 0.2 or more, indicating that they are not well estimated. In particular, this applies to landings and dead discards (A+B1), even for coastwide annual summaries. 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. 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 14 - Estimated recreational skate harvest (lb) by species, 2009-2012 (A+B1)

	Winter	Smooth	Clearnose	Little	Total
2009	0	0	61,074	28	61,102
2010	4,505	0	45,740	0	50,245
2011	0	173	37,130	1,423	38,726
2012	1,772	0	2,290	0	4,062

Source: NMFS/MRIP (PSE >50 for all values indicating imprecise estimates)
http://www.st.nmfs.noaa.gov/recreational-fisheries/access-data/run-a-data-query/index

No reported harvest for species not listed.

Table 15 - Recreational harvest (A+B1) of winter skate by state, 2009 - 2013

Estimate Status	Year	State	Common Name	Harvest (A+B1) Total Weight (lb)	PSE	Landings (no.) without Size Information
FINAL	2009	NEW JERSEY	WINTER SKATE	0	.	0
FINAL	2009	NEW YORK	WINTER SKATE	0	.	0
FINAL	2010	NEW JERSEY	WINTER SKATE	0	.	0
FINAL	2010	NEW YORK	WINTER SKATE	4,505	100.4	0
FINAL	2010	RHODE ISLAND	WINTER SKATE	0	.	0
FINAL	2011	MASSACHUSETTS	WINTER	0	.	0

			SKATE			
FINAL	2011	NEW YORK	WINTER SKATE	0	.	0
FINAL	2011	RHODE ISLAND	WINTER SKATE	0	.	0
FINAL	2012	NEW JERSEY	WINTER SKATE	1,772	73.9	0
FINAL	2012	NEW YORK	WINTER SKATE	0	.	0
PRELIMINARY	2013	MASSACHUSETTS	WINTER SKATE	358	101.4	0
PRELIMINARY	2013	NEW JERSEY	WINTER SKATE	0	.	0
PRELIMINARY	2013	NEW YORK	WINTER SKATE	0	.	0

Table 16 - Recreational harvest (A+B1) of smooth skate by state, 2009 - 2013

Estimate Status	Year	State	Common Name	Harvest (A+B1) Total Weight (lb)	PSE	Landings (no.) without Size Information
FINAL	2009	NEW YORK	SMOOTH SKATE	0	.	3,521
FINAL	2010	NEW YORK	SMOOTH SKATE	0	.	0
FINAL	2011	NEW JERSEY	SMOOTH SKATE	173	110.1	0
FINAL	2012	NEW YORK	SMOOTH SKATE	0	.	0
PRELIMINARY	2013	CONNECTICUT	SMOOTH SKATE	0	.	0
PRELIMINARY	2013	NEW YORK	SMOOTH SKATE	0	.	0

Table 17 - Recreational harvest (A+B1) of clearnose skate by state, 2009 - 2013

Estimate Status	Year	State	Common Name	Harvest (A+B1) Total Weight (lb)	PSE	Landings (no.) without Size Information
FINAL	2009	DELAWARE	CLEARNOSE SKATE	6,918	64.5	0
FINAL	2009	FLORIDA	CLEARNOSE SKATE	0	.	0
FINAL	2009	MARYLAND	CLEARNOSE SKATE	0	.	0
FINAL	2009	NEW JERSEY	CLEARNOSE SKATE	38,579	96	0
FINAL	2009	NEW YORK	CLEARNOSE SKATE	5,145	94.2	0
FINAL	2009	SOUTH CAROLINA	CLEARNOSE SKATE	0	.	0
FINAL	2009	VIRGINIA	CLEARNOSE	10,432	79.1	0

			SKATE			
FINAL	2010	DELAWARE	CLEARNOSE SKATE	158	50.8	0
FINAL	2010	FLORIDA	CLEARNOSE SKATE	0	.	0
FINAL	2010	MARYLAND	CLEARNOSE SKATE	0	.	0
FINAL	2010	NEW JERSEY	CLEARNOSE SKATE	38,889	98.2	0
FINAL	2010	NEW YORK	CLEARNOSE SKATE	0	.	0
FINAL	2010	NORTH CAROLINA	CLEARNOSE SKATE	0	.	0
FINAL	2010	SOUTH CAROLINA	CLEARNOSE SKATE	0	.	0
FINAL	2010	VIRGINIA	CLEARNOSE SKATE	6,693	95.8	0
FINAL	2011	DELAWARE	CLEARNOSE SKATE	90	94.3	0
FINAL	2011	FLORIDA	CLEARNOSE SKATE	0	.	0
FINAL	2011	GEORGIA	CLEARNOSE SKATE	0	.	0
FINAL	2011	MARYLAND	CLEARNOSE SKATE	0	.	0
FINAL	2011	NEW JERSEY	CLEARNOSE SKATE	37,040	67	0
FINAL	2011	NEW YORK	CLEARNOSE SKATE	0	.	0
FINAL	2011	NORTH CAROLINA	CLEARNOSE SKATE	0	.	856
FINAL	2011	SOUTH CAROLINA	CLEARNOSE SKATE	0	.	0
FINAL	2011	VIRGINIA	CLEARNOSE SKATE	0	.	0
FINAL	2012	DELAWARE	CLEARNOSE SKATE	2,528	61.4	0
FINAL	2012	FLORIDA	CLEARNOSE SKATE	0	.	0
FINAL	2012	MARYLAND	CLEARNOSE SKATE	0	.	0
FINAL	2012	NEW JERSEY	CLEARNOSE SKATE	0	.	0
FINAL	2012	NEW YORK	CLEARNOSE SKATE	0	.	0
FINAL	2012	NORTH CAROLINA	CLEARNOSE SKATE	0	.	0
FINAL	2012	RHODE ISLAND	CLEARNOSE SKATE	0	.	0
FINAL	2012	SOUTH CAROLINA	CLEARNOSE SKATE	0	.	17,216
FINAL	2012	VIRGINIA	CLEARNOSE SKATE	2,290	98.8	0
PRELIMINARY	2013	DELAWARE	CLEARNOSE SKATE	449	102.8	2,786
PRELIMINARY	2013	FLORIDA	CLEARNOSE SKATE	0	.	0
PRELIMINARY	2013	GEORGIA	CLEARNOSE SKATE	0	.	0

PRELIMINARY	2013	MARYLAND	CLEARNOSE SKATE	0	.	0
PRELIMINARY	2013	NEW JERSEY	CLEARNOSE SKATE	0	.	0
PRELIMINARY	2013	NEW YORK	CLEARNOSE SKATE	0	.	0
PRELIMINARY	2013	NORTH CAROLINA	CLEARNOSE SKATE	1,464	99.4	224
PRELIMINARY	2013	RHODE ISLAND	CLEARNOSE SKATE	13,183	76.2	0
PRELIMINARY	2013	SOUTH CAROLINA	CLEARNOSE SKATE	0	.	0
PRELIMINARY	2013	VIRGINIA	CLEARNOSE SKATE	1,031	99.1	1,890

Table 18 - Recreational harvest (A+B1) of little skate by state, 2009 - 2013

Estimate Status	Year	State	Common Name	Harvest (A+B1) Total Weight (lb)	PSE	Landings (no.) without Size Information
FINAL	2009	MASSACHUSETTS	LITTLE SKATE	0	.	0
FINAL	2009	NEW JERSEY	LITTLE SKATE	0	.	6,996
FINAL	2009	NEW YORK	LITTLE SKATE	0	.	0
FINAL	2009	RHODE ISLAND	LITTLE SKATE	28	97.6	0
FINAL	2010	MASSACHUSETTS	LITTLE SKATE	0	.	0
FINAL	2010	NEW HAMPSHIRE	LITTLE SKATE	0	.	0
FINAL	2010	NEW JERSEY	LITTLE SKATE	0	.	0
FINAL	2010	NEW YORK	LITTLE SKATE	0	.	0
FINAL	2010	RHODE ISLAND	LITTLE SKATE	0	.	0
FINAL	2011	MARYLAND	LITTLE SKATE	936	100.3	0
FINAL	2011	MASSACHUSETTS	LITTLE SKATE	458	83.4	0
FINAL	2011	NEW JERSEY	LITTLE SKATE	0	.	0
FINAL	2011	NEW YORK	LITTLE SKATE	0	.	0
FINAL	2011	RHODE ISLAND	LITTLE SKATE	29	105.9	0
FINAL	2012	CONNECTICUT	LITTLE SKATE	0	.	0
FINAL	2012	MASSACHUSETTS	LITTLE SKATE	0	.	39
FINAL	2012	NEW JERSEY	LITTLE SKATE	0	.	0
FINAL	2012	NEW YORK	LITTLE SKATE	0	.	0
FINAL	2012	RHODE ISLAND	LITTLE SKATE	0	.	340
PRELIMINARY	2013	CONNECTICUT	LITTLE SKATE	0	.	0
PRELIMINARY	2013	MASSACHUSETTS	LITTLE SKATE	1,352	101.9	0
PRELIMINARY	2013	NEW JERSEY	LITTLE SKATE	7,705	77.9	0

PRELIMINARY	2013	NEW YORK	LITTLE SKATE	10,886	73.3	0
PRELIMINARY	2013	RHODE ISLAND	LITTLE SKATE	351	46.2	0

6.4.1.4 Landings by fishery and DAS declaration

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).

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 (for a full description of historic landings please refer to Amendment 3, NEFMC ???). Total skate landings have fluctuated between two levels between FY 2009 and 2012 (Table 19). The fluctuations in landings are largely attributable to the wing fishery as landings in the bait fishery have remained relatively stable (Table 20). It is not clear what is driving the trend in wing landings as quota is not thought to be limiting to the fishery. One potential explanation is the decrease in winter skate survey index that suggests fewer winter skate were available to the fishery.

Table 19 – Total Landings in the Skate Fisheries

Fishing Year	Landings (in lbs)
2009	41,634,696
2010	32,347,014
2011	41,103,304
2012	33,084,082
Grand Total	148,169,096

Table 20 – Landings by Skate Fishery Type

FY	DISPOSITION	Landings (in lbs)
2009	Bait	9,049,822
	Wing	32,584,874
2010	Bait	10,020,271
	Wing	22,326,743
2011	Bait	10,861,122
	Wing	30,242,182
2012	Bait	10,789,031
	Wing	22,295,051
Grand Total		148,169,096

Total revenue from all species on active skate vessels also declined in 2012 (Table 21).

Table 21 - Total fishing revenue (all species) from active skate vessels

Year	Total REVENUE
2009	603863486
2010	724533778
2011	725270981
2012	690935796
Grand Total	**2744604041**

Landings by DAS declaration indicate that a large portion of bait is landed while on a multispecies (sector and common pool) trip (Table 22). A large amount of total skate landings have no associated declaration. The majority of the wing landings are associated with monkfish trip.

Table 22. Total skate landings (lb live weight) by DAS program, FY2012.

VMS Declaration	BAIT	WING
Mults Sector	1,702,725	1,903,586
Mults Common	1,358,315	6,943,323
Monkfish	53,780	8,580,391
Scallop	15,375	41,991
Unmatched/No Declaration	4,961,386	4,044,169
DOF	2,697,450	781,750
Total	10,789,031	22,295,210

Source: NMFS, Fisheries Statistics Office

6.4.1.5 Trends in number of vessels

The number of skate permits has declined between FY 2009 and 2012. On a broader time scale, between FY2003 and 2013, there was an increase in skate permits with a high occurring in 2007 (Table 23).

Table 23 - Number of Skate Permits issued

AP_YEAR	Number of skate permits issued
2003	1,968
2004	2,391
2005	2,632
2006	2,675
2007	2,685
2008	2,633
2009	2,574
2010	2,503
2011	2,326
2012	2,265
2013	2,043

The number of active permits has decreased between FY 2009 and 2012 (Table 24). This decrease may contribute to the observed trend in wing landings shown in Table 20, with fewer active permits in years with lower landings.

Table 24 - Number of Active Permits between 2009 and 2012

FY	Number of active permits
2009	571
2010	547
2011	561
2012	525

6.4.1.6 Trends in revenue

Skate revenue decreased in FY2012 despite quota not being limiting (Table 25). The decrease in revenue is largely attributable to changes in wing revenue and landings (Table 26).

Table 25 – Total Skate Revenue

FY	Revenue
2009	$ 7,380,043
2010	$ 7,786,423
2011	$ 8,419,911
2012	$ 6,645,435
Grand Total	$ 30,231,812

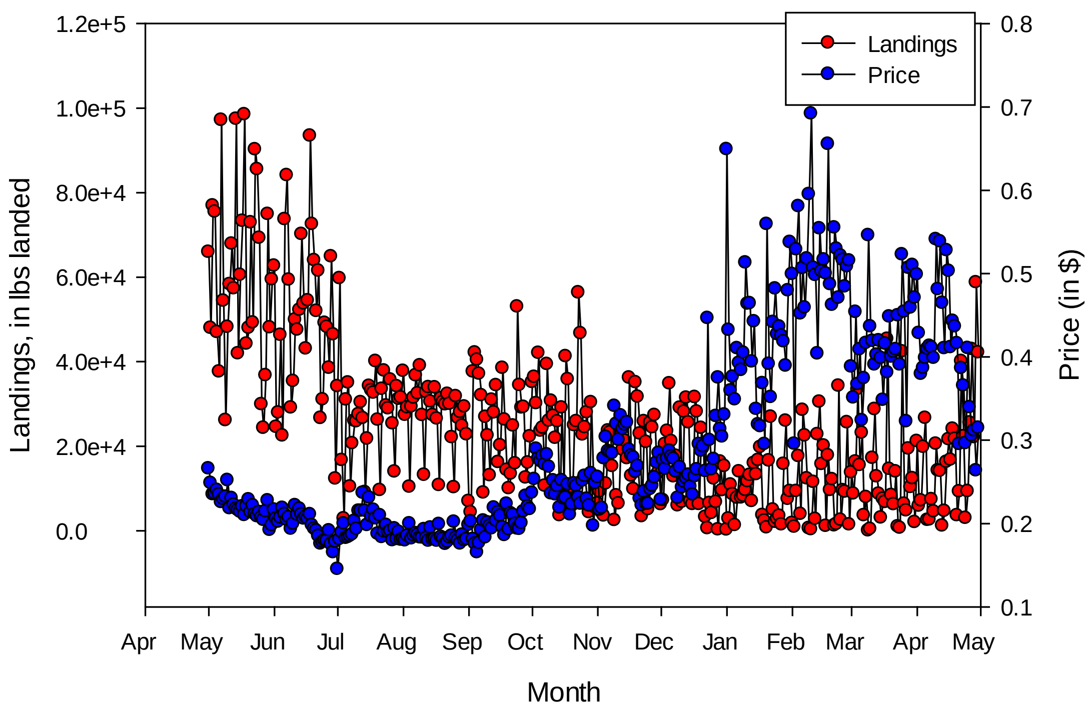
Table 26 - Total Skate Revenue by Fishery (Bait and Wing)

FY	DISPOSITION	Revenue
2009	Bait	$ 872,669
	Wing	$ 6,507,374
2010	Bait	$ 2,624,844
	Wing	$ 5,161,579
2011	Bait	$ 1,128,278
	Wing	$ 7,291,633
2012	Bait	$ 1,113,427
	Wing	$ 5,532,008
Grand Total		$ 30,231,812

6.4.1.7 Skate prices

For a historic account of trends in skate prices in relation to market supply and demand, refer to the FEIS of Amendment 3. In FY2012, wing prices increase throughout the fishing year, while landings appear to decline (Figure 2). Amendment 3 analyses identified an inverse relationship between domestic supply of wings and price, as would be expected with an elastic supply and demand response.

Figure 2. Relationship between skate wing prices and landings since May 1, 2012. *Prices for skate wings were 2.27 times the converted whole skate prices shown in the figure*.



6.4.2 Fishing Communities

There are over 100 communities that are homeport to one or more Northeast groundfish fishing vessels. These ports occur throughout the coastal northeast and mid-Atlantic. Consideration of the social impacts on these communities from proposed fishery regulations is required as part of the National Environmental Policy Act (NEPA) of 1969 and the Magnuson Stevens Fishery Conservation and Management Act, 1976. Before any agency of the federal government may take "actions significantly affecting the quality of the human environment," that agency must prepare an Environmental Assessment (EA) that includes the integrated use of the social sciences (NEPA Section 102(2)(C)). National Standard 8 of the MSA stipulates that "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 economic impacts on such communities" (16 U.S.C. § 1851(a)(8)).

A "fishing community" is defined in the Magnuson-Stevens Act, as amended in 1996, as "a community which is substantially dependent on or substantially engaged in the harvesting or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community" (16 U.S.C. § 1802(17)). Determining which fishing communities are "substantially dependent" on, and "substantially engaged" in, the groundfish fishery can be difficult. In recent amendments to the fishery management plan the council has categorized communities dependent on the groundfish resource into primary and secondary port groups so that community data can be cross-referenced with other demographic information. Descriptions of 24 of the most important communities involved in the multispecies fishery and further descriptions of North East fishing communities in general can be found on North East Fisheries Science Center's website (http://www.nefsc.noaa.gov/read/socialsci/community_profiles/).

Although it is useful to narrow the focus to individual communities in the analysis of fishing dependence there are a number of potential issues with the confidential nature of the information. There are privacy concerns with presenting the data in such a way that proprietary information (landings, revenue, etc.) can be attributed to an individual vessel or a small group of vessels. This is particularly difficult when presenting information on small ports and communities that may only have a small number of vessels and that information can easily be attributed to a particular vessel or individual.

6.4.2.1 Overview of Ports

There were a total of 75 ports where skate were landed in 2012 (Table 27). They include ports from all states in the Northeast plus North Carolina. Skate bait was landed in 17 ports in 2012 with skate wings landed in 72 ports. This represented a decrease in landings and number of ports for the wing fishery on 2011 (79 bait ports), while the bait fishery remained relatively constant in terms of landings but decreased in number of ports (24 ports in 2011). New Bedford, MA and Chatham still dominate skate landings. New Bedford and Chatham dominate skate wing landings, and Point Judith dominates skate bait landings.

Table 27 - All Ports Landing Skates in 2012

State	Port name	Total Revenue	Total Landings (lbs.)
CT	OTHER CONNECTICUT	5394	23425
CT	EAST LYME	10711	42093
CT	NEW HAVEN	378	2043
CT	NEW LONDON	198620	958549
CT	OTHER CONNECTICUT	11393	56121
CT	STONINGTON	27291	99237
MA	FALL RIVER	147885	1059640
MA	NEW BEDFORD	46250	463825
MA	PROVINCETOWN		870
MA	BOSTON	65331	216659
MA	CHATHAM	1188862	5635372
MA	DENNIS	1353	4365
MA	FALMOUTH	488	1846
MA	GLOUCESTER	121036	422087
MA	HARWICHPORT	808	3320
MA	HYANNIS	813	3689
MA	NANTUCKET	106	240
MA	NEW BEDFORD	1345236	4846954

MA	NEWBURYPORT	554	1473
MA	OTHER MASSACHUSETTS	400	2270
MA	PLYMOUTH	13164	58393
MA	PROVINCETOWN	1675	5968
MA	SANDWICH	102	455
MA	WESTPORT	124126	352084
MA	WOODS HOLE	32262	110180
MD	OCEAN CITY	104	10400
ME	FREEPORT	644	4193
ME	OCEAN CITY	5278	23571
ME	PORT CLYDE	598	2464
ME	PORTLAND	401	1243
NC	WANCHESE	105	411
NH	PORTSMOUTH	111	422
NJ	BARNEGAT LIGHT/LONG BEACH	797	22098
NJ	BELFORD	41571	519635
NJ	SEA ISLE CITY	1619	210845
NJ	ATLANTIC CITY	920	2581
NJ	BARNEGAT LIGHT/LONG BEACH	212606	856171
NJ	BELFORD	49875	170843
NJ	CAPE MAY	2841	23672
NJ	OTHER BARNSTABLE	6609	34799
NJ	POINT PLEASANT	94890	390454
NJ	SEABROOK	683	2404
NJ	WARETOWN	25823	99296
NY	POINT LOOKOUT	56	318
NY	AMAGANSETT	278	1247
NY	CENTER MORICHES	10724	35747
NY	EAST HAMPTON	201	833
NY	ISLIP	776	3170
NY	MATTITUCK	3480	22822
NY	MONTAUK	241191	934324
NY	RYE	618	1911
NY	SHINNECOCK	11741	49972
NY	WAINSCOTT	1	7
RI	NEWPORT	322165	2421320
RI	POINT JUDITH	545300	6036681
RI	SOUTH KINGSTOWN	1	13
RI	TIVERTON	1427	9720
RI	LITTLE COMPTON	320051	1254205

RI	NEWPORT	271282	919553
RI	NORTH KINGSTOWN	56	281
RI	POINT JUDITH	744049	2883681
RI	TIVERTON	38168	160032
RI	WAKEFIELD	462	1158
RI	WESTERLEY	44	266
VA	CAPE CHARLES	91	905
VA	CHINCOTEAGUE	40012	222226
VA	HAMPTON	17462	56332
VA	NEWPORT NEWS	17818	43221
	CHILMARK	641	6450
	MARBLEHEAD	120	2847
	MORICHES	6	39
	CHILMARK	239	2664
	EAST HAVEN	950	2393
	EAST MORICHES	8	29
	GREENBACKVILLE	4850	19817
	HAMPTON BAYS	237203	1097038
	MARBLEHEAD	1856	39554
	MENEMSHA	39	128
	MORICHES	671	2152
	MOUNT SINAI	576	2456
	OTHER ATLANTIC	10	45
	OTHER LANCASTER	1773	17685
	OTHER NORTHUMBERLAND	1	1
	OTHER PLYMOUTH	315	1567
	OTHER SUFFOLK	356	1602
	POINT LOOKOUT	5328	28772
	RIVERHEAD	63	409
	SCITUATE	13263	44929
	SEA ISLE CITY		6900

Only 31 ports received at least $10,000 in FY 2012 from skate; 13 ports receive at least $100,000 per year. New Bedford, MA, Point Judith, RI, and Chatham, MA were the highest grossing ports. There are 43 ports that landed at least 10,000 lbs of skate. As expected the top ports in landings were Point Judith, Chatham and New Bedford.

Table 28 outlines commercial landings of skates by individual states from FY2009 – FY2012. Massachusetts and Rhode Island continue to dominate the skate fishery, in most years. Skate landings fluctuate by year in both fisheries.

Table 28 - Total Skate landings by fishery and state

FY	DISPOSITION	STATE	Revenue	Landings (in lbs)
2009	Bait	CT	486	100
		MA	200079	2043465
		MD	35	175
		NJ	46010	349032
		RI	620709	6593550
		VA	5350	63500
	Bait Total		872669	9049822
	Food	CT	92313	544411
		MA	4833231	23537183
		MD	18328	139747
		ME	2076	5813
		NC	548	3725
		NH	3605	14555
		NJ	385823	2174166
		NY	288283	1458601
		RI	835257	4349024
		VA	47910	357649
	Food Total		6507374	32584874
2010	Bait	CT	1569279	644244
		MA	250956	1599765
		MD	934	8496
		NJ	48814	516887
		RI	753110	7241592
		VA	1751	9287
	Bait Total		2624844	10020271
	Food	CT	168252	423848
		MA	2646071	12065409
		MD	16530	65514
		ME	4647	10012
		NC	5673	17361
		NH	1784	6966
		NJ	609734	2661087
		NY	520774	2128177
		RI	1081201	4341377
		VA	106913	606992
	Food Total		5161579	22326743
2011	Bait	CT	5385	23950
		MA	293792	2478875

		MD	120	13270
		NJ	32792	575919
		NY	75	227
		RI	796114	7766581
		VA	0	2300
	Bait Total		1128278	10861122
	Food	CT	171173	786312
		MA	4089342	15898905
		MD	18389	96489
		ME	2208	7334
		NC	1117	4976
		NH	2740	9751
		NJ	752122	3652368
		NY	472707	2232517
		RI	1688054	7043150
		VA	93781	510380
	Food Total		7291633	30242182
2012	Bait	CT	5394	23425
		MA	194896	1533632
		MD	104	10400
		NJ	43987	752578
		NY	62	357
		RI	868893	8467734
		VA	91	905
	Bait Total		1113427	10789031
	Food	CT	249343	1160436
		MA	2918637	11788996
		MD	5244	23419
		ME	999	3707
		NC	105	411
		NH	1412	4737
		NJ	386999	1550114
		NY	513241	2184773
		RI	1374112	5219176
		VA	81916	359282
	Food Total		5532008	22295051
Grand Total			30231812	148169096

6.4.3 Skate Dealers

There were 130 skate dealers in 2012.

Table 29 - Landings and Revenue by State from Dealer Data for FY 2012

2012	**Bait**	CT	5,394	23,425
		MA	194,896	1,533,632
		MD	104	10,400
		NJ	43,987	752,578
		NY	62	357
		RI	868,893	8,467,734
		VA	91	905
	Bait Total		**1,113,427**	**10,789,031**
	Food	CT	249,343	1,160,436
		MA	2,918,637	11,788,996
		MD	5,244	23,419
		ME	999	3,707
		NC	105	411
		NH	1,412	4,737
		NJ	386,999	1,550,114
		NY	513,241	2,184,773
		RI	1,374,112	5,219,176
		VA	81,916	359,282
	Food Total		**5,532,008**	**22,295,051**

6.4.4 Skate Processors – Not yet updated

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 30. 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.

6.4.5 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.

Figure 3 - Skate bait landings by statistical area for FY 2012

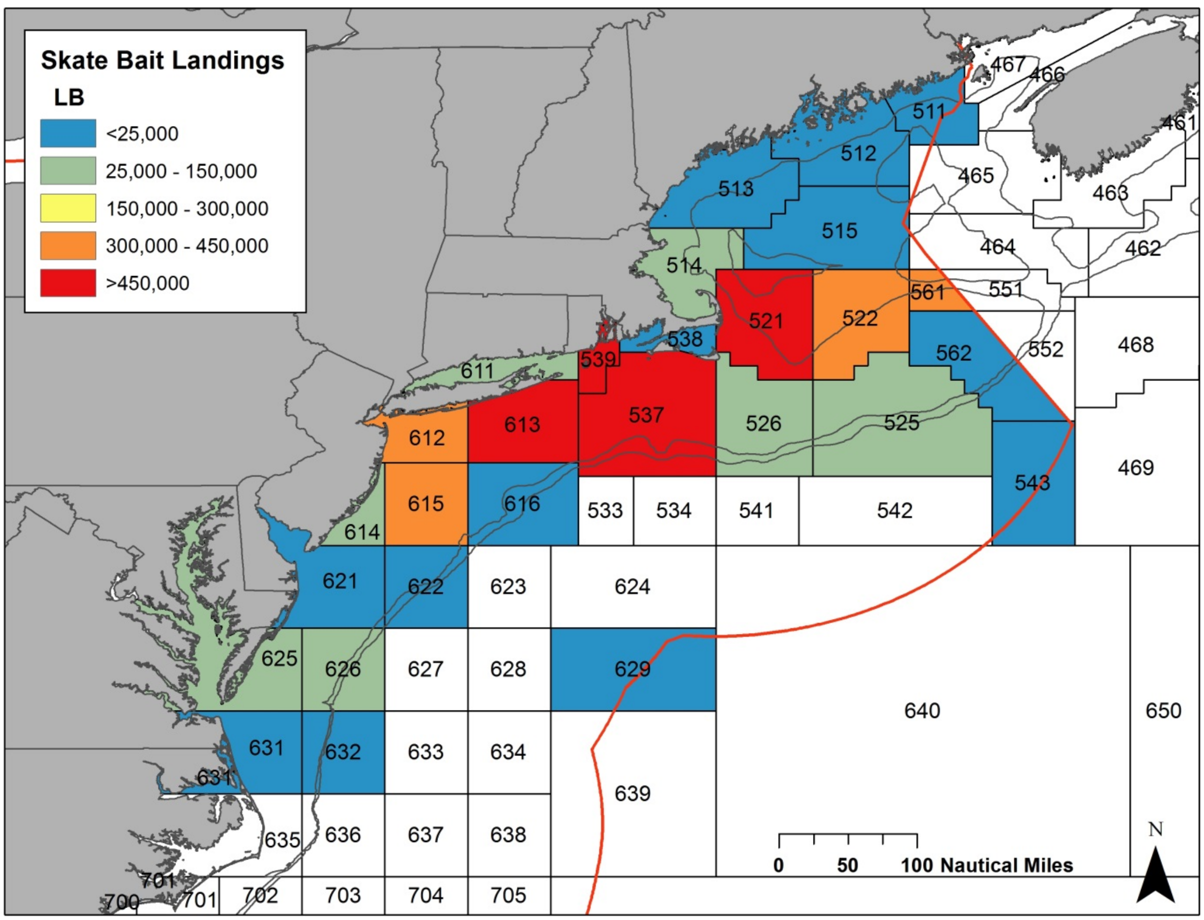
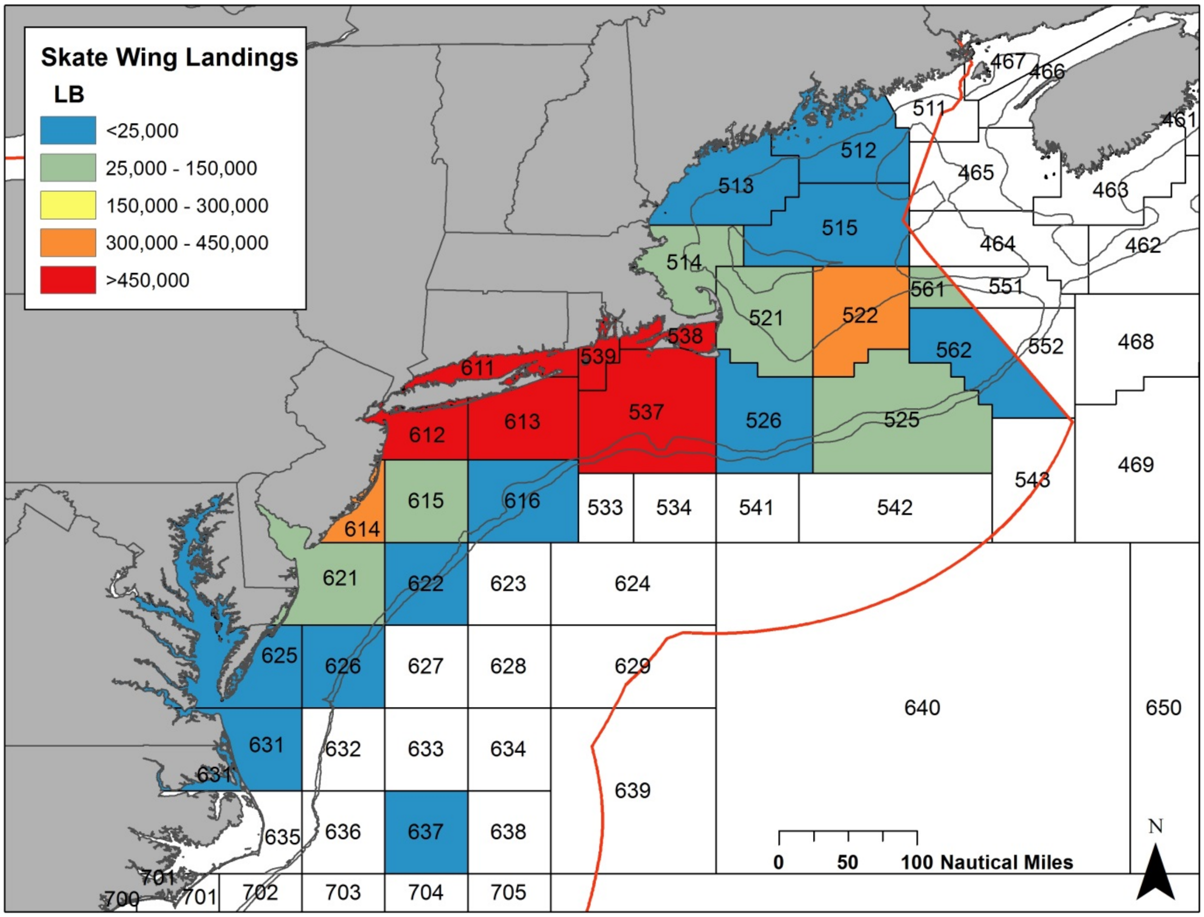


Figure 4 - Skate wing landings by statistical area for FY 2012



6.4.6 Data on Lobster Fishing in Top Skate Ports – Not yet updated

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 31. 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 32. 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%

7.0 ENVIRONMENTAL CONSEQUENCES (EA)

7.1 Biological Impacts

7.1.1 Updates to Annual Catch Limits

7.1.1.1 Option 1: No Action

The No Action alternative would maintain the ACL specifications as those established in the 2012 specifications package. This would allow a higher catch at a time when survey indices have decreased for five of the seven skate species, which may negatively impact the complex. Thorny and winter skates are experiencing overfishing; barndoor, thorny and smooth skates are in rebuilding plans. Allowing a higher ABC than is suggested appropriate by the survey indices, could hinder rebuilding of species experiencing overfishing. This alternative would not incorporate the best available science; it would not utilize the most recent survey indices or revised discard mortality rate estimates for trawl gear. Option 1 would more adversely affect the skate complex compared to Options 2 and 3.

7.1.1.2 Option 2: Revised Annual Catch Limit Specifications

Option 2 would revise the ABC for the skate complex using the most recent best available science – revised survey indices and discard mortality rate estimates. The revised ABC was calculated using the revised median catch/biomass exploitation ratio (updated with the revised discard mortality rate estimates for trawl gear) and the most recent 3 year moving average of the relevant NEFSC trawl survey. Catches at or below the median catch/biomass exploitation ratio have shown a tendency for biomass to increase more frequently and by a greater amount than catches that were above the median exploitation ratio [see Appendix I of Amendment 3 (NEFMC 2009)].

The biological impacts of the ABC and allocations to discards and catch result mainly from preventing overfishing and keeping catches below a level that has been shown in Amendment 3 to produce larger and more frequent increases in skate biomass[3]. Variations in landings and discards may cause catch to exceed the ACT and any overages of the risk-adverse ACT will be absorbed by the 25% management uncertainty buffer. Any overages of the ACL will trigger accountability measures. Thus it is highly unlikely that skate catches will exceed the ABC. A more detailed review of this analysis is given in Appendix 1, Document 4 of Amendment 3 (NEFMC 2009).

Skates are ubiquitous in most fisheries and are caught by most gear types. The reduced ACL is not likely to affect fishing effort, unless the incidental trip limit is triggered, which may impact fisheries that also land skate, e.g. monkfish because of the high levels of skates also caught in this fishery. If the trip limits are maintained, they are not expected to impact fishing behavior, unless fishing effort shifts to areas with fewer skates. The decrease in ABC would be expected to positively impact overall skate biomass based on the relationship between catch and biomass. The decreased ABC would potentially decrease overall skate landings but since the fishery has not achieved its TAL in the past, this may not result in a large reduction in landings. This would address overfishing on winter skate. Reduced landings may increase discards, however, possession of barndoor, thorny, and smooth skates is currently prohibited. Only if effort shifts away from where these species are found could a change positively impact these species.

---

[3] Projections based on analytical models are not available however because the attempted analytical stock assessment models have not been reliable for management (NEFSC 2007???).

There are three ways that vessels may respond to the higher TALs and new possession limits, depending on the situation. Vessels that target skates may take longer trips to catch the possession limit, may fish in more productive areas that might be further from port, or take more trips targeting skates because the fishery is open longer, or a little of all three. Vessels in other fisheries may also begin targeting skates due to the greater fishing opportunity offered by the higher skate TALs (this may be mitigated somewhat by the potential of lower skate prices). And finally, vessels targeting other species and catching an incidental amount of skates may land more skates rather than discard them[4].Option 2 has more positive biological impacts than Options 1 and 3.

Table 33. Current and proposed 2012-2013 specifications including changes in input parameters: C/B exploitation medians, updated stratified mean biomass in FSV Albatross IV units, and a average mean discard mortality rate weighted by estimated discards by species and fishing gear.

	Current Specifications 2008-2011 survey, 2008-2011 discards	Proposed 2014-2015 Specifications 2010-2012 survey; 2010-2012 discards
ACL specifications		
ABC (mt)	50,435	35,479
ACT (mt)	37,826	27,275
TAL (mt)	24,088	18,001
Assumed state landings	723	1206
Federal TAL	23,365	16,795
Wing TAL	15,538	11,169
Bait TAL	7,827	5,626
C/B medians		
Barndoor	2.938	2.64
Clearnose	5.910	3.98
Little	2.384	2.14
Rosette	3.622	2.57
Smooth	2.388	2.80
Thorny	2.300	1.27
Winter	2.256	1.83
Survey biomass (mean kg/tow)		
Barndoor	1.114	1.22
Clearnose	0.933	0.97
Little	7.848	7.11
Rosette	0.040	0.033
Smooth	0.161	0.23
Thorny	0.245	0.18
Winter	9.684	6.68
Discard rate	36.3%	34%
Discard mortality	31.0%	

[4] The skate wing possession limit was reduced to only 500 lbs. of skate wings (1137 lbs. whole) on September 3, 2010 to accommodate some incidental landings, but may have caused vessels on some trips to discard excess skates.

7.1.1.3 Option 3: Revised Annual Catch Limit based on old catch/biomass medians

This option would only incorporate the updated survey indices into the specifications and would not use the best available science (revised discard mortality rates) in the catch/biomass medians. This results in a lower ABC than Option 1 but a higher ABC than Option 2. Because of the reduction in the ABC the biological impacts are expected to be similar to those of Option 2, but might be of a lower magnitude.

Skates are ubiquitous in most fisheries and are caught by most gear types. The reduced ACL is not likely to affect fishing effort, unless the incidental trip limit is triggered, which may impact fisheries that also land skate, e.g. monkfish because of the high levels of skates also caught in this fishery. If the trip limits are maintained, they are not expected to impact fishing behavior, unless fishing effort shifts to areas with fewer skates. The decrease in ABC would be expected to positively impact overall skate biomass based on the relationship between catch and biomass. The decreased ABC would potentially decrease overall skate landings but since the fishery has not achieved its TAL in the past, this may not result in a large reduction in landings. This would address overfishing on winter skate. Reduced landings may increase discards, however, possession of barndoor, thorny, and smooth skates is currently prohibited. Only if effort shifts away from where these species are found could a change positively impact these species. Option 3 has more positive impacts than Option 1 but would have more negative impacts compared to Option 2.

7.1.2 Skate Wing Possession Limit Alternative

<u>Option 1: No Action</u>

The No Action alternative would keep the current possession limits as set in Framework Adjustment 1 and would have neutral biological impacts. The trip limits are designed to allow the fishery to harvest the full ACL without exceeding it. These trip limits did not achieve the ACL set in the last specifications package, but is expected to allow the fishery to do so under the revised specifications. The No Action alternative would have similar impacts to Option 2 but would have more positive impacts than Option 3.

<u>Option 2: Skate Wing Possession Limit Alternatives</u>

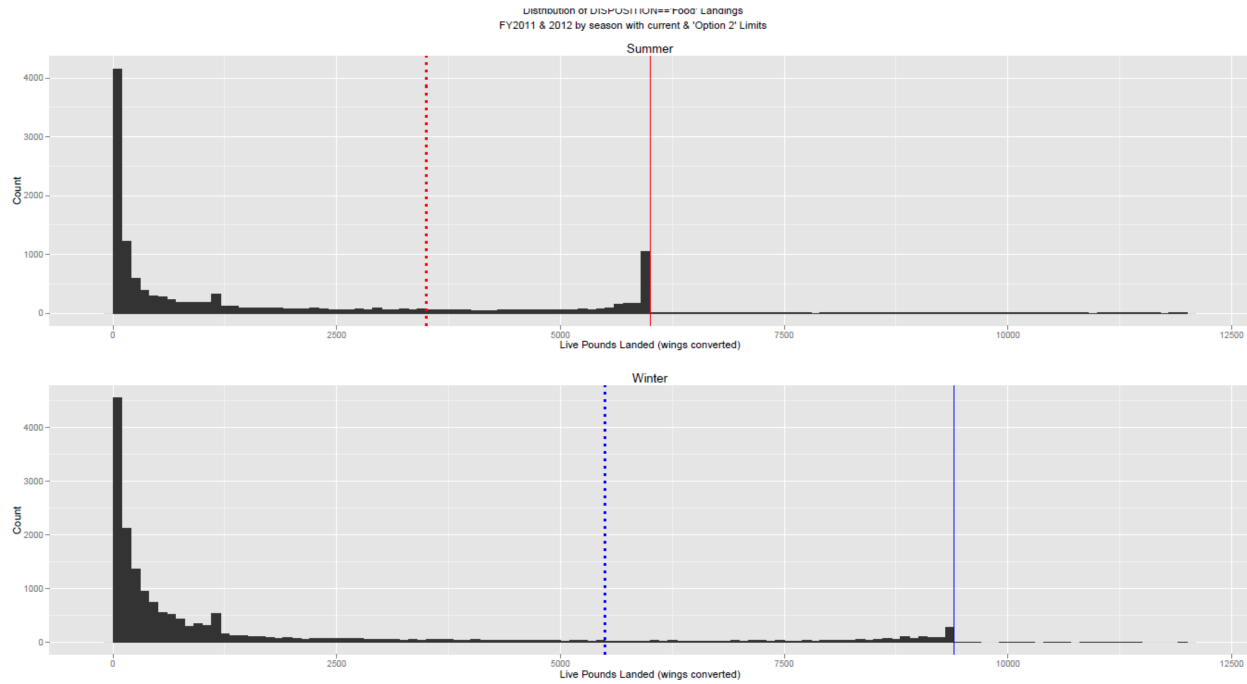
Option 2 would reduce the trip limits to a level that would not trigger the incidental trip limit. The limits were set to prevent overages of the TAL, not reduce effort on skate. This measure would reduce directed effort and allow the fishery to be executed for the entire fishing year, however, it is likely to increase discards of skate and not impact overall skate effort.

The main biological effect of the skate wing possession limit is on the discard mortality, as a proportion of total catch. With a low possession limit, the fishery may not be able to land the allocated TAL and optimum yield will not be achieved. With a high possession limit, the fishery may reach the 85% TAL trigger early in the season (as it did during 2010) and skates will be discarded on trips that target other species and whose catch exceeds the 500 lbs. incidental skate wing limit[5]. This effect may be exacerbated by vessels fishing for skates in state waters in response to the stricter skate regulations in Federal waters and by vessels that target other species in lieu of skates, but continue to discard incidental catches of skates. In order to minimize biological impacts on skates and other species, the skate wing possession limit should be set at a level that will 1) allow the fishery to take the skate wing TAL and 2) will not close the directed skate fishery early. It is also possible that the effects on barndoor, smooth, and thorny skates

[5] Framework Adjustment 1 (NEMFC 2011) considered and proposed raising the incidental skate possession limit from 500 to 1,250 lbs. to reduce discards but this measure was disapproved by NMFS.

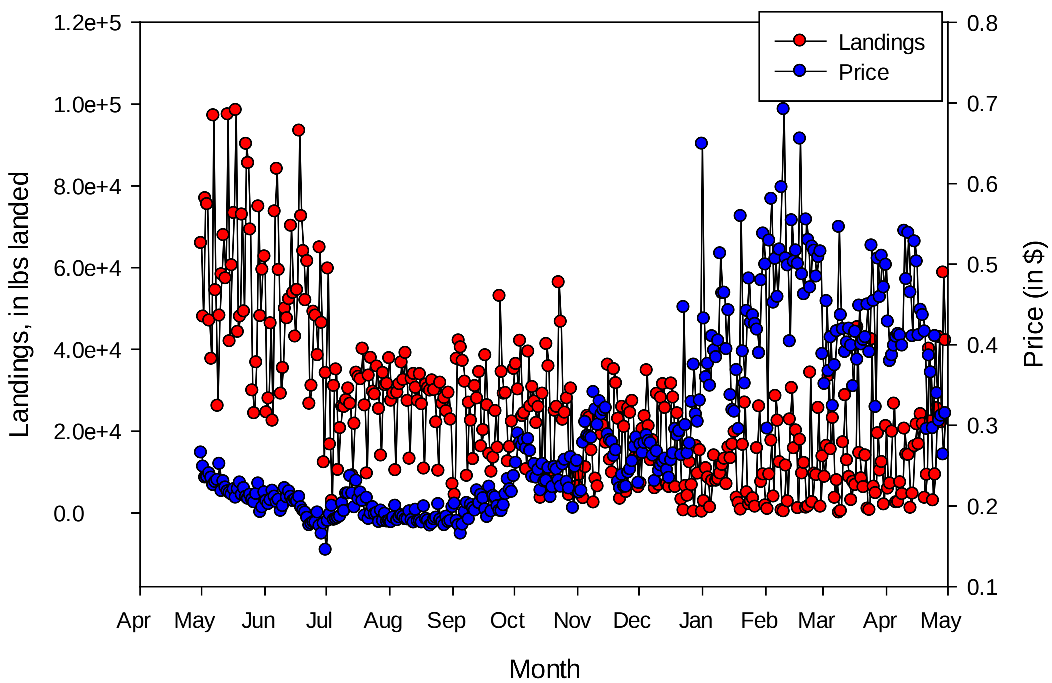
will be greater if the skate fishery closes early and vessels shift effort onto other species that may have a greater interaction with these skates.

Based on an examination of seasonal wing landings for FY2011 and FY2012 combined, approximately 5,000 trips would have exceeded the proposed trip limits under Option 2. This alternative may impede the fishery from landing its TAL.



Examining the relationship between landings and price shows an increase in price per pound of landed skate occurred in the second half of the fishing year (FIG). The fishery landed more skate at the beginning of the fishing year under the lower trip limit. In FY 2012, there could be more vessels landing skates, existing vessels in the skate fishery took more trips, or vessels landed more of their skate catch when targeting other species. The only changes in impacts caused by the first two responses above are economic. The last response (landing more skates that are caught while targeting other species) might not change the amount of skates captured, but fewer skates would be discarded (and fewer would as a result survive when the discard mortality is less than 100%). Option 2 would have similar impacts to Option 1 but more positive impacts when compared to Option 3.

Figure 5. Trend in daily skate landings and price from May 1, 2012 to April 30, 2013.



7.1.2.1 Option 3: Revised Skate Wing Possession Limit

This Option would result in a higher trip limit that was maintained throughout the year. This Option would be expected to have greater biological impacts than Options 1 and 2. This Option would be more likely to result in an overage of the TAL and triggering of the incidental trip limit (Table 36) when compared to behavior in previous fishing years. The trip limits were designed to prevent an overage of the TAL and not to reduce fishing effort on skate. This Option would not prevent the likelihood of overfishing occurring on a species; after the incidental trip limit was triggered, the level of discarding of skate would increase. The incidental trip limit would reduce directed skate trips but could shift effort onto other species managed under other FMPs. Option 3 would have more negative impacts compared to Options 1 and 2.

7.1.3 Skate Bait Possession Limit Alternatives

7.1.3.1 Option 1: No Action

This alternative would maintain the skate bait possession limit at 25,000 lbs. this alternative is included here for MSA requirements and is not being analyzed for NEPA.

7.1.3.2 Option 2: Revised Skate Bait Possession Limit

This Option would reduce the skate bait possession limit to 20,000 lbs. This alternative is included here for MSA requirements and is not being analyzed for NEPA.

7.1.4 Skate VTR and Dealer Reporting Codes

Option 1: No Action

The No Action alternative would not modify the reporting codes available. This is largely an administrative action that would not directly impact on the biology of the complex but it would not help in improving species specific reporting of landings, which is a requirement of the FMP and which may in time improve stock assessments (or make more models available for use). Option 1 would have neutral biological impacts and would have similar impacts to Option 2.

Option 2: Revised Skate VTR and Dealer Reporting Codes

This alternative would remove the unclassified VTR code for the bait fishery and would remove the unclassified and species codes that are not landed in the wing fishery in order to improve the species specific reporting of landings. This measure does not apply to discards. This is an administrative measure that would not directly impact the biology of the complex but would in time improve the stock assessment and location based reporting of species landed. Option 2 would have neutral biological impacts and would have similar impacts to Option 1.

7.2 Biological Impact on non-target species and other discarded species

The Skate FMP requires that all vessels landing skates be fishing under a monkfish, multispecies, or scallop DAS. As such, fishing effort in the wing and bait fishery is constrained by the effort controls in place in those other fisheries. Despite the reduced ABC under Option 2, effort on skates may not be impacted under the current wing possession limit because of the fishery not achieving its TAL in recent years, unless the incidental trip limit is triggered. The incidental trip limit would result in less fishing for skates and possibly increased targeting of other species to make up the difference in skate landings and revenue.

The reduced ABC is not expected to increase targeting of skates, however, vessels may increase skate landings to compensate for reductions in quotas for other stocks that they are targeting. Catch of other species on trips landing skates are controlled by the DAS limits or sector rules in other FMPs. Vessels that target skates in lieu of other fish while on a DAS are likely to catch and possibly discard lower amounts of other species.

7.3 Essential Fish Habitat (EFH) Impacts

7.3.1 Updates to Annual Catch Limits

7.3.1.1 Option 1: No Action

Option 1 would maintain current specifications levels from the 2012-2013 fishing years for fishing years 2014-2015.

- The aggregate skate ABC and ACL would stay at 50,435 mt.
- The ACT would stay at 37,826 mt.
- The TAL would stay at 23,365 mt.

The TAL is allocated amongst the bait and wing fisheries. Each fishery has its own daily trip limits. By regulation, the wing fishery can only land clearnose and winter skates as they are above the minimum size of 23 inches but not possession prohibited like barndoor, thorny, or smooth skates. Winter skates constitute the bulk of the catch. The bait fishery is also prohibited from possessing or landing barndoor, thorny, and smooth skates, and generally prefers to take smaller animals, i.e. little skates and juvenile winter skates. In 2011 and 2012, the fishery did not reach either the bait TAL or the wing TAL (Table 34).

Table 34 – Catch relative to TAL in FY 2011 and 2012

	2011		2012	
	Specification Amount	Catch/Landings (mt)	Specification Amount	Catch/Landings
TAL (Bait + Wing)	21,561	15,922	23,365	15,617
TAL Bait	7,223	4,132	7,827	5,504
TAL Wings	14,338	11,790	15,538	10,113

7.3.1.2 Option 2: Revised Annual Catch Limit Specifications

Option 2 would adjust skate specifications for fishing years 2014-2015 as follows:

- The aggregate skate ABC and ACL would decrease from 50,435 to **35,479** mt.
- The ACT would likewise decrease from 37,826 to **26,609** mt.
- The TAL would decrease from 23,365 to **16,385** mt. (10,896 wing, 5,489 bait)

EFH impacts are related to the amount and location of fishing effort, and the gear type used. Skates are caught using both gillnets and bottom trawls. Gillnets have a much smaller footprint overall than otter trawls because they are a fixed gear, and the quality of the per unit area impact is also lower. Thus, the gillnet component of the skate fishery is not causing adverse effects to EFH. Bottom otter trawls have a relatively large area swept footprint and their per unit area impact aggregated over this larger footprint causes adverse effects to EFH.

The lower Option 2 TALs are similar to the landings in 2012, as shown in the table above. Similarity in patterns of fishing (i.e. amount and location) between 2012 and 2014-2015 may be reasonable to assume if trip limits are kept the same and spatial management of locations fished by the skate fishery do not change. If catch/landings remain at current levels, Option 2 would have neutral impacts to EFH relative to Option 1, No Action. If effort under the lower TALs declines as compared to No Action, impacts to EFH would likely decrease.

7.3.1.3 Option 3 – Revised Annual Catch Limit based on old catch/biomass medians

Option 3 would adjust skate specifications for fishing years 2014-2015 as follows. These specifications were generated using different data from those used in Option 2. Specifically, they are based on catch biomass median values used in Amendment 3, not on new values updated for this action.

- The aggregate skate ABC and ACL would decrease from 50,435 to **42,421** mt.
- The ACT would likewise decrease from 37,826 to **31,816** mt.
- The TAL would decrease from 23,365 to **19,592** mt. (13,028 wing, 6,563 bait)

Impacts?

7.3.2 Skate Wing Possession Limit Alternatives

7.3.2.1 Option 1: No Action

Option 1 would maintain the Framework Adjustment 1 skate wing possession limits of **2,600** lbs. from May 1 to Aug 31 and **4,100** lbs. from Sep 1 to Apr 30, or until the 85% TAL trigger has been met and it appears that without adjustment the fishery will exceed the annual TAL. This alternative would not alter the 85% trigger.

7.3.2.2 Option 2: Revised Skate Wing Possession Limits

Option 2 would decrease these possession limits to 1,500 lbs. (May 1 to Aug 31) and 2,400 lbs. (Sep 1 to Apr 30). Although vessels do not hit the possession limit on every trip (Table 35???), the lower limits would probably decrease effort in the wing fishery. This can be inferred from the fact that roughly 5,000 of the FY 2011 and FY 2012 wing trips would have been above the limits suggested in this alternative (see biological impacts section). Thus, impacts to EFH would likely decline under these lower limits relative to No Action limits. However, a lower possession limit may mean that the fishery will not be able to land the TAL and achieve optimum yield.

7.3.2.3 Option 3: Revised Skate Wing Possession Limit

Option 3 would increase the possession limit to 5,000 lbs. year round. Given a fixed TAL, higher catches per trip or more trips could trigger the 85% TAL limit earlier in the year, thus shifting fishing effort earlier into the fishing year (see discussion of this in the biological impacts section). There is precedent for such a pattern, as the 85% TAL trigger was reached earlier in FY 2010 when the possession limit was higher than it is now. In terms of EFH impacts, Option 3 probably has similar impacts to No Action, although those impacts may be distributed differently throughout the year. To the extent that catch rates for large winter skate vary seasonally, it may be more efficient to target these skates during particular times of year. Given a fixed TAL, more efficient fishing will reduce habitat impacts as compared to less efficient fishing.

7.3.3 Bait Possession Limit Alternatives

7.3.3.1 Option 1: No Action

This alternative would maintain the skate bait possession limit at 25,000 lbs. Vessels that obtain a Skate Bait Letter of Authorization would be able to retain up to 25,000 lbs. of whole skates.

7.3.3.2 Option 2: Revised Skate Bait Possession Limit

This alternative would reduce the skate bait possession limit from 25,000 lbs. to **20,000** lbs. This alternative is included for analysis to meet MSA requirements, but is not expected to be selected by the Council. Similar to the lower wing limits, the lower bait limit would probably decrease effort in the bait fishery. Thus, impacts to EFH would likely decline under these lower limits relative to No Action limits. However, a lower possession limit may mean that the fishery will not be able to land the TAL and achieve optimum yield.

7.3.4 Skate VTR and Dealer Reporting Codes

7.3.4.1 Option 1: No Action

The No Action alternative would maintain the skate VTR and dealer reporting codes as established in the original FMP. The original FMP included codes for each species, plus a combined little/winter code and an unclassified skate code. This administrative measure is not expected to have impacts on EFH.

7.3.4.2 Option 2: Revised Skate VTR and Dealer Reporting Codes

This alternative would remove the unclassified skate bait VTR reporting code. This alternative would also remove the unclassified and species that are not landed in the wing fishery due to size restrictions, i.e. little skate, little/winter skate, smooth skate, and rosette skate. This is an administrative alternative and is not expected to impact skate catch or fishing behavior. Similar to Option 1, this administrative measure is not expected to have impacts on EFH; the intent is to improve the specificity of reporting in the fishery.

.

7.4 Impacts on Endangered and Other Protected Species (ESA, MMPA)

The protected resources that may be impacted by interactions with fishing gear used to catch skates are identified in Section 6.1.7 Marine Mammals and Protected Species.

7.4.1 Updates to Annual Catch Limits

7.4.1.1 Option 1: No Action

The No Action alternative would maintain the ACL limits as those established in the 2012 specs package. This would maintain fishing effort at a higher level than under Option 2. This would have potentially higher interactions with protected resources as it results in a higher TAL for the fishery. Option 1 would have potentially more negative impacts on protected species than Options 2 and 3. The No Action aggregate ACL, and the bait and wing TALs, are not expected to increase fishing effort for skates because they typically are caught on trips targeting groundfish, monkfish, or scallops. The catch of these species is controlled by DAS and/or sector catch allocations. Since the possession of skates mostly requires vessels to be fishing on a NE Multispecies, Scallop, or Monkfish DAS, fishing effort on skates and potential protected species interactions are largely constrained by other FMPs. As noted in FW1, the action is also not likely to result in any spatial or temporal shifts in fishing effort that might increase the risk of interaction with protected species.

7.4.1.2 Option 2: Revised Annual Catch Limit Specifications

Option 2 would revise the ABC for the skate complex using the most recent and best available science. The reduction in the ABC may result in less directed fishing effort and reduces the possibility that interactions with protected species may occur.

It is important to note that the overall impacts to protected species are likely to be negligible, and the impacts are uncertain as quantitative analysis has not been performed. Catches in the fishery would still be constrained by other limitations placed on the fishery, such as those relating to the catch of other stocks managed under different permits and trip limits, thereby mitigating the impacts of the potential changes. The catch of these species is controlled by DAS and/or sector catch allocations. Since the possession of skates mostly requires vessels to be fishing on a NE Multispecies, Scallop, or Monkfish DAS, fishing effort on skates and potential protected species interactions are largely constrained by other FMPs. Option 2 would have less negative impacts on protected species than Options 1 and 3.

7.4.1.3 Option 3: Revised Annual Catch Limit based on old catch/biomass medians

Option 3 would not use the best available science in setting specifications and would allow for a great ABC than is recommended by the data and ABC control rule. It would allow for continued fishing on skates and increases the possibility that interactions with protected species may occur.

7.4.2 Skate Wing Possession Limit Alternative

7.4.2.1 Option 1: No Action

The No Action alternative would maintain the seasonal wing possession limits as established in FW 1. The impact of possession limits on fishing effort is unknown as skates are typically landed on trips targeting groundfish, monkfish or scallops. The maintenance of the existing possession limits would not allow for an increase in directed fishing effort. Option 1 would have neutral impacts on protected species compared to Option 2.

7.4.2.2 Revised Skate Wing Possession Limit

Option 2 would reduce the wing possession limit for skates. It is not clear that changing the skate possession limit changes the level of fishing effort. If however, the reduction in the possession limit reduces directed fishing effort on skates, this reduction will occur during the summer months when interactions of skate gear with turtles tend to be higher in Southern New England and Georges Bank. Vessels may shift fishing effort to areas of lower skate density to reduce skate encounters that can be time consuming; there is no economic benefit to discarding skate. Option 2 would have more negative impacts on protected species compared to Option 1.

7.4.2.3 Option 3: Revised Skate Wing Possession Limit

Option 3 would raise the wing trip limit to 5,000 lbs which is projected to trigger the incidental trip limit. This would be expected to have biological impacts on skates and economic impacts, however, skates are typically landed on trips targeting other species and this trip limit may not impact protected species. It is not clear how changing the skate wing possession limit affects fishing effort. Vessels may choose to fish in areas of high skate density under this possession limit, which may impact any protected species in these areas.

7.4.3 Skate Bait Possession Limit Alternatives

7.4.3.1 Option 1: No Action

The No Action alternative would maintain the current trip limit of 25,000 lbs with a Letter of Authorization. This would not change current fishing effort and would likely not change the impacts on protected species as established in previous management actions. This alternative is included in the document to meet M-S Act standards. Option 1 would have similar impacts to Option 2 as only a small number of trips land the full bait trip limit in a fishing year.

7.4.3.2 Option 2: Revised Skate Bait Possession Limit

Option 2 would lower the bait possession limit to 20,000 lbs with a Letter of Authorization. This would have a positive impact on protected species if fishing effort was impacted by the reduction, however, this may be unlikely as only a small number of trips land the current bait possession limit. Option 2 would have similar impacts to Option 1.

7.4.4 Skate Wing VTR Reporting Codes

7.4.4.1 Option 1: No Action

The No Action alternative would not modify the reporting codes available. This is largely an administrative action that would not directly impact protected resources. Option 1 would have similar impacts on protected resources as Option 2.

7.4.4.2 Option 2: Revised Skate Wing VTR Reporting Codes

This alternative would remove the unclassified VTR code for the wing fishery and improve the species specific reporting of landings. This measure does not apply to discards. This is an administrative measure that would not directly impact protected resources. Option 2 would have similar impacts on protected resources as Option1.

7.5 Economic Impacts

7.5.1 Updates to Annual Catch Limits Alternatives

Alternatives for updating ACL are described in Section 4.1. The No Action Alternative would not be consistent with the Act. The Preferred Alternative would lower TAL across the skate wing and bait fisheries.

7.5.1.1 Option 1: No Action

Under the No Action Alternative, no changes in ACL or TAL would occur. No additional economic impacts beyond those already analyzed in previous plan amendments and framework adjustments are expected in the short run. Although recent landings have been below TAL, this alternative carries the distinct possibility of allowing landings to exceed the TAL based on revised data. In the long run, this option may lead to future declines in biomass and catch, more restrictive regulation, and the failure to reach optimum yield, which would result in a negative and potentially significant economic impact to the fishery.

7.5.1.2 Option 2: Revised Annual Catch Limit Specifications

Under this alternative, TAL would be reduced from 23,365 metric tons to 16,385 mt. Reductions in the ACL and TAL themselves do not necessarily necessitate changes in management measures, reductions in fishery effort, or changes in fishery profits. In this case, the Option 2 TAL (16,385 mt) remains above the total catch by federally reporting vessels from FY 2012 (14,429 mt), but is below FY2011 total catch by federally reporting vessels from 2011 (18,081 mt). FY2011 represents the recent maximum total landings. Relative to Option 1: No Action, this alternative would result in a higher likelihood of triggering AMs.

Accountability measures (AMs) are triggered when catch of skate wings reaches 85% of the wing TAL or 90% for the skate bait fishery, as established in Framework Adjustment 1 and Amendment 3 to the Northeast Skate Complex FMP. Amendment 3 mandated that skate wing possession limits be reduced to the incidental limit of 1,250 lbs when the AM is triggered. For the skate bait fishery, triggering the AM requires that bait possession limits be reduced to those of the skate wing fishery. For either fishery, a lower TAL increases the likelihood of triggering AMs that reduce possession limits to incidental levels. While the long-run economic benefits of both skate fisheries depend on meeting, but not exceeding, the TAL, short-term negative economic impacts may accrue to the targeted skate fishery as a result of this alternative.

The magnitude of the impact of increased triggering of AMs depends on two factors: the number of vessels that target skates and would therefore be affected by reduced trip possession limits, and the probability of triggering AMs under this alternative compared to the status quo. To avoid exceeding the TAL, revised trip possession limits could be necessary, and are discussed and evaluated for economic impacts in Section 7.5.2 and Section 7.5.3. Revised trip possession limits would be the primary driver of short-run economic impacts from a revised TAL under the assumption that the TAL is optimally set.

7.5.1.3 Option 3: Revised Annual Catch Limit Specifications

Under this alternative, TAL would be reduced from 23,365 mt to 19,592 mt. Reductions in the ACL and TAL themselves do not necessarily necessitate changes in management measures, reductions in fishery effort, or changes in fishery profits. In this case, the Option 3 TAL (19,592 mt) remains above the total catch by federally reporting vessels from FY 2012 (14,429 mt) and FY2011 (18,081 mt). FY2011 represents the recent maximum total landings. It is unlikely that this alternative would necessitate changes in trip possession limits or other effort controls. Relative to Option 1: No Action, this alternative would result in a higher likelihood of triggering AMs, but that likelihood would remain very low.

This alternative carries the distinct possibility of allowing catch to exceed the TAL based on revised data. In the long run, exceeding TAL may lead to declines in biomass and catch, more restrictive regulation, and the failure to reach optimum yield, which would result in a negative and potentially significant economic impact to the fishery.

7.5.2 Skate Wing Possession Limit Alternatives

7.5.2.1 Option 1: No Action (Preferred Alternative)

When combined with Updates to ACL Alternative 1: No Action, this alternative would not increase or decrease short-term economic benefits beyond those analyzed in Framework Adjustment 1, which set seasonal skate wing possession limits. Long-term, negative economic impacts would be realized only if the long-term health of the stock were to decline, as would be expected if an ACL is set at an amount higher than that determined by the best available science. However, allowing an ACL to remain at a level below that mandated by the best available science would be inconsistent with the Act.

When combined with Updates to ACL Alternative 2: Revised ACL Specifications, the wing possession limits associated with this alternative could potentially result in more frequent triggering of AMs due to the triggering threshold remaining at 85% of TAL and a decreased TAL. The distribution and estimated magnitude of the economic impact of a lower TAL combined with status quo possession limits is similar to, but of lesser magnitude than the impact associated with Skate Wing Possession Limit Alternative – Option 3: Revised Skate Wing Possession Limits, analyzed below. In that analysis, the fishery is presumed to close due to AMs in December. Under this assumption, 10 vessels would see a reduction of more than 10 percent of their total landings revenue under FY2011 conditions, and 5 would see reductions of more than 15 percent of total landings revenue. One vessel would see reductions of over 30 percent.

Option 1: No Action, combined with the preferred Updates to ACL Alternative – Option 2: Revised ACL Specifications would not be as likely to trigger AMs as the scenario analyzed below; thus, the impact from this option would be lower, and the number of affected vessels would be fewer. Given the lesser impact of this alternative relative to both Option 2 and Option 3, this alternative is identified as the preferred alternative. It would not significantly affect a substantial number of permit-level or affiliate (“ownership group”) level entities.

7.5.2.2 Option 2: Revised Skate Wing Possession Limits

This alternative is described in Section 4.2.2. The total number of unique permits landing skate wings during FY2011 and FY2012 was 616. Of these, 228 unique permits landed greater than 1,500 lbs of wings from May 1 to Aug 31 (Summer season) or greater than 2,400 lbs from Sep 1 to Apr 30 (Winter season) during fishing year (FY) 2011 and 2012. 151 unique permits recorded trip landings within 100 lbs of the season’s trip possession limit over a total of 2,034 trips. These trips are most likely to be “skate targeting” trips.

A simulation of the effects of revised trip possession limits was performed based on FY2011 and FY2012 data. While future fishing behavior and effort may vary significantly from past effort due to exogenous influences such as weather, ex-vessel prices, and the availability of other species, recent fishing behavior and effort is the best feasible predictor of future effort. The results discussed here do not account for future, unknown changes in fishery dynamics, but provide a reasonable and feasible estimate of the impact of alternative trip possession limits.

Over fishing years 2011 and 2012, an average of 2,809,247 lbs (wing weight, 2,892 mt live weight) of skate wings would not have been landed each year under this option. In addition to this, some number of skate targeting trips that did occur in FY2011 and FY2012 would not have taken place at all as a result of the lower trip possession limits. This would occur when the maximum revenue under the trip limits would be less than the expected total cost of the trip itself, which is unknown.

Table 35 shows the total landings for FY2011 and FY2012, the number of trips that exceeded the trip possession limits proposed in this alternative, and the truncated landings, assuming that all trips occurring at the higher 2011-2012 limits would still occur, but with landings truncated at the proposed limits. The purpose is to gain an understanding of how many trips would be affected by this alternative.

Total skate wing landings in 2011 would have been at least 3,441 mt lower under the proposed trip possession limits. For 2011, total skate wing landings would have been at least 2,343 mt lower. Total skate wing landings for 2011 and 2012 would have been 9,759 and 7,264, respectively. In both cases, the total skate landings would not have exceeded the TAL associated with the ACL set by Option 2 (above). Although 2011 had the highest landings of the last three years, the total landings that fishing year would have fallen short of the TAL set in Option 2: Revised Annual Catch Limit Specifications by approximately 1,317 mt (12,1%).

Table 35 - Landings in excess of Option 2 proposed trip possession limits (FY2011 - FY 2012)

	Actual Landings			**Option 2: Revised Skate Wing Possession Limits**				
	Total Landings (mt)	**Trips (count)**	**TAL (mt)**	**Proposed TAL (mt)**	**# of trips in excess of Opt. 2**	**Landings in excess of Opt. 2 (mt)**	**Truncated total landings (mt)**	**Percent of "Option 2: Revised Annual Catch Limit Specification" TAL**
2011	13,200	16,479	15,538	10,896	2,831 (17.1%)	3,441	9,579	87.9%
2012	9,608	13,624	15,538	10,896	2,178 (16.0%)	2,343	7,264	66. 7%

Source: SAFIS/CFDBS; includes all non-bait landings from federal permit-holders converted to live weight

Under this option, a total of 43 permits, all of which qualify as small businesses at both the permit level and the affiliate (or "ownership group" level), would have lost greater than 5% of total permit revenue, and 25 vessels would have lost greater than 10% of total permit revenue. This number of affected entities exceeds the number of potentially affected entities associated with either Option 1 or Option 3.

While revenues are not perfectly correlated with profits, a change in revenue represents a decrease in economic well-being for the permit-holder. Implementation of Option 2: Revised Skate Wing Possession Limits would likely result in landings well below each of the proposed TALs, including Option 1: No Action, which is the highest proposed TAL. Failure to land a TAL due to trip possession limits signifies a real and negative economic impact to the skate wing fishery. Furthermore, trip possession limits may encourage increased discarding, leading to under-estimated fishing mortality and declines in stocks relative to optimum levels.

7.5.2.3 Option 3: Revised Skate Wing Possession Limits

This alternative would eliminate the seasonal trip limits and replace them with a constant skate wing possession limit of 5,000 lbs (11,350 live lbs). This alternative is described in detail in Section 4.2.3.

The economic benefit of an increase in trip possession limits depends upon the corresponding skate wing TAL. To estimate the likelihood of exceeding a proposed TAL, a counterfactual trip landing was generated for every trip in FY2011 and FY2012. To simulate landings under a 5,000 lbs possession limit, the landings are set at either (1) 5,000 lbs (wing weight) *if and only if* the actual trip landings were greater than 100 live lbs below the actual trip possession limit (in live pounds), or (2) the actual trip landings *if* the actual trip landings was less than 100 live lbs below the actual trip possession limit (in live pounds). For example, a trip landing 5,820 live lbs of skate wings during a summer month (trip possession limit: 2600 wing lbs x 2.27 conversion factor = 5,902 live lbs) would be within 100 live lbs of the possession limit, would be considered a "skate targeting / maximizing" trip, and would be assigned a counterfactual landing of 5,000 lbs (11,350 live lbs). A trip landing 5,800 live lbs at the same time would *not* be considered a "skate targeting / maximizing" trip, and the counterfactual would be the actual landing lbs (5,800).

The counterfactual represents a likely upper-bound for landings. Although trips within 100 live lbs of the possession limit may be accurately assumed to be "skate targeting / maximizing," the actual landings of these trips under the higher proposed possession limits may not consistently reach the new limit. This is a methodological limit on analysis; complete information on actual catch under higher possession limits is not observable in the data and is thus not feasibly available.

Table 36 shows the counterfactual landings under this possession limit option. In both FY2011 and FY2012, the TAL would likely have been exceeded. FY2011 represented a peak year for skate landings; in the FY2011 counterfactual, AMs would have been triggered in October, and TAL would have been exceeded as early as November. Counterfactual catch in FY2011 would have exceeded TAL by 4,229 mt (live weight).

Table 36 - Landings in excess of Option 3 proposed trip possession limits (FY2011-FY2012)

	Actual Landings				Option 3: Revised Skate Wing Possession Limits			
	Total Landings (mt)	**Trips (count)**	**Trips within 100lbs of Possession Limit**	**Permits Landing within 100lbs of Possession Limit At Least Once**	**Total Est. Landings (mt)**	**Est. Percent of Option 2: Revised ACL Specification TAL (10,896 mt)**	**Est. Month Option 2: Revised ACL Spec. AM Triggered**	**Est. Month Option 2: Revised ACL Spec. TAL Exceeded**
2011	13,200	16,479	1,169 (7.1%)	126 of 550 (22.9%)	15,125	139%	October	November
2012	9,608	13,624	856 (6.3%)	101 of 513 (19.7%)	11,303	104%	December	April

Source: SAFIS/CFDBS; includes all non-bait landings from federal permit-holders converted to live weight

Distribution of Impacts From Triggering Accountability Measures

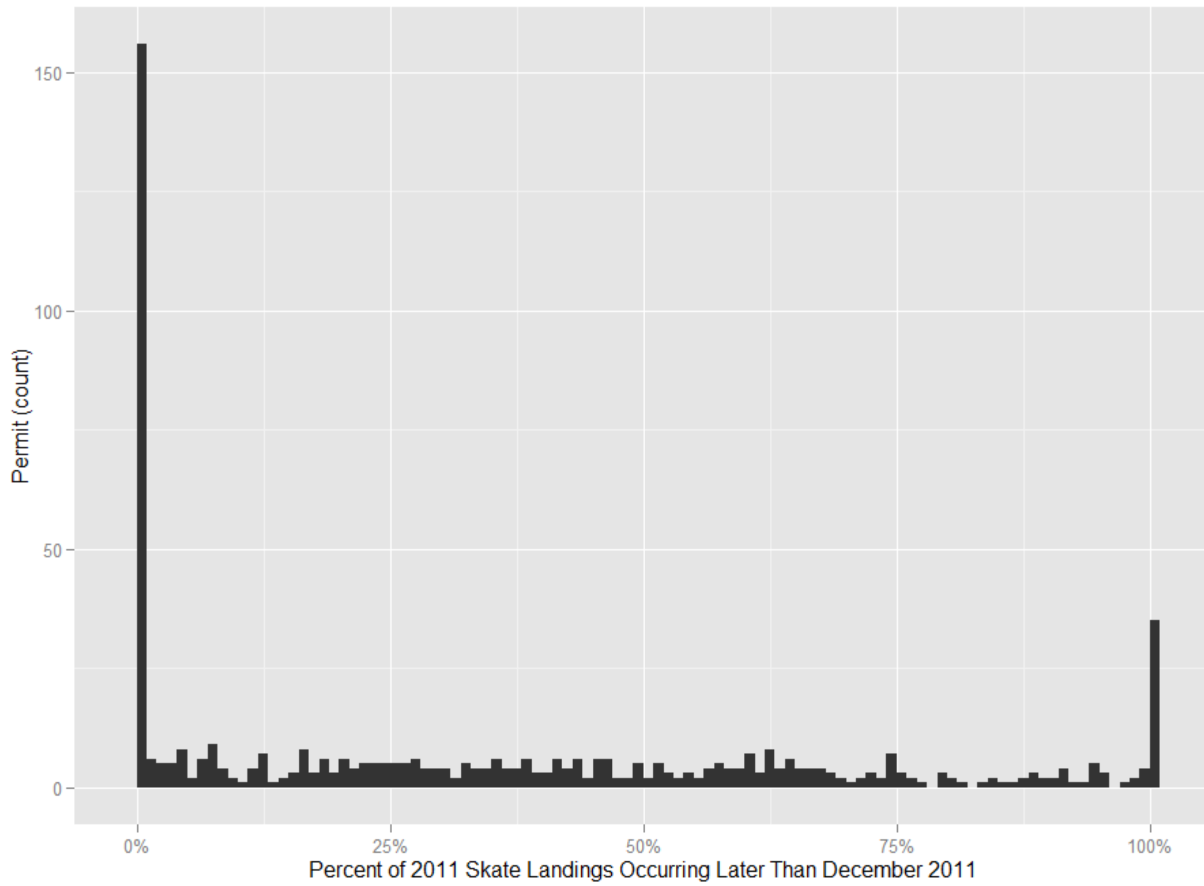
FY2011 counterfactual landings suggest that the skate wing fishery triggered AMs in November of FY2011 under the proposed trip possession limits and under Preferred Alternative Option 2: Revised ACL Specification. When a TAL is likely to be binding before the end of the fishing year, an incentive for derby-style fishing exists where individual permit-holders intensify skate landings prior to the triggering of AMs. Existing data is not sufficient to estimate how effort would shift (or the intensity of the derby-style fishing) given that skates are not frequently targeted, and are landed only as sellable by-catch by many permit-holders.

In FY2011, the recent peak of skate wing landings, 550 unique permits landed skates. Of these, 208 (37.8%) landed skates in December or later and would be affected by an early closure.[6] These are landings that would not be possible under Option 3 due to the triggering of AMs in October and the exceeding of TAL by November. However, some number of these permit-holders would be capable of shifting skate landings to earlier in the fishing year. To be negatively impacted by the triggering of AMs and the exceeding of TAL, a permit-holder would have to disproportionately rely on skate wing landings from December to April. Figure 6 shows the distribution of reliance on landings in December or later. 176 of 550 permits (32%) caught 50% of more of all FY 2011 skate landings in December of FY2011 or later; 82 (15%) caught 75% or more in that period; and 35 (6%) caught 100% of skate landings during that period.

For permit-holders that landed 100% of FY2011 skate landings in December or later, the mean FY total landings per permit were 9,659 and the median landings were 1,217. For permit-holders that landed more than 75% of FY2011 skate landings in December or later, the mean total landings per permit were 29,867 and the median landings were 4,741. Permit-holders that rely on December or later skate landings recorded 29 of 1,169 (2.9%) of all "skate targeting / maximizing" trips.

Figure 6 - Distribution of Permit-Aggregated Shares of FY2011 Skate Landings in December or Later

[6] 406 total permits landed skates in December or later. 208 permits landed skates in excess of the incidental trip limit of 1,250 lbs wing weight in December of FY2011 or later. Even when TAL is exceeded and AMs have been triggered, landings of up to 1,250 lbs are allowed.



The 82 permit-holders that rely heavily (>75%) on late-season skate landings and would be significantly affected by closures triggered by increased possession limits land a substantial amount of skate wings and may occasionally target skates, although the extent to which they could shift landings to offset losses is unknown. Although overall economic benefits from skate wing landings are independent of season landed, the negative impacts of this option would fall primarily on these 82 permit-holders rather than the fishery at large. Home ports for these vessels are primarily Barnegat Light, NJ (11 of 36 skate-landing permits rely on Winter season skate landings), Gloucester, MA (5 of 51), New Bedford, MA (5 of 42), Boston, MA (4 of 36), and Belford, NJ (3 of 12). Vessels landing primarily during Summer, when the fishery is more likely to be open under this option, would accrue the largest share of benefits.

Vessels that disproportionately rely on late-season landings for skate landings but do not rely on skates as a signification portion of their landing portfolio will be minimally affected by this alternative. Of the 82 vessels that gain a significant share of skate landings from December-or-later landings, 10 vessels rely on skate landings for greater than 10 percent of total revenue, and 15 vessels rely on skate landings for greater than 5 percent of total revenue. Multiplying the percent of total revenue that the vessel lands in skates by the total share of skate landings that could potentially be lost due to a December skate fishery closure yields an estimate of the percent of total vessel revenue that could potentially be lost (assuming effort cannot be shifted to pre-closure periods) as a result of this alternative. This share exceeds 10 percent for 10 vessels, all of which are considered “small businesses” at both the permit level and the affiliate (or “ownership group” level). Five vessels exceed 15 percent, and one vessel reaches 31 percent.

7.5.3 Bait Possession Limit Alternatives

7.5.3.1 Option 1: No Action

This action would keep the skate bait possession limit constant at 25,000 lbs. Total federally-reported skate bait landings in FY2011 and FY2012 were 4,880 mt and 4,821, respectively. FY2011 represents the recent peak of skate bait landings, but this amount does not exceed the trigger amount (90% of TAL) for *any* of the proposed TALs.

In FY2011, zero trips landed within 1,000 lbs of the possession limit. In 2012, 18 out of the 1,478 (1.2%) federally-reported skate bait landings came within 1,000 lbs of the 25,000 lb trip limit. No measurable economic impacts would results from this alternative, and it is unlikely that the skate bait fishery, under this option, would trigger AMs at any proposed TAL.

7.5.3.2 Option 2: Revised Skate Bait Possession Limit

This action would lower the skate bait possession limit to 20,000 lbs. In FY2011, one trip out of 1,733 (.05%) landed greater than the proposed possession limit. In FY2012, 115 out of 1,478 (7.8%) trips landed greater than the proposed possession limit. In FY2011 and FY2012, a total of 256,840 lbs of skate bait were landed in excess of the proposed possession limits. This amount represents only1.2% of all FY2011-FY2012 landings. Although vessels who reach the lower proposed possession limit can shift additional catch to other trips to offset potential losses, the impact of this proposed possession limit would have an upper-bound economic loss of 128,420 lbs of skate bait per year, assuming that TAL is not exceeded under either possession limit.

An average reduction of 128,420 lbs for a fishery that has not reached TAL would represent a real, negative economic loss in comparison to Option 1: No Action. TAL is not likely to be exceeded, nor is the 90% AM trigger expected to be reached, under either possession limit. Therefore, no future benefits are gained through a reduction in catch and the proposed constraining possession limit constitutes an un-necessary economic loss for the skate fishery.

7.5.4 Skate VTR and Dealer Reporting Codes Alternatives

These proposed alternatives alter reporting requirements to align data collection with the goals and objectives stated in the corresponding Fishery Management Plan. Although Option 2: Revised Skate VTR and Dealer Reporting Codes would eliminate a frequently-used classification for skates (“Unclassifiable Skates”), the “Little/Winter Skate” classification would remain available. Little and Winter Skates are not easily discerned from other skates, however, under all proposed alternatives, the little/winter classification would provide sufficient coverage for easy dockside classification.

Both alternatives would result only in recordkeeping changes and would not present additional measurable costs to the fishery. Therefore, neither alternative proposed would result in any economic impact.

7.6 Social Impacts

7.6.1 Updates to Annual Catch Limits

ACL alternatives are described in Section 4.1 and include decreases in the ABC, in the aggregate skate ACL, and in the skate bait and skate wing fishery TALs.

7.6.1.1 No Action

Under the No Action Alternative, the skate catch limits would be those proposed by the 2012-2013 specifications. No additional impacts on human communities beyond those already analyzed in the 2012-2013 specifications package and FW1 EA are expected. The FW1 EA determined that the action would have positive economic and social benefits, mainly by reducing the risk of closing the directed skate wing fishery early in the fishing year. This was expected to prolong the fishing season, stabilize skate wing markets and revenue, maintain processing jobs, and reduce the incentives for derby-style fishing behavior. The two seasonal skate wing possession limits implemented by FW1 (2,600 lb for May 1 through August 31, and 4,100 lb for September 1 through April 30) were also expected to increase efficiency and revenue in the skate wing fishery by allowing more landings when prices are typically higher, and when winter skates can generally be captured closer to shore. Option 1 would have more positive impacts than Options 2 and 3.

7.6.1.2 Option 2: Revised Annual Catch Limit Specifications

Under Option 2, the specifications are calculated using the best available science that includes revised discard mortality rate estimates for four of the seven skate species. The reduced ABC and TAL have the potential to impact fishing behavior and profits; the reduction also would increase the potential of the AM being triggered before the end of the fishing year. Based on recent landings, the revised specifications are not thought to be restrictive of landings. Option 2 might allow for a higher percentage of the TAL to be landed, which would have positive impacts. This option incorporates revised discard mortality rates and reduces the assumed rate for trawl gear for the two primary skate species landed. This option would not apportion a larger percentage of the catch to dead discards and would allow for a higher TAL based on fewer dead discards, which would have positive impacts. Option 2 would have more positive impacts than Option 3 but would allow for lower landings compared to Option 1.

7.6.1.3 Option 3: Revised Annual Catch Limit Specifications

Under Option 3, the specifications are updated only with the updated survey indices and do not incorporate the best available science for the revised discard mortality rates. This option would negatively impact fishermen by charging them more dead discards than the science recommends. Compared to Option 1, there is still a reduction in the ABC and TAL which may impact landings and have a negative impact. The higher TAL would reduce the potential for an AM being triggered before the end of the fishing year. Option 3 would have fewer negative impacts compared to Option 2 and more when compared to Option 1. However, this Option is inconsistent with the Magnuson-Stevens Act and is therefore not a viable option.

7.6.2 Skate Wing Possession Limit Alternatives

7.6.2.1 Option 1: No Action

This option would maintain the current skate wing possession limits established in FW1. Option 1 might have more negative impacts compared to Option 2 if an AM is triggered before the end of the fishing year, assuming there is a reduction in the TAL. Compared to Option 3, Option 1 would have fewer negative impacts.

7.6.2.2 Option 2: Revised Skate Wing Possession Limits

This Option would reduce the trip limit in both seasons to 1,500 lbs from May to Aug 31 and 2,400 lbs from Sep 1 to Apr 30. This option would likely reduce the likelihood of an AM being triggered before the end of the fishing year but may negatively impact landings if fishermen are encountering more skates than they can land. Option 2 may laso reduce the ability of fishermen to land their TAL. Compared to Option 1, Option 2 would have neutral impacts on fishermen as the likelihood of an AM being triggered is reduced but it makes it more difficult for fishemren to achieve the total TAL. Option 2 has more positive impacts when compared to Option 3.

7.6.2.3 Option 3: Revised Skate Wing Possession Limits

This Option would raise the skate wing trip limit to 5,000 lbs and remove the seasonal component. This option would allow the fishery to achieve its TAL, however, the likelihood of an AM being triggered greatly increases. Based on the simulated impacts of the revised trip limits described in Section 7.6.2.3 it is highly likely that the TAL would be exceeded under this option. Option 3 has more negative impacts compared to Options 1 and 2.

7.6.3 Skate Bait Possession Limit Alternatives

7.6.3.1 Option 1: No Action

This Option would maintain the currently skate bait possession limit at 25,000 lbs, with a Letter of Authorization. The trip limit is unlikely to result in an overage of the TAL and would have neutral impacts on the fishery. It is included in this document to meet MSA requirements. Compared to Option 2, Option 1 would have more positive impacts on the fishery.

7.6.3.2 Option 2: Revised Skate Bait Possession Limit

Option 2 would reduce the skate possession limit to 20,000 lbs, with a letter of Authorization. This would have negative impacts on the fishery as it would reduce the possession limit on a fishery that has not exceeded the TAL and is not likely to. It would make it more difficult for the fishery to achieve the TAL. Option 2 would have more negative impacts compared to Option 1.

7.6.4 Skate VTR and Dealer Reporting Codes

7.6.4.1 Option 1: No Action

This Option would maintain the VTR and dealer reporting codes as established in the original FMP. This is an administrative measure and would be expected to have neutral, if any, impacts on the fishery. Option 1 would have similar neutral impacts to Option 2.

7.6.4.2 Option 2: Revised Skate VTR and Dealer Reporting Codes

This Option would revise the VTR and dealer reporting codes to more accurately reflect what is being caught in each fishery and would remove the unclassified reporting code to be more consistent with the requirement of the original FMP to report species specific landings. This is an administrative measure and would be expected to have neutral, if any, impacts on the fishery. Option 2 would have similar neutral impacts to Option 1.

7.7 Cumulative effects analysis – NOT YET UPDATED

The need for a cumulative effects analysis (CEA) is referenced in the CEQ regulations implementing NEPA (40 CFR Part 1508.25). CEQ regulations define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other action." The purpose of this CEA is to consider the effects of the Proposed Action and the combined effects of many other actions on the human environment over time that would be missed if each action were evaluated separately. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective; rather, the intent is to focus on those effects that are truly meaningful. The CEA baseline in this case consists of the combined effects of Amendment 3, FW1, and the past, present, and reasonably foreseeable future fishing and non-fishing actions which are described below.

This CEA assesses the combined impact of the direct and indirect effects of the proposed skate specifications for 2012-2013 with the impact from the past, present, and reasonably foreseeable future fishing actions, as well as factors external to the skate fishery that affect the physical, biological, and socioeconomic resource components of the skate environment. This analysis is focused on the VECs (see below) and because this action is supplementing Amendment 3 and FW1, it relies heavily on the analysis contained in the Amendment 3 EIS (NEMFC 2009; Section 8.1) and in the FW1 EA (NEMFC 2011; Section 6.6).

Valued Ecosystem Components (VECs): The CEA focuses on VECs, specifically including:

- Physical environment/habitat (including EFH);
- Regulated stocks (skate complex);
- Non-target species and bycatch;
- Protected resources/endangered species; and
- Human communities.

Temporal and Geographic Scope of the Analysis: The temporal range that will be considered for habitat, allocated target species, non-allocated target species and bycatch, and human communities, extends from 2010, the year that Amendment 3 was implemented, through May 1, 2012 the beginning of the next fishing year. While the effects of actions prior to Amendment 3 are considered (see Amendment 3 for a full cumulative effects analysis), the cumulative effects analysis for this action is focused primarily on Amendment 3 and subsequent actions because Amendment 3 implemented ACLs for skates and included major changes to management of the skate fishery.

The temporal range considered for endangered and other protected species begins in the 1990s when NMFS began generating stock assessments for marine mammals and developed recovery plans for sea turtles that inhabit waters of the U.S. EEZ. In terms of future actions, the analysis examines the period of approval for this action through May 1, 2012, which is the beginning of the subsequent fishing year when new management measures will be implemented. The broad geographic scope considered for cumulative effects to habitat, allocated target species, and non-allocated target species and bycatch consists of the range of species, primary ports, and geographic areas (habitat) discussed in Section 5.0 (Affected Environment) of the FW1 EA. Similarly, the range of each endangered and protected species as presented in Section 5.4 of FW1 will be the broad geographic scope for that VEC, however, the most likely geographic scope for all cumulative effects will be the Gulf of Maine, Georges Bank, and Southern New England waters where most of the skate fishery occurs. The geographic scope for the human communities will consist of those primary port communities from which vessels fishing for skates originate.

7.7.1 Summary of Direct/Indirect Impacts of the Proposed Action

The direct and indirect effects on the VECs from the revised ACL analyzed in this supplemental EA (Preferred Alternative) compared to what the impacts would be if the skate specifications approved are those described in the No Action Alternative are summarized in Table 6 below. The nomenclature used is the following:

- Physical Environment: positive = actions that improve or reduce disturbance of habitat; negative = actions that degrade or increase disturbance of habitat;
- Biological Environment: positive = actions that increase stock size; negative = actions that decrease stock size;
- Human Communities: positive = actions that increase revenue and well-being of fishermen and/or associated businesses; negative = actions that decrease revenue and well-being of fishermen and/or associated businesses

Table 37. Summary of Direct and Indirect Effects of the Alternatives

Alternative	Valued Ecosystem Components (VECs)				
	Physical Env	Biological Environment			Human Communities
	Habitat/EFH	Allocated Target Species	Non-Allocated Target Species and Bycatch	Protected Resources	Skate fishery participants
ACL alternatives described in Section 4.1					
No-Action Alternative	negligible	negligible	negligible	negligible	negligible
Proposed Alternative	negligible	positive	positive	negligible	positive
Status specification alternatives described in Section Error! Reference source not found.					
No-Action Alternative	negligible	negligible	negligible	negligible	negligible
Proposed Alternative	negligible	negligible	negligible	negligible	positive
Skate wing fishery possession limit alternatives described in Section 4.4					
No-Action Alternative	negligible	negligible	negligible	negligible	negligible
Proposed Alternative 1	negligible	positive	negligible	negligible	positive
Proposed Alternative 2	negligible	positive	negligible	negligible	positive
Skate bait fishery possession limit alternatives described in Section Error! Reference source not found.					
No-Action Alternative	negligible	negligible	negligible	negligible	negligible
Proposed Alternative	negligible	negligible	negligible	negligible	positive

Impacts to the physical and biological environment from the proposed action were assessed and found to be negligible. In general, the larger allowable amounts of skate catch and landings are not likely to result in considerable additional fishing effort. Fishing effort for skates is largely controlled by DAS in the groundfish, monkfish, and scallop fisheries. The amount of fishing effort in the fishery in FY 2012-2013 is likely to be similar FY 2010 effort and will be within the scope of fishing effort analyzed in Amendment 3 and FW1, as well as in recent actions in the DAS fisheries noted above.

7.7.2 Past, Present and Reasonably Foreseeable Future Actions

Detailed information on the past, present, and reasonably foreseeable future actions that may impact this action can be found in the FEIS for Amendment 3 and in the FW1 EA (Section 6.6.10). The information on relevant past, present and reasonably foreseeable future actions and their impacts are summarized in this section.

Other Fishing Effects: Past, Present and Reasonably Foreseeable Future Skate and Related Management Actions

The following is a summary of the past, present, and reasonably foreseeable future fishing actions and effects thought most likely to impact this cumulative effects assessment. The three FMP's that have had the greatest impact on skate fishery VECs, other than the Skate FMP, are the Atlantic Sea Scallop, Monkfish, and NE Multispecies FMPs, 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. For additional information on the cumulative effects and to view the complete summary of the history of the Skate FMP, please see Amendment 3 (NEFMC 2009) and Section 6.6.10 of the FW1 EA (NEMFC 2011).

Past and Present Actions:

Skates. Amendment 3 to the Skate FMP implemented an ACL and AMs for the skate complex and was designed to reduce skate discards and landings sufficiently to rebuild stocks of thorny and smooth skates, and to prevent other skates from becoming overfished. Skate FW1, implemented in May 2011, reduced skate possession limits and adjusted other measures to lengthen the fishing season for the directed skate wing fishery. The Regional Administrator has also published a proposed rule to implement an Emergency Action to raise the 2011 specifications, with an ABC of 50,435 mt.

NE Multispecies. Amendment 16 and FW 44 to the NE Multispecies FMP are regulations that have effectively reduced fishing effort for skates as well as other targeted groundfish. FW 45 implemented a variety of measures including revision of biological reference points, updated ACLs for several groundfish stocks, and established new closed areas to protect spawning cod.

Monkfish. Monkfish Amendment 5 implemented ACL and AMs for the monkfish fishery, and updated the biological reference points for monkfish stocks. FW 7 has proposed a new ACT for the monkfish Northern Fishery Management Area, increasing the allocated DAS from 31 to 40 days per vessel, and adjustment of some possession limits.

Atlantic Sea Scallops. Amendment 15 to the Scallop FMP implemented ACLs and AMs for the scallop fishery. It also included updates to EFH, biological reference points, the research set-aside program, and other measures to improve the limited access general category fishery. FW 22 implemented fishery specifications for 2011 and 2012 to prevent overfishing on scallops and help improve the yield-per-recruit in the resource. It built upon the measures implemented by Amendment 15, and adjusted DAS and access area trip allocations, and implemented measures to minimize fishery interactions with endangered sea turtles.

Spiny Dogfish. Along with skates, spiny dogfish are one of the primary incidental species in the NE multispecies fishery. Spiny dogfish have historically been landed more with bottom gillnets rather than bottom trawls. Specifications for FY 2010 and 2011 included an overall commercial quota (15 million lb in 2010; 20 million lb in 2011) and a 3,000-lb trip limit. Fishing effort is largely constrained by NE Multispecies and Monkfish DAS.

American Lobster. Since the skate bait fishery supplies a large proportion of bait to lobster trap fisheries, regulations affecting lobster fishing effort may influence demand for skate products. NMFS is in rulemaking to limit future access and control trap fishing effort in Lobster Management areas 2 (southern MA and RI waters) and the Outer Cape Area (east of Cape Cod, MA). This action will address measures to: implement a trap transferability system in these areas, as well as Area 3 (the offshore Area from ME to NC); allow trap transfers among qualifiers; and impose a trap reduction or conservation tax on any trap transfers. Another action proposes to limit future access into the lobster trap fishery in Lobster Area 1 (the inshore Gulf of Maine). This action is intended to discourage lobster non-trap vessels from entering the lobster trap fishery, and discourage lobster trap vessels fishing in other lobster management areas from entering the Area 1 lobster trap fishery. A proposed rule for these actions is under development at this time.

Atlantic Herring. The impacts of the herring fishery on skates catch is considered negligible. However, the 2010-2012 herring specifications reduced the ABC by 45% to 106,000 mt. Herring are often used as lobster bait in the Gulf of Maine and the Area 1A TAC declined by 41% to 26,546 mt. As the supply of herring bait for the lobster fishery declines, it could result in increased demand for skate bait.

Mid-Atlantic Species. Skates are occasionally caught as bycatch in various fisheries managed by the Mid-Atlantic Fishery Management Council (e.g., summer flounder, scup, black sea bass, bluefish). NMFS has recently proposed regulations implementing the Mid-Atlantic ACL Omnibus Amendment, which will implement ACLs and AMs for all species managed by the Mid-Atlantic Council. As many of these fisheries are jointly managed with the Atlantic States Marine Fisheries Commission (ASMFC), seasons, quotas, trip limits, and other measures are specified by state agencies. The implementation of ACLs and AMs for these fisheries will help constrain total catch of these species, as well as bycatch of non-target species like skates.

Large Whales. The Atlantic Large Whale Take Reduction Program (ALWTRP) requires the use of sinking groundlines, which may have a negligible to low negative impact on habitat due to associated bottom sweep by the groundline. In addition, required use of weak links in gillnets may result in floating "ghost gear," which could snag on and damage bottom habitat.

Future Actions:

Skates. Skate fishery specifications for the 2012-2013 fishing years would replace the management measures implemented by Amendment 3, Framework Adjustment 1, and the pending Emergency Action. Without approval of the proposed action in this specifications document, the Emergency Action would expire during the 2012 fishing year and the ACL specifications would revert back to ones set by Amendment 3 for the 2010-2011 fishing years. No other skate actions are currently planned, but the Council may consider initiating a future action when it considers priorities for 2012. The industry has asked the Council to consider limiting access to the skate bait fishery and NMFS set a control date in 2010 at the request of the Council.

NMFS has received two petitions to list certain skates as endangered or threatened species under authority of the Endangered Species Act. NMFS has 90 days to respond whether it should consider listing one or more of the species identified in the two petitions. One petition was submitted by the Animal Welfare

Institute on Aug 11, 2011, and requests the US Department of Commerce to list the Northwest Atlantic or the US District Population Segment of thorny skate as an endangered or threatened species. The other petition submitted on Aug 22, 2011, requests the US Secretary of Commerce to list thorny, barndoor, winter, and smooth skates as endangered or threatened species. NMFS will respond to the petitions by mid-November as to whether these species will be considered as candidate species. Therefore, it would be speculative to predict future actions that might arise from these petitions at this time, and no further consideration of this is made in this document.

The Council has asked coastal states to examine their state water fisheries for skates and determine whether they need to take action to prevent state water fisheries from undermining the conservation goals of the Skate Complex FMP. During the review of 2010 data for this document, state landings had jumped from an assumed 3% of total landings (6.7% in 2009) to 12%, possibly in response to tighter fishing regulations in Federal waters and an early closure of the directed skate wing fishery on Sep 3, 2010. States may as a result of this Council letter take action to bring state fishing rules in line with those that apply to Federal waters. As of this time, MA and RI are evaluating their fisheries to determine whether action is necessary. Action by states may improve monitoring and reduce management uncertainty.

NE Multispecies. FW 46, if approved by NMFS, would increase the amount of haddock allowed to be caught by the herring fishery ("haddock catch-cap") from its current level of 0.2 percent of the ABC, to 1% of the ABC, and make separate allocations for the Georges Bank and Gulf of Maine stocks. The Council is expected to initiate FW 47 in June 2011 to set specifications (OFLs, ABCs, and ACLs) for 20 groundfish stocks for FYs 2012-2013 (beginning May 1, 2012). Framework 47 would also refine AMs for ocean pout, windowpane flounder, Atlantic halibut, Atlantic wolffish, and SNE/MA winter flounder, consider eliminating the scallop access area yellowtail flounder caps, and consider additional allocation of yellowtail flounder to the scallop fishery based on estimated catch.

Atlantic Sea Scallops. The Council is currently developing FW 23 to the Scallop FMP. The action is expected to consider scallop dredge gear modifications and measures to reduce bycatch of sea turtles and yellowtail flounder.

Essential Fish Habitat. Reasonably foreseeable future actions that will likely affect habitat include the EFH Omnibus Amendment (under development at this time). The EFH Omnibus Amendment will provide for a review and update of EFH designations, identify HAPCs, as well as provide an update on the status of current knowledge of gear impacts. It will also include new proposals for management measures for minimizing the adverse impact of fishing on EFH that will affect all species managed by the NEFMC.

Sea Turtles. The Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic Ocean and Gulf of Mexico ("Strategy") is a gear-based approach to addressing sea turtle bycatch. NMFS is considering increasing the size of the escape opening for Turtle Excluder Devices (TEDs) in the summer flounder fishery, expanding the use of TEDs to other trawl fisheries, and modifying the geographic scope of the TED requirements (74 FR 88 May 8, 2009).

Atlantic Sturgeon. Atlantic sturgeon has been proposed for listing under the Endangered Species Act (ESA). Final listing determinations for the Atlantic sturgeon distinct population segments (DPSs) are expected by October 2011. Serious injuries and mortalities of Atlantic sturgeon in commercial fishing gear are a likely concern for the long-term persistence and recovery of the DPSs, and a primary reason cited for the proposals to list the DPSs under the ESA. If the species is listed under the ESA, re-initiation of formal consultations on FMPs, and the effects of fisheries on the five DPSs would be fully examined. The formal consultation process may result in conservation recommendations and, if pertinent, reasonable and prudent measures or reasonable and prudent alternatives, which would be actions deemed appropriate or necessary to minimize the impact of take of Atlantic sturgeon.

Non-Fishing Effects: Past, Present and Reasonably Foreseeable Future Actions

Non-fishing activities that occur in the marine nearshore and offshore environments and their watersheds can cause the loss or degradation of habitat and/or affect the species that reside in those areas. Section 6.6.10.2 in the FW1 EA provides a summary of past, present, and reasonably foreseeable non-fishing activities and their expected effects on VECs in the affected environment. The following discussions of impacts are based on past assessments of activities and assume these activities will likely continue into the future as projects are proposed.

Construction/Development Activities and Projects: Construction and development activities include, but are not limited to, point source pollution, agricultural and urban runoff, land (roads, shoreline development, wetland loss) and water-based (beach nourishment, piers, jetties) coastal development, marine transportation (port maintenance, shipping, marinas), marine mining, dredging and disposal of dredged material and energy-related facilities. These activities can introduce pollutants (through point and non-point sources), cause changes in water quality (temperature, salinity, dissolved oxygen, suspended solids), modify the physical characteristics of a habitat or remove/replace the habitat altogether. Many of these impacts have occurred in the past and present and their effects would likely continue in the reasonably foreseeable future. It is likely that these projects would have negative impacts caused from disturbance, construction, and operational activities in the area immediately around the affected project area. However, given the wide distribution of the affected species, minor overall negative effects to offshore habitat, protected resources, allocated target stocks, and non-allocated target species and bycatch are anticipated since the affected areas are localized to the project sites, which involve a small percentage of the fish populations and their habitat. Thus, these activities for most biological VECs would likely have an overall low negative effect due to limited exposure to the population or habitat as a whole. Any impacts to inshore water quality from these permitted projects, including impacts to planktonic, juvenile, and adult life stages, are uncertain but likely minor due to the transient and limited exposure. It should be noted that wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and, as such, may indirectly constrain the sustainability of the allocated target stocks, non-allocated target species and bycatch, and protected resources.

Restoration Projects: Other regional projects that are restorative or beneficial in nature include estuarine wetland restoration; offshore artificial reef creation, which provides structure and habitat for many aquatic species; and eelgrass (*Zostera marina*) restoration, which provides habitat for many juvenile fishes. Due to past and present adverse impacts from human activities on these types of habitat, restorative projects likely have slightly positive effects at the local level.

Protected Resources Rules: The NMFS final Rule on Ship Strike Reduction Measures (73 FR 60173, October 10, 2008) is a non-fishing action in the US-controlled North Atlantic that is likely to affect endangered species and protected resources. The goal of this rule is to significantly reduce the threat of ship strikes on North Atlantic right whales and other whale species in the region. Ship strikes are considered the main threat to North Atlantic right whales; therefore, NMFS anticipates this regulation will result in population improvements to this critically endangered species.

Energy Projects: Cape Wind Associates (CWA) has received approval to construct a wind farm on Horseshoe Shoal, located between Cape Cod and Nantucket Island in Nantucket Sound, MA. The CWA project would have 130 wind turbines located as close as 4.1 miles off the shore of Cape Cod in an area of approximately 24 square miles with the turbines being placed at a minimum of 1/3 of a mile apart. The potential impacts associated with the CWA offshore wind energy project include the construction, operation, and removal of turbine platforms and transmission cables; thermal and vibration impacts; and changes to species assemblages within the area from the introduction of vertical structures. Other offshore projects that can affect VECs include the construction of offshore liquefied natural gas (LNG) facilities such as the project "Neptune." As it related to the impacts of the Proposed Action, the Neptune project is expected to have small, localized impacts where the pipelines and buoy anchors contact the bottom.

7.7.3 Summary of Cumulative Effects

The following analysis summarizes the cumulative effects of past, present, and reasonably foreseeable future actions in combination with the proposed action on the VECs identified in this section.

Physical Environment/Habitat/EFH

The management measures described above in the NE Multispecies, Scallop, Monkfish, and Skate FMPs, largely have positive effects on habitat due to reduced fishing efforts, consequently reducing gear interaction with habitat. The other FMP actions that reduce fishing effort generally result in fewer habitat and gear interactions, resulting in low positive effects on habitat. The ALWTRP resulted in low negative to negligible effects on habitat due to the possibility of groundline sweep on the bottom and "ghost gear." The proposed TED requirements would possibly have negative effects on habitat due to potential slight increases in towing time. However, this gear is still being tested. The effects of the proposed action on habitat are considered neutral. Overall, the cumulative effect of past, present, and reasonably foreseeable future fishing actions has resulted in low positive effects on habitat.

While the impact analysis in this action is focused on direct and indirect impacts to the physical environment and EFH, there are a number of non-fishing impacts that must be considered when assessing cumulative impacts. Many of these activities are concentrated near-shore and likely work either additively or synergistically to decrease habitat quality. Other non-fishing factors such as climate change and ocean acidification are also thought to play a role in the degradation of habitat. The effects of these actions, combined with impacts resulting from years of commercial fishing activity, have negatively affected habitat. However, impacts from the proposed action were found to be negligible. Therefore, when considering the cumulative effects of this action in combination with past, present, and reasonably foreseeable future actions, no significant impacts to the physical environment, habitat or EFH from the proposed action are expected.

Target Species

The management measures described above are expected to have overall neutral to low positive impacts on target species (skates). Effort limits in the NE Multispecies, Monkfish, and Scallop FMPs are likely to constrain skate catches, while the Skate FMP and the proposed action are likely to convert more skate discards into landings (relatively neutral fishing mortality) and divert some fishing activity to trips targeting skates.

Future measures that will likely restrict fishing effort (EFH Omnibus) will also have positive effects on target species. Future measures such as the TED requirements would likely result in positive effects to target species because they may help reduce bycatch. Overall, the cumulative effect of past, present, and reasonably foreseeable future fishing actions has resulted in positive effects on target species. The decline in allowable herring landings could open up new markets for alternative lobster baits, some of it filled by either whole skate landings or by the carcasses of skates landed for the wing market.

As found in the cumulative effects analysis for FW1, the long-term trend has been positive for cumulative impacts to target species. While thorny skate remains overfished, effort reductions in the NE Multispecies, Monkfish, and Scallop FMPs have allowed other skate stocks to rebuild, and the rebuilding process for others is underway. Due to differences in effort and species distributions, only marginal increases in barndoor, smooth, and thorny skates catch is expected to result from the proposed action, certainly not enough to cause a stock to become overfished and not enough to derail increases in stock biomass for rebuilding stocks. Further, indirect impacts from the effort reductions in other FMPs are also thought to contribute to skate mortality reductions. These factors, when considered in conjunction with the proposed action which would have negligible impacts to target species due to the implementation of the recommended ABC, would not have any significant cumulative impacts.

Non-Target Species and Bycatch

Actions that reduce fishing effort have had positive effects on non-target species and bycatch because in general, less fishing effort results in less impact to non-allocated target species and bycatch. Conversely, actions that increase fishing effort are considered to have low negative effects on non-target species and bycatch because more fishing generally results in more bycatch. Increases in directed skate fishing effort are likely to come from diverted fishing activity targeting other species, due in part to the requirement to have a multispecies, scallop, or monkfish DAS limited access permit. And when this occurs, it would decrease catch of non-target species that occur more frequently in other areas than those where vessels fish for skates.

Catch of primary non-target species in the skate fishery is monitored and controlled through other FMPs. TED requirements would likely have a positive effect on non-target species and bycatch and discards as they would likely exclude some of these species from capture in the cod end. Overall, the cumulative effect of past, present, and reasonably foreseeable future fishing actions has resulted in positive effects on non-target species and bycatch.

Skates are typically harvested incidentally to fishing for other more valuable species. The primary non-target and bycatch species analyzed for the purposes of this EA are monkfish, spiny dogfish, groundfish, and prohibited skates (barndoor, thorny, and smooth). Management efforts in the past have led to these species being managed under their own FMP. While some groundfish stocks remain in an overfished condition, or subject to overfishing, actions in the NE Multispecies FMP (e.g. Amendment 16) are attempting to control mortality on these stocks. Monkfish, spiny dogfish, barndoor skate, and smooth skate are no longer overfished or experiencing overfishing. Only thorny skate remains overfished, but there is little overlap between skate or groundfish fishing effort and thorny skate distribution (e.g. deep basins in the Gulf of Maine) (NEFMC 2009 and Section **Error! Reference source not found.** of this document). Mortality and effort controls such as NE Multispecies, Monkfish, and Scallop DAS collectively help reduce bycatch of non-target species. Impacts to all of these species from the proposed action were found to be negligible, and the proposed action would not result in any significant cumulative direct or indirect impacts.

Protected Resources

Past and present actions in fisheries that catch skates (groundfish, monkfish, scallop) have had negligible or positive effects on protected resources. Management plans for marine mammals have implemented effort restrictions and had positive affects by reducing injuries and deaths. Future positive impacts are likely.

The proposed action is not expected to increase the potential for gear interactions with protected species. This action would likely have negligible impacts on protected resources. Historically, the implementation of FMPs has resulted in reductions in fishing effort and as a result, past fishery management actions are thought to have had a slightly positive impact on strategies to protect protected species. Gear entanglement continues to be a source of injury or mortality, resulting in some adverse effects on most protected species to varying degrees. One of the goals of future management measures will be to decrease the number of marine mammal interactions with commercial fishing operations. The cumulative result of these actions to meet mortality objectives will be slightly positive for protected resources. The effects from non-fishing actions are also expected to be low negative as the potential for localized harm to VECs exists. The combination of these past actions along with future initiatives to reduce turtle interactions through the Sea Turtle Strategy when considered with the proposed action would not result in significant cumulative impacts.

Human Communities

The effects of past, present, and reasonably foreseeable future fishery management actions have been slightly positive on nearly all VECs with the exception of human communities. Mandated reductions in fishing effort have resulted in negative economic impacts to human communities. Management measures designed to benefit protected resources and restrict fishing effort have low negative effects on the human communities. However, the implementation of annual catch limits and expansion of opportunities through numerous sectors and achievement of the larger goal of fishing groundfish stocks at sustainable rates and rebuilding groundfish stocks to of scallops, spiny dogfish, and monkfish have also helped increase revenue and positive economic impacts. Overall, the cumulative effect of past, present, and reasonably foreseeable future fishing actions has resulted in negative effects on human communities.

The proposed action will have positive impacts on human communities due to large increases in allowable landings of skates. The positive impacts from the proposed action would provide some mitigation of the negative economic impacts of recent actions in the NE Multispecies fishery. Therefore, the proposed action when taken into consideration with past, present, and reasonably foreseeable future actions is not expected to have significant cumulative impacts. The table below summarizes the cumulative effects resulting from implementation of the proposed action and CEA baseline.

Table 38. Cumulative Effects resulting from implementation of the proposed action and CEA Baseline.

		Biological Impacts				
		Habitat Impacts	Allocated Target Species	Non-allocated Target Species and Bycatch	Endangered/ Protected Species	Human Community Impacts
Cumulative Effect Baseline	Effects of Past, Present, and Reasonably Foreseeable Future Non-Fishing Actions	Low negative / negligible	Low negative / negligible	Low negative / negligible	Low negative / negligible	Low negative / negligible
	Effects of Past, Present, and Reasonably Foreseeable Future Fishing Actions	Positive	Positive	Positive	Negligible / positive	Negative
Direct and Indirect Effects of		Negligible	Negligible	Negligible	Negligible	Positive

Proposed /Supplemental Action Cumulative Effects Summary of Effects from implementation of Proposed Action and Cumulative Effect Baseline	Negligible	Negligible	Negligible	Negligible	Low positive

8.0 Applicable Law – NOT YET UPDATED

8.1 MAGNUSON-STEVENS FISHERY MANAGEMENT AND CONSERVATION ACT (MSA)

Section 301 of the Magnuson-Stevens Act requires that FMPs contain conservation and management measures that are consistent with the ten National Standards. The most recent Skate FMP changes implemented by Amendment 3 and FW1 address how the proposed management actions comply with the National Standards (refer to Section 6.1 of Amendment 3 and Section 7.1 of the FW1 EA). Under Amendment 3, the NEFMC adopted conservation and management measures that would rebuild overfished skate stocks to achieve, on a continuing basis, the optimum yield for US fishing industry using the best scientific information available consistent with National Standards 1 and 2. The Skate FMP and implementing regulations manage all seven skate species throughout their entire US range, as required by National Standard 3. Amendment 3 (Section 6.1) and FW1 (Section 7.1) describes how the measures implemented under that action do not discriminate among residents of different states consistent with National Standard 4, do not have economic allocation as their sole purpose (National Standard 5), account for variations in these fisheries (National Standard 6), avoid unnecessary duplication (National Standard 7), take into account fishing communities (National Standard 8), addresses bycatch in fisheries (National Standard 9), and promote safety at sea (National Standard 10). By proposing to meet the National Standards requirements of the Magnuson-Stevens Act through future FMP amendments and framework actions, the NEFMC will ensure that overfishing is prevented, overfished stocks are rebuilt, and the maximum benefits possible accrue to the ports and communities that depend on these fisheries and the Nation as a whole.

The proposed action would comply with all elements of the Magnuson-Stevens Act, including the National Standards, and the Skate FMP. This action is being taken in response to new data that indicate an increase in skate biomass, new research on little and winter skate discard mortality, and new information about how the wing fishery responds to various possession limits. The FW1 EA, completed prior to the development of the updated skate ABC, did not contain an analysis of the revised ABC and associated catch limits. Therefore, this EA analyzes the impacts of the revised ABC, ACL, and TALs for skates and adjustments to wing and bait fishery possession limits, in compliance with applicable laws requirement for an analysis of proposed measures.

8.2 National Environmental Policy Act (NEPA)

8.2.1 Revised FONSI

This supplemental EA updates the Finding of No Significant Impact (FONSI) consistent with the conclusions derived in the Amendment 3 SEIS, the FW1 EA, and this document.

National Oceanic and Atmospheric Administration (NOAA) Administrative Order 216-6 (NAO 216-6) (May 20, 1999) contains criteria for determining the significance of the impacts of a Proposed Action. In addition, the Council on Environmental Quality (CEQ) regulations at 40 C.F.R. 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant in making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

1. *Can the proposed action reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?*

Response:

2. *Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?*

Response:

3. *Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson- Stevens Act and identified in FMPs?*

Response:

4. *Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?*

Response:

5. *Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?*

Response:

6. *Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?*

Response:

7. *Are significant social or economic impacts interrelated with natural or physical environmental effects?*

Response:

8. *Are the effects on the quality of the human environment likely to be highly controversial?*

Response:

9. *Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, parkland, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?*

Response:

10. *Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?*

Response:

11. *Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?*

Response:

12. *Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?*

Response:

13. *Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?*

Response:

14. *Is the proposed action likely to establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration?*

Response:

15. *Can the proposed action reasonably be expected to threaten a violation of federal, state, or local law or requirements imposed for the protection of the environment?*

Response:

16. *Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species*?

Response:

DETERMINATION
In view of the information presented in the FW1 EA and this document, the analysis contained in the supporting EA prepared for the approval of revised catch limits for skates, it is hereby determined that the approval of the revised Skate ABC and catch limits will not significantly impact the quality of the human environment as described above and in the supporting EA. In addition, all beneficial and adverse impacts of the Proposed Action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environmental Impact Statement (EIS) for this action is not necessary.

____________________________ ______________________

Patricia A. Kurkul Date
Regional Administrator Northeast Region, NMFS

8.2.2 List of preparers; point of contact

Questions concerning this document may be addressed to:

Mr. Thomas Nies, Executive Director
New England Fishery Management Council
50 Water Street, Mill 2
Newburyport, MA 01950
(978) 465-0492

The information contained in this document was prepared throughout the cooperative efforts of the Skate Plan Development Team members, and other members of the staffs of NMFS and the New England Fishery Management Council. Contributors are:

- Walter Anoushian, National Marine Fsiheries Service (NMFS)
- Michelle Bachmann, New England Fishery Management Council (NEFMC)
- Tobey Curtis, NMFS Northeast Regional Office (NERO)
- Dr. Fiona Hogan, NEFMC
- A. Justin Kirkpatrick, Northeast Fisheries Science Center (NEFSC)
- Scott Olszewski, RI Department of Environmental Management (RI DEM)
- Katherine Richardson, NERO
- Kathy Sosebee, NEFSC

Primary point of contact to obtain copies of this Environmental Assessment:

John Bullard, Northeast Regional Administrator
NOAA Fisheries Service
Northeast Regional Office
55 Great Republic Drive
Gloucester, MA 01930
Phone: (978) 281-9300

8.2.3 Agencies consulted

This proposed action was developed by the New England Fishery Management Council in coordination with the National Marine Fisheries Service and the Mid-Atlantic Fishery Management Council.

8.2.4 Opportunity for public comment

The Preferred Alternatives were developed during the period August 2013 through January 2014 and were discussed at the following meetings. Opportunities for public comment were provided at each of these meetings.

Date	Meeting Type	Location
2012		
8/15/2013	Skate PDT	Hyatt Place, Braintree, MA
9/16/2013	Science and Statistical Committee	Omni Hotel, Providence, RI
9/20/2013	Joint Advisory Panel and Skate Oversight Committee	Holiday Inn, Peabody, MA
9/24-9/26/2013	Council Meeting	Cape Codder Resort, Hyannis, MA
10/30/2013	Skate PDT Conference Call	
11/15/2013	Science and Statistical Committee	Omni Hotel, Providence, RI

11/20/13	Council Meeting	Newport Marriot Hotel, Newport, RI
12/20/2013	Skate PDT Conference Call	
2014		
1/15/2014	Joint Advisory Panel and Skate Oversight Committee	Sheraton Harborside, Portsmouth, NH
1/28-1/30/2014	Council Meeting	Sheraton Harborside, Portsmouth, NH

8.3 Endangered Species Act (ESA)

Section 7 of the ESA 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. In a Biological Opinion dated October 29, 2010, NMFS determined that fishing activities conducted under the Skate FMP and its implementing regulations are not likely to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS or result in the destruction or adverse modification of critical habitat. An informal consultation under the ESA for FW1 measures was conducted. This action is consistent with, and does not affect the analysis and conclusions of the FW1 EA regarding compliance with the ESA. For further information, refer to Section 8.2 of the FW1 EA.

8.4 Marine Mammal Protection Act (MMPA)

NMFS has reviewed the impacts of FW1 and the Skate FMP on marine mammals and concluded that the specifications are consistent with the provisions of the MMPA and would not alter existing measures to protect the species likely to inhabit the management unit of the Skate FMP. For further information on the potential impacts of the proposed management action, see Section 7.4 of this document.

8.5 Coastal Zone Management Act (CZMA)

Section 307(c)(1) of the CZMA requires that all Federal activities which affect any coastal use or resource be consistent with approved state coastal zone management programs (CZMP) to the maximum extent practicable. NMFS has reviewed the relevant enforceable policies of each coastal state in the NE region for this action and has determined that this action is incremental and repetitive, without any cumulative effects, and is consistent to the maximum extent practicable with the enforceable policies of the CZMP of the following states: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, and North Carolina. NMFS finds this action to be consistent with the enforceable policies to manage, preserve, and protect the coastal natural resources, including fish and wildlife, and to provide recreational opportunities through public access to waters off the coastal areas. Pursuant to the general consistency determination provision under Section 307 of the CZMA and codified at 15 CFR 930.36(c), NMFS sent a general consistency determination applying to Amendment 3 to the Skate FMP, and all routine Federal actions carried out in accordance with the FMP, to the following states: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Pennsylvania, Maryland, Virginia, and North Carolina on December 18, 2009. New Hampshire, Connecticut, Pennsylvania, New Jersey, Delaware, Virginia, and North Carolina have concurred with this determination. For the remaining states that have not responded, consistency has been inferred pursuant to the consistency letter.

8.6 Administrative Procedure Act

Section 553 of the APA establishes procedural requirements applicable to 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, no abridgement of the rulemaking process for this action is being requested.

8.7 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 the proposed action. 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.

8.8 Regulatory Flexibility Analysis (IRFA) – Determination of Significance

8.8.1 Introduction

The RFA requires agencies to assess the impacts of their proposed regulations on small entities. The Regulatory Flexibility Act Analysis (RFAA) determines whether the proposed action would have a significant economic impact on a substantial number of small entities. The Small Business Administration (SBA) size standards define whether a business entity is small and, thus, eligible for Government programs and preferences reserved for "small business" concerns. Size standards have been established for all for-profit economic activities or industries in the North American Industry Classification System (NAICS). The SBA defines a small business in the finfish fishing sector as a firm or affiliate group with gross revenue of $19.0 million; the shellfish fishing sector as a firm or affiliate group with gross revenue of $5.0 million or more; and the other marine fishing sector (including recreational party/charter firms) as a firm or affiliate group with gross revenue of $7.0 million or more.

This section provides an assessment and discussion of the potential economic impacts of the proposed action, as required of the RFA. The objective of the RFA is to require consideration of the capacity of those affected by regulations to bear the direct and indirect costs of regulation. The Final Regulatory Flexibility Analysis (FRFA) must identify the number and types of businesses that would be regulated, indicate how many of these entities are small businesses, explain the expected economic impact of the regulation on small businesses, and describe any feasible alternatives that would minimize the economic impacts.

8.8.2 Description of the Reasons Why Action by Agency is Being Considered

The need and purpose of the actions are set forth in Section 3.2 of this document and are incorporated herein by reference.

8.8.3 Statement of the Objectives and Legal Basis for the Proposed Action

The goals and objectives of Framework Adjustment 2 are the same as those detailed in Amendment 3 and original Northeast Skate Complex FMP. In general, FW 2 is intended to modify catch limits and management measures to ensure that overfishing does not occur, while at the same time achieving optimal yield (OY).

8.8.4 Description and Estimate of the Number of Small Entities to which the Proposed Rule will apply

The proposed decrease in the Skate ACL and TALs would impact vessels that hold Federal open access commercial skate permits that participate in the skate fishery or affiliated groups that hold multiple open access commercial skate permits that participate in the skate fishery. Within the skate fishery, the majority of affiliate groups consist of a single permit-holder. However, 68 affiliate groups hold two or more permits, and one affiliate group holds greater than 4 permits.

According to the FW1 final rule and Final Regulatory Flexibility Analysis (76 FR 28328), as of December 31, 2012, the maximum number of small fishing entities (as defined by the Small Business Administration (SBA)) that may be affected by this action is 2,043 entities (number of skate permit holders). However, during fishing year 2012, only 616 unique permit holders over 526 affiliate groups landed any amount of skate. At the permit level, every skate landing permit is defined as a small business according to SBA standards. At the affiliate group level, 7 are defined as large businesses based on 2010-2012 landings. As can be seen from Table 39 below, average revenue from skate or all species taken together is much lower than $19 million.

Table 39. Skate fishery summary data for 2010 fishing year (Source: NMFS VTR/Dealer data)

Number of vessels	616
Total annual revenue from Skate	$ 6,645,435
Average revenue from Skate	$ 10,788
Total revenue from all trips of the vessels landing any Skate	$229 million
Average revenue from all trips of the vessels landing any Skate	$371,816

8.8.5 Reporting, Recordkeeping and Other Compliance Requirements

This action does not introduce any introduce any new reporting, recordkeeping, or other compliance requirements. This action does alter currently available reporting codes but does not create any additional reporting, record-keeping or other compliance requirements. This proposed action does not duplicate, overlap, or conflict with other Federal rules.

8.8.6 Description of Steps the Agency Has Taken to Minimize the Significant Economic Impact on Small Entities Consistent with the Stated Objectives of Applicable Statutes

During the development of FW2, NMFS and the Council considered ways to reduce the regulatory burden on and provide flexibility to the regulated community. The measures implemented by the FW2 final rule minimize the long-term economic impacts on small entities to the extent practicable. The proposed action decreases the total allowable landings (TAL), however, the wing and bait possession limits are maintained in an effort to allow the fisheries to achieve the full available TAL. This is expected to allow the fishery to land the TAL with a moderate possibility of triggering the incidental trip limit. Based on FY2011 data, a small number of vessels would see a decline in total landings revenue. Overall, long term impacts of FW2 rule, as well as the related actions of the Skate FMP, are minimized by ensuring that management measures and catch levels are sustainable and contribute to rebuilding stocks and, therefore, maximizing yield, as well as providing additional flexibility for fishing operations in the short term.

8.8.7 Economic Impacts on Small Entities Resulting from Proposed Action

The economic impact resulting from this action on these small entities is associated with the possession limit; the preferred alternative may be more likely to trigger the incidental trip limit under the lower ACL. Based on recent landing information the fishery is more likely to land close to the full amount of skates allowable under the quotas. The Preferred Alternative is almost certain to result in greater revenue from skate landings when compared to the other wing possession limit options that would lower possession limit or increase it to a level that was highly likely to trigger an AM. Based on 2011 data, the preferred alternatives are expected to result in a reduction of more than 10 percent of total landings revenue for 10 vessels, more than 15 percent for 5 vessels and over 30 percent for 1 vessel. Based on recent landing information, the skate fishery should be able to land close to the full amount of skates allowable under the quotas.

8.9 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.

8.10 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. PRA for data collections relating to the Skate FMP have been considered and evaluated under the original Skate FMP implemented in 2003, and approved by the Office of Management and Budget (OMB). This action relies upon the existing collections, including those approved by the OMB under the original FMP, and does not propose to modify any existing collections or to add any new collections. Therefore, no review under the PRA is necessary for this action.

8.11 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 8.8 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.

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:

1* 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;

2* Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

3* Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

4* Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

The analysis included in this document shows that this action is not a "significant regulatory action" because it will not affect in a material way the economy or a sector of the economy. The preferred Update to Annual Catch Limits Alternative would adopt the TAL consistent with optimal yield in the long-run, maximizing economic benefits of the fishery. The preferred Skate Wing Possession Limit Alternative, though it would result in more frequent triggering of accountability measures (AMs), would reach the TAL associated with the optimum yield, maximizing long-run benefits. The preferred Bait Possession Limit Alternative (Option 1: No Action) would be most likely to harvest TAL without exceeding it, and would thus represent the long-run economic benefit-maximizing option. Skate VTR and Dealer Reporting Code Alternatives, including the preferred alternative, would have negligible economic impacts.

8.12 Information Quality Act (IQA)

Pursuant to NOAA 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 the information (including statistical information) disseminated by or for federal agencies. The following section addresses these requirements.

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.

This document 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 development of this document and the decisions made by NMFS to propose this action are the result of a multi-stage public process.

The *Federal Register* notice that implements the proposed revision to the skate catch limits would be made available in printed publication and on the NMFS NE Regional Office website. Instructions for obtaining a copy of this supplemental EA are included in the *Federal Register* notice.

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 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 United States 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.

Objectivity

For the purposes of the Pre-Dissemination Review, this supplemental EA 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 EFH Guidelines; the National Standard Guidelines; and NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the NEPA.

This information product uses information of known quality from sources acceptable to the relevant scientific and technical communities. Stock status (including estimates of biomass) and the recommended ABC reported in this product are based on the results of the NEFSC bottom trawl survey and catch statistics reported to NMFS, and were subject to peer-review through the Council's Skate PDT and SSC. These methods were developed and peer-reviewed during the 2008 Northeast Data Poor Stocks Working Group stock assessment of the skate complex (NEFSC 2009). These reports are developed using an approved, scientifically valid sampling process. Original analyses in this supplemental EA build upon the analyses contained in Amendment 3 and the FW1 EA, and were prepared using data from accepted sources, and the analyses have been reviewed by NOAA.

Despite current data limitations, the measures proposed for this action were selected based upon the best scientific information available (NEFMC 2011). The principal author of this document is a professional fishery scientist employed by the Council, the chair of the Council's Skate Plan Development Team, and is familiar with the available data and information relevant to the state of the regulated fisheries under the FMP, fishing techniques in the NE Region, biology of skates, and the socioeconomic impacts of the fisheries on impacted communities.

The policy choices are clearly articulated in Section **Error! Reference source not found.** of this document, as the management alternatives considered in this action. The supporting science and analyses, upon which the policy choices are based, are summarized and described, or incorporated by reference, in Sections 6.0 and 7.0 of this supplemental EA. 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 supplemental EA involves the Northeast Fisheries Science Center, the Northeast Regional Office, and NMFS 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. 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 the action proposed in this supplemental EA and clearance of any rules prepared to implement resulting regulations is conducted by staff at NMFS Headquarters, the Department of Commerce, and the United States Office of Management and Budget.

9.0 Glossary

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.

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.

10.0 LITERTURE CITED

Abernathy, A., ed. 1989. Description of the Mid-Atlantic environment. U.S. Dep. Interior, Minerals Manage. Ser., Herndon, VA. 167 p. + appendices.

Aguilar, A. 2002. Fin whale, Balaenoptera physalus. Pages 435-438 in W.F. Perrin, B. Würsig, and J.G.M. Thewissen (eds.). Encyclopedia of Marine Mammals. San Diego: Academic Press.

Almeida, F., L. Arlen, P. Auster, J. Cross, J. Lindholm, J. Link, D. Packer, A, Paulson, R. Reid, and P. Valentine. 2000. The effects of marine protected areas on fish and benthic fauna: the Georges Bank closed area II example. Poster presented at Am. Fish. Soc. 130th Ann. Meet. St. Louis, MO, August 20-24, 2000.

Anonymous. 2005. COSEWIC Assessment Summary.

ASMFC TC (Atlantic States Marine Fisheries Commission Technical Committee). 2007. Special Report to the Atlantic Sturgeon Management Board: Estimation of Atlantic sturgeon bycatch in coastal Atlantic commercial fisheries of New England and the Mid-Atlantic. August 2007. 95 pp.

ASSRT (Atlantic Sturgeon Status Review Team). 2007. Status review of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). National Marine Fisheries Service. February 23, 2007. 188 pp.

Backus, R.H. 1987. Georges Bank. Massachusetts Inst. Tech. Press, Cambridge, MA. 593 p.

Beardsley, R.C., B. Butman, W.R. Geyer, and P. Smith. 1996. Physical oceanography of the Gulf of Maine: an update. In G.T Wallace and E.F. Braasch, eds. Proceedings of the Gulf of Maine ecosystem dynamics scientific symposium and workshop. p. 39-52. Reg. Assn. for Res. on the Gulf of Maine (RARGOM), Rep. 97-1.

Benoit, HP. 2006. Estimated discards of winter skate (*Leucoraja ocellata*) in the southern Gulf of St. Lawrence, 1971-2004. Canadian Science Advisory Secretariat Research Document 2006/002. 43 p.

Benoit, HP. 2010. Estimated bycatch mortality of winter skate (*Leucoraja ocellata*) in the southern Gulf of St. Lawrence scallop fishery (2006 to 2008). Canadian Science Advisory Secretariat Science Response 2010/009. 5 p.

Best, P.B., J. L. Bannister, R.L. Brownell, Jr., and G.P. Donovan (eds.). 2001. Right whales: worldwide status. J. Cetacean Res. Manage. (Special Issue) 2. 309pp.

Beverton, R.J.H. and S.J. Holt. 1956. A review of methods for estimating mortality rates in fish populations, with special reference to sources of bias in catch sampling. Rapp. P.v. Reun. Cons. Int. Explor. Mer 140: 67-83.

Bigelow and Schroeder.1953. Fishes of the Gulf of Maine.

Boesch, D.F. 1979. Benthic ecological studies: macrobenthos. Chapter 6 in Middle Atlantic outer continental shelf environmental studies. Conducted by Virginia Inst. Mar. Stud. under contract AA550-CT6062 with U.S. Dep. Interior, Bur. Land Manage. 301 p.

Bowen, B.W., A.L. Bass, S.-M. Chow, M. Bostrom, K.A. Bjorndal, A.B. Bolten, T. Okuyama, B.M. Bolker., S. Epperly, E. Lacasella, D. Shaver, M. Dodd, S.R. Hopkins-Murphy, J.A. Musick, M. Swingle, K. Rankin-Baransky, W. Teas, W.N. Witzell, and P.H. Dutton. 2004. Natal homing in juvenile loggerhead turtles (*Caretta caretta*). Molecular Ecology 13:3797-3808.

Braun-McNeill, J., and S.P. Epperly. 2004. Spatial and temporal distribution of sea turtles in the western North Atlantic and the U.S. Gulf of Mexico from Marine Recreational Fishery Statistics Survey (MRFSS). Mar. Fish. Rev. 64(4):50-56.

Brooks, D.A. 1996. Physical oceanography of the shelf and slope seas from Cape Hatteras to Georges Bank: A brief overview. In K. Sherman, N.A. Jaworski, and T.J. Smayda, eds. The northeast shelf ecosystem – assessment, sustainability, and management. p. 47-75. Blackwell Science, Cambridge, MA. 564 p.

Brown, M.W., O.C. Nichols, M.K. Marx, and J.N. Ciano. 2002. Surveillance of North Atlantic right whales in Cape Cod Bay and adjacent waters—2002. Final Report to the Division of Marine Fisheries, Commonwealth of Massachusetts. 29pp.

Butman, V., M. Noble and J. Moody. 1982. Observations of near-bottom currents at the shelf break near Wilmington Canyon in the Mid-Atlantic outer continental shelf area: results of 1978-1979 field seasons. U.S. Geol. Surv. Final Rep. to U.S. Dep. Interior, Bur. Land Manage: 3-1-3-58.

Casey, Jill M., & Ransom A. Myers. 1998. Near extinction of a large, widely distributed fish. Science. **281**(5377): 690-- 692.

CETAP, A characterization of marine mammals and turtles in the mid- and north Atlantic areas of the USA outer continental shelf. Cetacean and Turtle Assessment Program, University of Rhode Island. Final Report #AA551-CT8-48 to the Bureau of Land Management, Washington, DC, 538 pp., 1982.

Clapham, P.J., S.B. Young, and R.L. Brownell. 1999. Baleen whales: Conservation issues and the status of the most endangered populations. Mammal Rev. 29(1):35-60

Colvocoresses, J.A. and J.A. Musick. 1984. Species associations and community composition of Middle Atlantic Bight continental shelf demersal fishes. Fish. Bull. (U.S.) 82: 295-313.

Conant, T.A., P.H. Dutton, T. Eguchi, S.P. Epperly, C.C. Fahy, M.H. Godfrey, S.L. MacPherson, E.E. Possardt, B.A. Schroeder, J.A. Seminoff, M.L. Snover, C.M. Upite, and B.E. Witherington. 2009. Loggerhead sea turtle (*Caretta caretta*) 2009 status review under the U.S. Endangered Species Act. Report of the Loggerhead Biological Review Team to the National Marine Fisheries Service, August 2009. 222 pp.

Cook, S.K. 1988. Physical oceanography of the Middle Atlantic Bight. In A.L. Pacheco, ed. Characterization of the middle Atlantic water management unit of the northeast regional action plan. p. 1-50. NOAA Tech. Mem. NMFS-F/NEC-56. 322 p.

Cooper, R.A., P.C. Valentine, J.R. Uzmann, and R.A. Slater. 1987. Submarine canyons. In R.H. Backus and D.W. Bourne, eds. Georges Bank. p. 52-63. MIT Press, Cambridge, MA.

Dadswell, M. 2006. A review of the status of Atlantic sturgeon in Canada, with comparisons to populations in the United States and Europe. Fisheries 31: 218-229.

DFO, 1999. Updates on Selected Scotian Shelf Groundfish Stocks in 1999. DFO Sci. Stock Status Report A3-35 (1999).

Dorsey, E.M. 1998. Geological overview of the sea floor of New England. In E.M. Dorsey and J. Pederson, eds. Effects of fishing gear on the sea floor of New England. p. 8-14. MIT Sea Grant Pub. 98-4.

Dovel, W. L. and T. J. Berggren. 1983. Atlantic sturgeon of the Hudson River estuary, New York. New York Fish and Game Journal 30: 140-172.

Dulvy, Nicholas, Metcalfe, J.D., Glanville, Jamie, Pawson, M.G., and John D. Reynolds. 2000. Fishery Stability, Local Extinctions, and Shifts in Community Structure in Skates. Conservation Biology. 14 (1): 283-293

Dunton, K.J., A. Jordaan, K.A. McKown, D.O. Conover, and M.G. Frisk. 2010. Abundance and distribution of Atlantic sturgeon (*Acipenser oxyrinchus*) within the Northwest Atlantic Ocean determined from five fishery-independent surveys. Fish. Bull. 108:450-465.

Enever, R, TL Catchpole, JR Ellis, and A Grant (2009). The survival of skates (Rajidae) caught by demersal trawlers fishing in UK waters. Fisheries Research 97: 72-76.

Frisk, Michael G., & Thomas J. Miller. 2006. Age, growth and latitudinal patterns of two rajidae species in the northwestern Atlantic: Little skate (*Leucoraja erinacea*) and winter skate (*Leucoraja ocellata*). Canadian Journal of Fisheries and Aquatic Sciences. **63**: 1078 – 1091.

Frisk, Michael G., Thomas J. Miller, and Michael J. Fogarty. 2001. Estimation and analysis of biological parameters in elasmobranch fishes: A comparative life history study. Canadian Journal of Fisheries and Aquatic Sciences. **58**: 969-- 981.

Gabriel, W. 1992. Persistence of demersal fish assemblages between Cape Hatteras and Nova Scotia, northwest Atlantic. J. Northwest Atl. Fish. Sci. 14: 29-46.

Gedamke, T. and J.M. Hoenig. 2006. Estimating mortality from mean length data in non-equilibrium situations, with application to the assessment of goosefish. Trans. Amer. Fish. Soc. 135: 476-487.

Gedamke, Todd, John M. Hoenig, John A. Musick, William D. DuPaul and Samuel H. Gruber. 2007. Using demographic models to determine intrinsic rate of increase and sustainable fishing for elasmobranchs: Pitfalls, advances, and applications. North American Journal of Fisheries Management. **27**: 605 - 618.

Gedamke, Todd, William D. DuPaul, & John A. Musick. 2005. Observations on the life history of the barndoor skate, *Dipturus* laevis, on Georges bank (western north Atlantic). Journal of Northwest Atlantic Fishery Science. **35**: 67 - 78.

Gelsleichter, JJ. 1998. Vertebral Cartilage of the Clearnose Skate, *Raja eglanteria*: Development, Structure, Ageing, and Hormonal Regulation of Growth. Dissertation. College of William and Mary.

Hecker, B. 1990. Variation in megafaunal assemblages on the continental margin south of New England. Deep-Sea Res. 37: 37-57.

Hecker, B. 2001. Polygons BH1–4 (Veatch, Hydrographer, Oceanographer and Lydonia Canyons). In S. Azimi, ed. Priority ocean areas for protection in the Mid-Atlantic. p. 32-36. Natural Resources Defense Council, Washington, DC. 59 p.

Hecker, B. and G. Blechschmidt. 1979. Epifauna of the northeastern U.S. continental margin. In B. Hecker, G. Blechschmidt, and P. Gibson, eds. Epifaunal zonation and community structure in three mid- and North Atlantic canyons. Appendix A. Final Rep. Canyon Assess. Stud. in the Mid- and North Atlantic Areas of the U.S. Outer Continental Shelf. U.S. Dep. Interior, Bur. Land Manage., Washington, DC, January 11, 1980.

Hecker, B., D.T. Logan, F.E. Gandarillas, and P.R. Gibson. 1983. Megafaunal assemblages in canyon and slope habitats. Vol. III: Chapter I. Canyon and slope processes study. Final Rep. prepared for U.S. Dep. Interior, Minerals Manage. Ser., Washington, D.C.

Hirth, H.F. 1997. Synopsis of the biological data of the green turtle, *Chelonia mydas* (Linnaeus 1758). USFWS Biological Report 97(1). 120pp.

Hoenig, J.M. 1987. Estimation of growth and mortality parameters for use in length-structured stock production models, p. 121-128. In D. Pauly and G.R. Morgan (eds.) Length-based methods in fisheries research. ICLARM Conference Proceedings 13, 468 p. International Center for Living

Aquatic Resources Management, Manila, Philippines, and Kuwait Institute for Scientific Research, Safat, Kuwait.

Holland, B.F., Jr., and G.F. Yelverton. 1973. Distribution and biological studies of anadromous fishes offshore North Carolina. Division of Commercial and Sports Fisheries, North Carolina Dept. of Natural and Economic Resources, Special Scientific Report No. 24. 130pp.

Horwood, J. 2002. Sei whale, *Balaenoptera borealis*. Pages 1069-1071 in W.F. Perrin, B. Würsig, and J.G.M. Thewissen, eds. Encyclopedia of Marine Mammals. San Diego: Academic Press.

ICES International Council for the Exploration of the Sea. 2000. Report of the ICES Advisory Committee on the Marine Environment (ACME) 2000. Cooperative Research Report No. 241, 27 pp.

International Whaling Commission (IWC). 2001. Report of the workshop on the comprehensive assessment of right whales: A worldwide comparison. Reports of the International Whaling Commission. Special Issue 2.

James, M.C., R.A. Myers, and C.A. Ottenmeyer. 2005. Behavior of leatherback sea turtles, *Dermochelys coriacea*, during the migratory cycle. Proc. R. Soc. B, 272: 1547-1555.

Johnson GF (1979) The biology of the little skate, Raja erinacea, in Block Island Sound, Rhode Island. MA thesis, University of Rhode Island, Kingston, R.I., USA.

Johnson, A., G. Salvador, J. Kenney, J. Robbins, S. Kraus, S. Landry, and P. Clapham. 2005. Fishing gear involved in entanglements of right and humpback whales. Mar. Mamm. Sci. 21(4): 635-645.

Kahnle, AW., K.A. Hattala, and K.A. McKown. 2007. Status of Atlantic sturgeon of the Hudson River Estuary, New York, USA. American Fisheries Society Symposium 56:347-363.

Katona, S.K., V. Rough, and D.T. Richardson. 1993. A field guide to whales, porpoises, and seals from Cape Cod to Newfoundland. Smithsonian Institution Press, Washington, D.C. 316pp.

Keinath, J.A., J.A. Musick, and R.A. Byles. 1987. Aspects of the biology of Virginias sea turtles: 1979-1986. Virginia J. Sci. 38(4): 329-336.

Kelley, J.T. 1998. Mapping the surficial geology of the western Gulf of Maine. In E.M. Dorsey and J. Pederson, eds. Effects of fishing gear on the sea floor of New England. p. 15-19. MIT Sea Grant Pub. 98-4.

Kenney, R.D. 2002. North Atlantic, North Pacific, and Southern hemisphere right whales. In: W.F.Perrin, B. Wursig, and J.G.M. Thewissen (eds.), Encyclopedia of Marine Mammals. Academic Press, CA. pp. 806-813.

Kneebone, Jeff, Darren E. Ferguson, James A. Sulikowski, & Paul C. W. Tsang. 2007. Endocrinological investigation into the reproductive cycles of two sympatric skate species, M*alacoraja senta* and A*mblyraja radiata*, in the western Gulf of Maine. Environmental Biology of Fishes. **80**: 257 - 265.

Kulka, D. W. and C. M. Miri 2003. The status of Thorny skate (*Amblyraja radiata* Donovan, 1808) in NAFO Divisions 3L, 3N, 3O, and Subdivision 3Ps. NAFO SCR Doc. 03/57, Ser. No. N4875. 100p.

Kulka, D.W., and C.M. Miri. 2007. Update on the status of thorny skate (*Amblyraja radiata*, Donovan 1808) in NAFO Divisions 3L, 3N, 3O, and Subdivision 3Ps. NAFO SCR Doc. 07/33.

Kulka, D.W., D. Swain, M.R. Simpson, C.M. Miri, J. Simon, J. Gauthier, R. McPhie, J. Sulikowski, and L. Hamilton. 2006b. Distribution, abundance, and life history of *Malacoraja senta* (smooth skate) in Canadian Atlantic waters with reference to its global distribution. DFO Research Document. 2006/093.

Kulka, D.W., M.R. Simpson, and C.M. Miri. 2006a. An assessment of thorny skate (*Amblyraja radiata* Donovan, 1808) on the Grand Banks of Newfoundland. NAFO SCR Doc. 06/44.

Kynard, B. and M. Horgan. 2002. Ontogenetic behavior and migration of Atlantic sturgeon, *Acipenser oxyrinchus oxyrinchus*, and shortnose sturgeon, *A. brevirostrum*, with notes on social behavior. Environmental Behavior of Fishes 63: 137-150.

Laney, R.W., J.E. Hightower, B.R. Versak, M.F. Mangold, W.W. Cole Jr., and S.E. Winslow. 2007. Distribution, habitat use, and size of Atlantic sturgeon captured during cooperative winter tagging cruises, 1988-2006. In Anadromous sturgeons: habitats, threats, and management (J. Munro, D. Hatin, J.E. Hightower, K. McKown, K.J. Sulak, A.W. Kahnle, and F. Caron (eds.)), p. 167-182. Am. Fish. Soc. Symp. 56, Bethesda, MD.

Laptikhovsky, VV (2004). Survival rates for rays discarded by the bottom trawl squid fishery off the Falkland Islands. Fishery Bulletin 102: 757-759.

Lindeboom, H.J., and S.J. de Groot. 1998. Impact II. The effects of different types of fisheries on the North Sea and Irish Sea benthic ecosystems. NIOZ Rapport 1998-1. 404 p.

Link, Jason A., and Katherine Sosebee. 2008. Estimates and Implications of Skate Consumption in the Northeast U.S. Continental Shelf Ecosystem. North American Journal of Fisheries Management 28:649–662, 2008.

Mahon, R., S.K. Brown, K.C.T. Zwanenburg, D.B. Atkinson, K.R. Buja, L. Claflin, G.D. Howell, M.E. Monaco, R.N. O'Boyle, and M. Sinclair. 1998. Assemblages and biogeography of demersal fishes of the east coast of North America. Can. J. Fish. Aquat. Sci. 55: 1704-1738.

McPhie, R. 2006. Proceedings of the review of DFO science information for smooth skate (*Malacoraja senta*) relevant to status assessment by COSEWIC. DFO Proceedings Series. 2006/030.

Morgan, L.E. and R. Chuenpagdee. 2003. Shifting gears: assessing the collateral impacts of fishing methods in U.S. waters. Pew Science Series on Conservation and the Environment, 42 p.

Morreale, S.J. and E.A. Standora. 1998. Early life stage ecology of sea turtles in northeastern U.S. waters. U.S. Dep. Commer. NOAA Tech. Mem. NMFS-SEFSC-413, 49 pp.

Morreale, S.J. and E.A. Standora. 2005. Western North Atlantic waters: Crucial developmental habitat for Kemp's ridley and loggerhead sea turtles. Chel. Conserv. Biol. 4(4):872-882.

Morreale, S.J., C.F. Smith, K. Durham, R.A. DiGiovanni, Jr., and A.A. Aguirre. 2005. Assessing health, status, and trends in northeastern sea turtle populations. Interim report - Sept. 2002 - Nov. 2004. Gloucester, Massachusetts: National Marine Fisheries Service.

Mountain, D.G., R.W. Langton, and L. Watling. 1994. Oceanic processes and benthic substrates: influences on demersal fish habitats and benthic communities. In R.W. Langton, J.B. Pearce, and J.A. Gibson, eds. Selected living resources, habitat conditions, and human perturbations of the Gulf of Maine: environmental and ecological considerations for fishery management. p. 20-25. NOAA Tech. Mem. NMFS-NE-106. 70 p.

Murray, K.T. 2006. Estimated average annual bycatch of loggerhead sea turtles (*Caretta caretta*) in U.S. Mid-Atlantic bottom otter trawl gear, 1996-2004. U.S. Dep. Commer., Northeast Fish. Sci. Cent. Ref. Doc. 06-19, 26pp.

Musick, J.A. and C.J. Limpus. 1997. Habitat utilization and migration in juvenile sea turtles. Pp. 137-164 In: Lutz, P.L., and J.A. Musick, eds., The Biology of Sea Turtles. CRC Press, New York. 432 pp.

Natanson, L.J. 1993. Effect of temperature on band deposition in the little skate, raja erinacea. Copeia. **1**: 199 - 206.

Natanson, Lisa J., James A. Sulikowski, Jeff R. Kneebone, & Paul C. Tsang. 2007. Age and growth estimates for the smooth skate, M*alacoraja senta*, in the Gulf of Maine. Environmental Biology of Fishes. **80**: 293 - 308.

National Marine Fisheries Service (NMFS) Southeast Fisheries Science Center (SEFSC). 2001. Stock assessments of loggerhead and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the Western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-455. 343 pp.

National Research Council (NRC). 1990. Decline of seat turtles: causes and prevention. National Academy Press, Washington D.C. 259 pages.

NEFMC. 2003. Final Amendment 13 to the Northeast Multispecies Fishery Management Plan, including a Final Supplemental Environmental Impact Statement and an Initial Regulatory Flexibility Analysis. Vols I and II, submitted Dec 1 2003 http://www.nefmc.org/nemulti/planamen/amend13_dec03.htm.

NEFMC. 2011. Framework Adjustment 1 to the Fishery Management Plan for the Northeast Skate Complex Including an Environmental Assessment and an Initial Regulatory Flexibility Analysis. 171 pp. http://www.nefmc.org/skates/frame/fw%201/Final%20FW1%20Submission%20revised%20EA%20-%20all.pdf.

NEFMC New England Fishery Management Council. 1998. Final Amendment #11 to the Northeast Multispecies Fishery Management Plan, #9 to the Atlantic Sea Scallop Fishery Management Plan, Amendment #1 to the Monkfish Fishery Management Plan, Amendment #1 to the Atlantic Salmon Fishery Management Plan, and components of the proposed Atlantic Herring Fishery Management Plan for Essential Fish Habitat, incorporating the environmental assessment. October 7, 1998.

NEFSC. 2007a. Skate Complex Assessment Summary for 2006. IN: 44th Northeast Regional Stock Assessment Workshop (44th SAW) assessment summary report. US Dep Commer, Northeast Fish Sci Cent Ref Doc. 07-03; 58 p http://www.nefsc.noaa.gov/publications/crd/crd0703/pdfs/b.pdf.

NEFSC. 2007b. Assessment Of Northeast Skate Species Complex. IN: 44th Northeast Regional Stock Assessment Workshop (44th SAW): 44th SAW assessment report. US Dep Commer, Northeast Fish Sci Cent Ref Doc 07-10; 661 p. http://www.nefsc.noaa.gov/publications/crd/crd0710/pdfs/b.pdf

NEFSC Northeast Fisheries Science Center. 2002. Workshop on the effects of fishing gear on marine habitats off the northeastern United States, October 23-25, 2001, Boston, Massachusetts. U.S. Natl. Mar. Fish. Serv. Northeast Fish. Cent. Woods Hole Lab. Ref. Doc. 02-01. 86 p.

New England Fishery Management Council (NEFMC). 2009. 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. 456 pp. http://www.nefmc.org/skates/planamen/amend3/final/Skate%20Amendment%203%20FEIS.pdf.

NMFS. 1991a. Final recovery plan for the humpback whale (*Megaptera novaeangliae*). Prepared by the Humpback Whale Recovery Team for the national Marine Fisheries Service, Silver Spring, Maryland. 105 pp.

NMFS. 1991b. Final recovery plan for the North Atlantic right whale (*Eubalaena glacialis*). Prepared by the Right Whale Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 86 pp.

NMFS. 1998. Recovery Plan for the blue whale (*Balaenoptera musculus*). Prepared by R.R. Reeves, P.J. Clapham, R.L. Brownell, Jr., and G.K. Silber for the National Marine Fisheries Service, Silver Spring, MD. 42pp.

NMFS. 1998b. Unpublished. Draft recovery plans for the fin whale (*Balaenoptera physalus*) and sei whale (*Balaenoptera borealis*). Prepared by R.R. Reeves, G.K. Silber, and P.M. Payne for the National Marine Fisheries Service, Silver Spring, Maryland. July 1998.

NMFS. 1998b. Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 104 pages.

NMFS. 2005. Recovery Plan for the North Atlantic Right Whale (*Eubalaena glacialis*). National Marine Fisheries Service, Silver Spring, MD.

NMFS. 2009a. Hawksbill Turtle (*Eretmochelys imbricate*). Available at http://www.nmfs.noaa.gov/pr/species/turtles/hawksbill.htm

NMFS. 2009b. Endangered Species Act Section 7 Consultation on the Atlantic Sea Scallop Fishery Management Plan. Biological Opinion. February 5, 2009.

NMFS. 2010. Recovery plan for the fin whale (*Balaenoptera physalus*). National Marine Fisheries Service, Silver Spring, MD. 121 pp.

NMFS. 2005. Recovery Plan for the North Atlantic right whale (*Eubalaena glacialis*). National Marine Fisheries Service, Silver Spring, MD. 137pp.

NMFS and U.S. Fish and Wildlife Service (USFWS). 1991a. Recovery plan for U.S. population of loggerhead turtle. National Marine Fisheries Service, Washington, D.C. 64 pp.

NMFS and USFWS. 1991b. Recovery plan for U.S. population of Atlantic green turtle. National Marine Fisheries Service, Washington, D.C. 58 pp.

NMFS and USFWS. 1992. Recovery plan for the Kemp's ridley sea turtle. National Marine Fisheries Service, Washington, D.C. 40 pp.

NMFS and U.S. Fish and Wildlife Service (USFWS). 1992. Recovery plan for leatherback turtles in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C. 65 pp.

NMFS and USFWS. 1995. Status reviews for sea turtles listed under the Endangered Species Act of 1973. National Marine Fisheries Service, Silver Spring, Maryland. 139 pp.

NMFS and USFWS. 2007a. Loggerhead sea turtle (*Caretta caretta*) 5 year review: summary and evaluation. National Marine Fisheries Service, Silver Spring, Maryland. 65 pp.

NMFS and USFWS. 2007b. Leatherback sea turtle (*Dermochelys coriacea*) 5 year review: summary and evaluation. National Marine Fisheries Service, Silver Spring, Maryland. 79 pp.

NMFS and USFWS. 2007c. Kemp's ridley sea turtle (*Lepidochelys kempii*) 5 year review: summary and evaluation. Silver Spring, Maryland: National Marine Fisheries Service. 50 pp.

NMFS and USFWS. 2007d. Green sea turtle (*Chelonia mydas*) 5 year review: summary and evaluation. Silver Spring, Maryland: National Marine Fisheries Service. 102 pp.

NMFS and USFWS. 2008. Recovery plan for the Northwest Atlantic population of the loggerhead turtle (*Caretta caretta*), Second revision. Washington, D.C.: National Marine Fisheries Service. 325 pp.

NMFS, U.S. Fish and Wildlife Service, and SEMARNAT. 2011. Bi-National Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), Second Revision. National Marine Fisheries Service. Silver Spring, Maryland 156 pp. + appendices.

NOAA/NMFS. 1975. The Market in Western Europe for Dogfish, Squid, Mussels, Skate, Monkfish and Whiting. Prepared as part of the New England Fisheries Development Program.

Northeast Fisheries Science Center (NEFSC). 1991. Report of the 12th Stock Assessment Workshop (12th SAW), Spring 1991. Woods Hole, MA: NOAA/NMFS/NEFC. NEFC Ref. Doc.91-03.

NEFSC. 2000. Skate Complex Assessment Summary for 1999. IN: 30th Northeast Regional Stock Assessment Workshop (30th SAW) assessment summary report. US Dep Commer, Northeast Fish Sci Cent Ref Doc. 00-04; 58 p http://www.nefsc.noaa.gov/publications/crd/pdfs/crd0004.pdf.

NEFSC. 2007. 44th Northeast Regional Stock Assessment Workshop (44th SAW): 44th SAW assessment report. US Dept. Commerce, Northeast Fish Sci. Cent. Ref. Doc. 07-10; 661 p. Also available at http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0710/.

NEFSC. 2000. 30th Northeast Regional Stock Assessment Workshop (30th SAW) Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. NEFSC Ref. Doc. 00-03, 477 p.

NRC National Research Council. 2002. Effects of trawling and dredging on seafloor habitat. Ocean Studies Board, Division on Earth and Life Studies, National Research Council. National Academy Press, Washington, D.C. 126 p.

Overholtz, W.J. and A.V. Tyler. 1985. Long-term responses of the demersal fish assemblages of Georges Bank. Fish. Bull. (U.S.) 83: 507-520.

Packer DB, Zetlin CA, Vitaliano JJ. 2003a. Essential fish habitat source document: barndoor skate, *Dipturus laevis*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-173.

Packer DB, Zetlin CA, Vitaliano JJ. 2003b. Essential fish habitat source document: clearnose skate, *Raja eglanteria*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-174.

Packer DB, Zetlin CA, Vitaliano JJ. 2003c. Essential fish habitat source document: little skate, *Leucoraja erinacea*, life history and habitat characteristics. NOAA Technical Memorandum NMFS-NE-175.

Parent, Serge, Serge Pepin, Jean-Pierre Genet, Laurent Misserey, and Salvador Rojas. 2008. Captive Breeding of the Barndoor Skate (*Dipturus laevis*) at the Montreal Biodome, With Comparison Notes on Two Other Captive-Bred Skate Species. Zoo Biology 27:145–153.

Perry, S.L., D.P. DeMaster, and G.K. Silber. 1999. The great whales: History and status of six species listed as endangered under the U.S. Endangered Species Act of 1973. Mar. Fish. Rev. Special Edition. 61(1): 59-74.

Poppe, L.J., J.S. Schlee, B. Butman, and C.M. Lane. 1989a. Map showing distribution of surficial sediment, Gulf of Maine and Georges Bank. U.S. Dep. Interior, U.S. Geol. Sur. Misc. Invest. Ser., Map I-1986-A, scale 1:1,000,000.

Poppe, L.J., J.S. Schlee,. Knebel H.J. 1989b. Map showing distribution of surficial sediment on the mid-Atlantic continental margin, Cape Cod to Albemarle sound. U.S. Dep. Interior, U.S. Geol. Sur. Misc. Invest. Ser., Map I-1987-D, scale 1:1,000,000.

Pratt, S. 1973. Benthic fauna. In Coastal and offshore environmental inventory, Cape Hatteras to Nantucket Shoals. p. 5-1 to 5-70. Univ. Rhode Island, Mar. Pub. Ser. No. 2. Kingston, RI.

Reid, R.N. and F.W. Steimle, Jr. 1988. Benthic macrofauna of the middle Atlantic continental shelf. In A.L. Pacheco, ed. Characterization of the middle Atlantic water management unit of the northeast regional action plan. p. 125-160. NOAA Tech. Mem. NMFS-F/NEC-56. 322 p.

Richards SW, Merriman D, Calhoun LH (1963) Studies in the marine resources of southern New England. IX. The biology of the little skate Raja erinacea, Mitchill. Bull Bingham Oceanogr Collect Yale Univ 18:311–407.

Schmitz, W.J., W.R. Wright, and N.G. Hogg. 1987. Physical oceanography. In J.D. Milliman and W.R. Wright, eds. The marine environment of the U.S. Atlantic continental slope and rise. p. 27-56. Jones and Bartlett Publishers Inc., Boston, MA.

Schueller, P. and D. L. Peterson. 2006. Population status and spawning movements of Atlantic sturgeon in the Altamaha River, Georgia. Presentation to the 14th American Fisheries Society Southern Division Meeting, San Antonio, February 8-12th, 2006. Scott, W. B. and E. J. Crossman. 1973. Freshwater fishes of Canada. Fisheries Research Board of Canada Bulletin 184: 966 pp.

Sears, R. 2002. Blue whale, *Balaenoptera nusculus*. Pages 112-116 in W.F. Perrin, B. Wursig, and J.G.M. Thewissen, eds. Encyclopedia of Marine Mammals. San Diego: Academic Press. NMFS December 1, 2008. Final List of Fisheries for 2009. Federal Register Vol. 73, No. 231, p. 73032-73076

Shepard, F.P., N.F. Marshall, P.A. McLonghlin, and F.G. Sullivan. 1979. Currents in submarine canyons and other sea valleys. Am. Assn. Petrol. Geol., Studies in Geol. No. 8.

Sherman, K., N.A. Jaworski, T.J. Smayda, eds. 1996. The northeast shelf ecosystem – assessment, sustainability, and management. Blackwell Science, Cambridge, MA. 564 p.

Shoop, C.R. and R.D. Kenney. 1992. Seasonal distributions and abundance of loggerhead and leatherback sea turtles in waters of the northeastern United States. Herpetol. Monogr. 6: 43-67.

Simon, J. E. and K. T. Frank. November 1998. *Assessment of the Winter Skate Fishery in Division 4VsW*. DFO Canadian Stock Assessment Secretariat Research Document 98/145.

Simon, James E., Lei H. Harris and Terry L. Johnston. 2003. Distribution and abundance of winter skate, *Leucoraja ocellatta*, in the Canadian Atlantic. DFO Research Document. 2003/028.

Sissenwine, M.P. and E.W. Bowman. 1978. An analysis of some factors affecting the catchability of fish by bottom trawls. ICNAF Res Bull. 13: 81-87.

Sosebee, K.A. 2005. Maturity of skates in northeast United States waters. E-Journal of Northwest Atlantic Fishery Science. **35**(9).

Steimle, F.W. and C. Zetlin. 2000. Reef habitats in the middle Atlantic bight: abundance, distribution, associated biological communities, and fishery resource use. Mar. Fish. Rev. 62: 24-42.

Steimle, F.W., C.A. Zetlin, P.L. Berrien, D.L. Johnson and S. Chang. 1999. Essential fish habitat source document: tilefish, Lopholatilus chamaeleonticeps, life history and habitat characteristics. NOAA Tech. Mem. NMFS-NE-152. 30 p.

Stein, A. B., K. D. Friedland, and M. Sutherland. 2004a. Atlantic sturgeon marine bycatch and mortality on the continental shelf of the Northeast United States. North American Journal of Fisheries Management 24: 171-183.

Stein, A.B., K. D. Friedland, and M. Sutherland. 2004b. Atlantic sturgeon marine distribution and habitat use along the northeastern coast of the United States. Transaction of the American Fisheries Society 133:527-537.

Stevenson, D., L. Chiarella, D. Stephan, R. Reid, K. Wilhelm, J. McCarthy, and M. Pentony. 2004. Characterization of the fishing practices and marine benthic ecosystems of the northeast U.S. shelf, and an evaluation of the potential effects of fishing on essential fish habitat. NOAA Tech. Memo. NMFS-NE-181. 179 p.

Stobutzki, IC, MJ Miller, DS Heales, and DT Brewer (2002). Sustainability of elasmobranchs caught as bycatch in a tropical prawn (shrimp) trawl fishery. Fishery Bulletin 100: 800-821.

Stumpf, R.P. and R.B. Biggs. 1988. Surficial morphology and sediments of the continental shelf of the middle Atlantic bight. In A.L. Pacheco, ed. Characterization of the middle Atlantic water management unit of the northeast regional action plan. p. 51-72. NOAA Tech. Mem. NMFS-F/NEC-56. 322 p.

Sulikowski, J. A., J. Kneebone, S. Elzey, J. Jurek, W. H. Howell, & P. C. W. Tsang. 2006. Using the composite variables of reproductive morphology, histology and steroid hormones to determine age and size at sexual maturity for the thorny skate *Amblyraja radiata* in the western Gulf of Maine. Journal of Fish Biology. **69**: 1449 - 1465.

Sulikowski, J.A., P. C. W. Tsang, & W. Huntting Howell. 2004. An annual cycle of steroid hormone concentrations and gonad development in the winter skate, Leucoraja ocellata, from the western Gulf of Maine. Marine Biology. **144**: 845 - 853.

Sulikowski, James A., Jeff Kneebone, Scott Elzey, Joe Jurek, Patrick D. Danley, W. Huntting Howell, and Paul C.W. Tsang. 2005a. Age and growth estimates of the thorny skate (*Amblyraja radiata*) in the western gulf of Maine. Fishery Bulletin. **103**: 161 - 168.

Sulikowski, James A., Michael D. Morin, Seung H. Suk, and W. Huntting Howell. 2003. Age and growth estimates of the winter skate (*Leucoraja ocellata*) in the western gulf of Maine. Fishery Bulletin. **101**: 405 - 413.

Sulikowski, James A., Paul C.W. Tsang & W. Huntting Howell. 2005b. Age and size at sexual maturity for the winter skate, *Leucoraja ocellata*, in the western Gulf of Maine based on morphological, histological and steroid hormone analyses. Environmental Biology of Fishes. **72**: 429 - 441.

Sulikowski, James A., Scott Elzey, Jeff Kneebone, Joe Jurek, W. Huntting Howell and Paul C. W. Tsang. 2007. The reproductive cycle of the smooth skate, *Malacoraja senta*, in the Gulf of Maine. Marine and Freshwater Researc*h*. **58**, 98–103

Swingle, W.M., S.G. Barco, T.D. Pitchford, W.A. McLellan, and D.A. Pabst. 1993. Appearance of juvenile humpback whales feeding in the nearshore waters of Virginia. Mar. Mamm. Sci. 9: 309-315.

Templeman, W. 1984. Migrations of thorny skate, *Raja radiata*, tagged in the Newfoundland area. Journal of Northwest Atlantic Fishery Science. **5**(1): 55 - 63.

Theroux, R.B. and M.D. Grosslein. 1987. Benthic fauna. In R.H. Backus and D.W. Bourne, eds. Georges Bank. p. 283-295. MIT Press, Cambridge, MA.

Theroux, R.B. and R.L. Wigley. 1998. Quantitative composition and distribution of the macrobenthic invertebrate fauna of the continental shelf ecosystems of the northeastern United States. NOAA Tech. Rep. NMFS 140. 240 p.

Townsend, D.W. 1992. An overview of the oceanography and biological productivity of the Gulf of Maine. In D.W. Townsend and P.F. Larsen, eds. The Gulf of Maine. p. 5-26. NOAA Coast. Ocean Prog. Reg. Synthesis Ser. No. 1. Silver Spring, MD. 135 p.

Tucholke, B.E. 1987. Submarine geology. In J.D. Milliman and W.R. Wright, eds. The marine environment of the U.S. Atlantic continental slope and rise. p. 56-113. Jones and Bartlett Publishers Inc., Boston, MA.

Turtle Expert Working Group (TEWG). 1998. An assessment of the Kemp's ridley (*Lepidochelys kempii*) and loggerhead (*Caretta caretta*) sea turtle populations in the Western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-409. 96 pp.

Turtle Expert Working Group (TEWG). 2000. Assessment update for the Kemp's ridley and loggerhead sea turtle populations in the western North Atlantic. U.S. Dep. Commer. NOAA Tech. Mem. NMFS-SEFSC-444, 115 pp.

Turtle Expert Working Group (TEWG). 2007. An assessment of the leatherback turtle population in the Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-555, 116 pp.

Turtle Expert Working Group (TEWG). 2009. An assessment of the loggerhead turtle population in the Western North Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-575:1-131.

USFWS. 1997. Synopsis of the biological data on the green turtle, *Chelonia mydas* (Linnaeus 1758). Biological Report 97(1). U.S. Fish and Wildlife Service, Washington, D.C. 120 pp.

USFWS (U.S. Fish and Wildlife Service) and NMFS (National Marine Fisheries Service). 1992. Recovery plan for the Kemp's ridley sea turtle (*Lepidochelys kempii*). St. Petersburg, Florida: National Marine Fisheries Service. 40 pp.

USFWS and NMFS. 1992. Recovery plan for the Kemp's ridley sea turtle (*Lepidochelys kempii*). NMFS, St. Petersburg, Florida.

Valentine, P.C. and R.G. Lough. 1991. The sea floor environment and the fishery of eastern Georges bank. U.S. Dep. Interior, U.S. Geol. Sur. Open File Rep. 91-439. 25 p.

Valentine, P.C., E.W. Strom, R.G. Lough, and C.L. Brown. 1993. Maps showing the sedimentary environment of eastern Georges bank. U.S. Dep. Interior, U.S. Geol. Sur. Misc. Invest. Ser., Map I-2279-B, scale 1:250,000.

Waldman, J. R., J. T. Hart, and I. I. Wirgin. 1996. Stock composition of the New York Bight Atlantic sturgeon fishery based on analysis of mitochondrial DNA. Transactions of the American Fisheries Society 125: 364-371.

Waring GT, Josephson E, Maze-Foley K, and Rosel PE, editors. 2009. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments -- 2009. NOAA Tech Memo NMFS NE 213; 528 p.

Waring, G.T. 1984. Age, growth and mortality of the little skate off the northeast coast of the United States. Transactions of the American Fisheries Society. **113**: 314 - 321.

Waring, G.T., D.L. Palka, P.J. Clapham, S. Swartz, M. Rossman, T. Cole, L.J. Hansen, K.D. Bisack, K. Mullin, R.S. Wells, D.K. Odell, and N.B. Barros. 1999. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments - 1999. NOAA Technical Memorandum NMFS-NE-153.

Waring, G.T., J. M. Quintal and C. P. Fairfield. 2002. U. S. Atlantic and Gulf of Mexico marine mammal stock assessments - 2002. NOAA Tech. Memo. NMFS-NE-169, 318 pp.

Waring, G.T., E. Josephson, C.P. Fairfield, and K. Maze-Foley, Editors. 2006. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments-2005. NOAA Tech. Memo. NMFS-NE-194, 352pp.

Waring, G.T., E. Josephson, C.P. Fairfield, and K. Maze-Foley, Editors. 2007. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments-2006. NOAA Tech. Memo. NMFS-NE-201, 378 pp.

Waring, G.T., R.M. Pace, J.M. Quintal, C. P. Fairfield, K. Maze-Foley (eds). 2003. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments - 2003 . NOAA Technical Memorandum NMFS-NE-182. 287 p.

Waring, G.T., E. Josephson, K. Maze-Foley, Rosel, P.E. (eds). 2010. US Atlantic and Gulf of Mexico marine mammal stock assessments -- 2010. NOAA Tech Memo NMFS NE 219; 598 p.

Watling, L. 1998. Benthic fauna of soft substrates in the Gulf of Maine. In E.M. Dorsey and J. Pederson, eds. Effects of fishing gear on the sea floor of New England. p. 20-29. MIT Sea Grant Pub. 98-4.

Whitehead, H. 2002. Estimates of the current global population size and historical trajectory for sperm whales. Mar. Ecol. Prog. Ser. 242: 295-304.

Wiebe, P.H., E.H. Backus, R.H. Backus, D.A. Caron, P.M. Glibert, J.F. Grassle, K. Powers, and J.B. Waterbury. 1987. Biological oceanography. In J.D. Milliman and W.R. Wright, eds. The marine environment of the U.S. Atlantic continental slope and rise. p. 140-201. Jones and Bartlett Publishers Inc., Boston, MA.

Wigley, R.L. and R.B. Theroux. 1981. Atlantic continental shelf and slope of the United States – macrobenthic invertebrate fauna of the middle Atlantic bight region – faunal composition and quantitative distribution. Geol. Surv. Prof. Pap. 529-N. 198 p.

Wiley, D.N., R.A. Asmutis, T.D. Pitchford, and D.P. Gannon. 1995. Stranding and mortality of humpback whales, *Megaptera novaengliae*, in the mid-Atlantic and southeast United States, 1985-1992. Fish. Bull., U.S. 93:196-205.

Worthington, L.V. 1976. On the North Atlantic circulation. Johns Hopkins Ocean. Stud. No. 6. Johns Hopkins Univ. Press, Baltimore, MD. 110 p.

Wright, W.R. and L.V. Worthington. 1970. The water masses of the North Atlantic Ocean: a volumetric census of temperature and salinity. Ser. Atlas Mar. Environ., Am. Geol. Soc. Folio No. 19.Wynne, K. and M. Schwartz. 1999. Guide to marine mammals and turtles of the U.S. Atlantic and Gulf of Mexico. Rhode Island Sea Grant, Narragansett. 115pp.