NEFMC Council Meeting

SBRM Discussion Materials

for

Tuesday, June 3

#7

New England Fishery Management Council
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John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

MEMORANDUM

DATE: May 28, 2008

TO: Paul Howard, Executive Director

FROM: Chris Kellogg

SUBJECT: Staff comments on proposed observer coverage levels

In reviewing the proposed observer coverage levels, the staff found it difficult to develop comprehensive comments because it had a lot of questions about how the coverage levels were determined and did not have the benefit of the presentation that the NEFSC is expected to give at the June Council meeting. As a result the comments below contain many of these questions. Most of the comments and questions pertain to the information distributed by the NEFSC at the April 2008 Council meeting in the document *Standardized Bycatch Reporting Methodology: Prioritization Process in 2008.*

1. For herring we are not sure why the optimization procedure would result in an allocation of trips for the MA mid-water trawl fishery of 294% compared to the Omnibus Amendment's preferred alternative but only 35% for the NE mid-water trawl fishery.
2. In light of the above question, we are not sure of the objective for allocating observers differently than proposed in the Omnibus Amendment. We understand that the optimization model minimizes the variance of the estimated bycatch for a number of gear modes simultaneously but are not sure why it results in coverage levels so different than those proposed in the Omnibus Amendment. Is some of the difference primarily due to the use of more recent data to estimate coverage levels?
3. We think too much coverage is proposed for the multispecies special management programs and would like to know how changes or reductions observer coverage would affect the CVs in these programs. The realized CV for GB YTF in 2005 and 2006 was in the range of 12-14 percent, compared to our desired standard of 30 percent. The only management reason to do so is to monitor the GB YTF TAC under the US/CA Resource Sharing Understanding. So in order to monitor one TAC, we are probably using close to 2000 observer sea days (assuming 500 are in the eastern area- which we doubt). Put another way - $2.3 million of observer dollars are being used to track $3.5 million of GB YT). Even a small 10 percent reduction in sea days allocated to the US/CA area would free up 250 sea days that could be used to double mid-water trawl coverage, NE small mesh trawl coverage, or increase levels in any number of modes. (For example, no days are allocated to lobster pots – yet we often hear they are catching cod in substantial amounts. Even 25-50 days might help us determine of that is true).

4. For the two other stocks of interest under the US/CA agreement – GB cod and GB haddock – the picture is not quite so clear cut. Only parts of these stocks are subject to the agreement, but we do not have area-specific CVs for both species. The overall CV for GB cod is in the range of .11-.16 for the stock as a whole in 2005 and 2006, but the CV for gillnet trips exceeded the SBRM standard (0.39 both years) while that for trawl trips was lower. I suspect many of those gillnet trips were not in the US/CA area though – that should be examined – but it may be that we can reduce sea days but redirect some to gillnet trips to both free up days and improve the gillnet CV (note the gillnet discards were only 25 mt, so this might not be a very productive use of limited resources). In the case of GB haddock, the overall CV was 0.2 in 2005 and 0.3 in 2006, but is driven by high CVs in the brief opening of the eastern area. The CV in the western area in 2006 was 0! Clearly we need to take a closer look at allocating sea days in the US/CA area.

5. The CAI Hook Gear Haddock SAP has been monitored for three years now and has very low catches of cod and other stocks of concern. That information should be examined to consider reducing coverage in that SAP, though the potential for freeing available sea days is smaller since the SAP uses fewer days (proposed changes might increase the number of sea days used in this SAP in 2009, but that is still a year away). Although coverage in the B DAS program, should be evaluated as well, the Council might want to continue the high levels of coverage the Council suggested in FW 42 because of evidence that compliance with the regulations changes when observers are present.

6. Are all the observer DAS in the table assigned to the monitoring of fish bycatch rather than protected resources or marine mammal bycatch? Table 1 seems to include some of the days from the Atlantic Coast funding to support the estimation of turtle bycatch in the mixed trawl, scallop trawl and purse seine fisheries although it isn't apparent that all the 337 days are included in Table 1.

7. It isn't clear what level of coverage should apply to the various components of the scallop fishery - should the target coverage be the level in the amendment preferred alternative, the level identified in the second column of Table 1 or another level (because only minor segments were included in the optimization model)? The document should include target levels of observer coverage for the industry funded programs as well.

8. Since funding is so limited we would expect that the scallop fishery may be granted less coverage because the Scallop FMP has the observer set-aside program in place (an additional source of funding for observer sea days). That makes sense from a limited resource perspective, but if in fact the scallop fishery originally "needs" more coverage to monitor yellowtail flounder bycatch rates in access areas for example, then it could be argued that some federally supported sea-days should be granted to the scallop fishery to observe other aspects of the scallop fishery in general.

9. During development of Scallop Amendment 13 the Council heard that the observer set-aside program is not working as well as it could be. According to the industry, observer service providers, and NMFS observer program, the industry funded program works better in access areas, but there are serious problems with open area trips. Vessels do not receive adequate compensation for carrying an observer in low density areas (i.e. open area trips). Vessels lose money on trips when an observer is onboard and often the observer makes more than the crew. So according to some observer service providers some vessels are dodging observers and changing their behavior to reduce costs while observers are onboard (shortening trips and fishing closer to shore). These comments have not been confirmed yet by analysis of the data collected thus far; however, if that is the case then data collected from the observer set-aside

program in open areas could be bias. In addition, general category vessels do not have to fund observers in open areas because there is no mechanism to compensate the cost of the observer on those trips (i.e. DAS); therefore, it could be argued that some federally supported sea-days should be allocated to the limited access fishery in open areas as well.

In summary, it may make sense to allocate some federally funded trips on limited access vessels in open areas to help alleviate these problems. That way the target level of industry funded sea-days would be lower and perhaps a higher compensation rate could be used for open area trips.

10. There is no reference to how sea-days will be distributed throughout the year in this document, but the Council may want to recommend that some thought be taken in determining when scallop trips should be observed in the Mid-Atlantic. For example, it could be argued that all or some scallop trips from August-October be federally funded with earmarked funds set up to observe interactions with sea turtles. This time of year is when interactions with sea turtles are expected to increase in the Mid-Atlantic. If some federal funds are used in this area during that time period more observer days could be used observing other aspects of the fishery.

4/8/08

Standardized Bycatch Reporting Methodology: Prioritization Process in 2008

Background

As established by the Standardized Bycatch Reporting Methodology (SBRM) omnibus amendment, Councils and public are provided an opportunity to consider and provide input into decisions regarding prioritization of at-sea observer coverage allocations, if the expected resources necessary may not be available to achieve CV-based performance goals. In any year in which external operational constraints would prevent NMFS from fully implementing the required at-sea observer coverage levels, the Regional Administrator and Science and Research Director will consult with the Councils to determine the most appropriate prioritization for how the available resources should be allocated.

The attached table (Table 1) summarizes the planned allocation of 6,217 at-sea observer days for the calendar year 2008. These allocations reflect information available through April 2008. The 2008 allocations are compared to the SBRM recommendations of 9,874 days as specified in the Amendment. The SBRM recommendations were based on data from January to December 2004.

1. At-sea Observer Coverage Levels Required to Attain SBRM Performance in Each Applicable Fishery

The Omnibus Amendment calls for attainment of CVs of no more than 30% in each unique fishing gear mode/species combination. Thus, for each fishing mode (Table 1), a CV of 30% or less is to be attained for each species within that mode. Some mode/species combinations contribute very little to the total mortality or discard of the species, but may require significant resources to characterize the precision of the estimate. For example, a high variance estimate for a rare event within a fishing mode would require high levels of sampling, even though the total discard in that mode was unimportant with respect to either the total discard or total mortality on the resource. The preferred alternative thus emphasizes mode/species combinations which have the combined influence of 95% of the total discards of the species group and 98% of the total mortality of the species. Application of this filter leads to CVs of 30% or better for all species groups in the reduced set of fishing mode x species group cells. Species include fishes and sea turtles, but exclude marine mammals. The number of sea days required to attain these performance levels by mode is summarized in Table 1, "Omnibus Amendment Preferred Alternative." Current resources are inadequate to support this coverage (9,874 sea days)

2. Coverage Levels Available If Available Resources Were Allocated Proportionately Across All Applicable Fisheries

Available resources were characterized as number of sea days which could be supported in 2008 based on funding through New England Groundfish, Atlantic Coast Observer, and Social Sciences/ Economics funding programs. Although each program has specific fish/protected species/data category targets associated with that funding, those restrictions were not considered in this summary. Thus, funding earmarked to observe New England groundfish bycatch was assumed to be transferable to any fishing mode, regardless of region. Funding dedicated for implementing the Marine Mammal Protection Act, including observer coverage to estimated bycatch of marine mammals, was not included in this summary, because marine mammal species were not included in the SBRM coverage targets. Funding for 6,217 sea days was available for proportional allocation.

Those sea days were distributed in the same proportion as the initial 9,874 sea days required to attain the SBRM performance standard. Elements in the Table 1 column labeled "Available Coverage with shortfall applied proportionally" were obtained by multiplying the column "Omnibus Amendment Preferred Alternative" by 0.6296 (= 6,217/9,874). While this achieves the same relative distribution of days as the original SBRM performance schedule, the CVs of estimates for each species in each mode will not be affected equally.

CC: Tech Staff

3. Coverage Levels That Incorporate the Recommended Prioritization; Justification for Prioritization

Recommended prioritization is summarized as "Prioritized 2008 Coverage" (Table 1). This represents the current proposed calendar year 2008 observer sea day schedule.

New England groundfish funding is primarily used to support three objectives in the New England region:

To insure that program-specific and negotiated TACs are not exceeded, relatively intense monitoring of SAP/B day and US-Canada sharing fisheries is supported (3000 sea days). Those days cannot be allocated to specific fishing modes *a priori*, because coverage depends on real-time industry use of DAS categories and call-in data.

To monitor bycatch of groundfish in the Atlantic herring fishery, a dedicated program covers mid-water trawl and purse seine components of the fishery, with statistical performance standards for that specific objective (284 sea days).

To ensure optimal coverage of fishing modes to estimate discards for stock assessments, an optimization tool is used to allocate the remaining sea days among modes harvesting the New England groundfish complex (1961 sea days).

Implementation of the optimization tool for 2008 allocations is based on more recent data than that used for the initial SBRM performance targets, and higher sample sizes are now required for some components depending on changes in variability within a fishing mode over time. As indicated in Table 1, the fishing modes that lacked observer coverage in 2004 were allocated sea days at the "pilot" coverage level (2% of trips with a cap of 100 trips per calendar quarter) in the SBRM report. Of the 23 fishing modes identified for pilot coverage based on 2004 data, 13 of these modes now receive coverage. One of the 23 fishing modes (Scottish seine) currently has only one vessel. Hence more than half of the fishing modes that had no baseline information in 2004 will have observer coverage in 2008.

Atlantic Coast funding supports the estimation of sea turtle bycatch in mixed trawl, scallop trawl and purse seine fisheries (337 sea days), supporting biological opinions and planned rulemaking. The optimization tool is used to allocate coverage among modes to most effectively estimate discards of summer flounder, scup, black sea bass and monkfish to support fish stock assessments (505 sea days).

Separately funded Social Sciences/Economic Data collection programs use the observer program for field interviewers, and program objectives are independent of SBRM, although observers collect the full suite of information on species discards (70 sea days) and these data are used in discard estimation analyses.

Discovery days are held in reserve to address emerging questions of scientific and management interest as the year progresses, to minimize disruption to statistically designed on-going coverage (60 sea days).

Table 1. Standardized Bycatch Reporting Methodology Prioritization Information, Calendar Year 2008

	Fishing Mode	Omnibus Amendment Preferred Alternative: 95% of Discards & 98% of Mortality	Available Coverage with shortfall applied proportionally	Prioritized 2008 Coverage	2008 Difference from Preferred Alternative	2008 Percentage of Preferred Alternative	Justification	Basis for SBRM Recommended Coverage
1	NE Clam Dredge	50	31	8	-42	16%	Economics data collection program	Pilot
2	MA Clam Dredge	84	53	0	-84	0%		Pilot
3	NE Crab Pot	101	64	0	-101	0%		Pilot
4	MA Crab Pot	28	18	16	-12	57%	Economics data collection program	Pilot
5	NE Fish Pot	20	13	3	-17	15%	Economics data collection program	Pilot
6	MA Fish Pot	40	25	3	-37	8%	Economics data collection program	Pilot
7	NE Small-mesh Gillnet	12	8	3	-9	25%	Fish stock assessment optimization	Pilot
8	MA Small-mesh Gillnet	1,259	793	0	-1,259	0%	(420 days marine mammal bycatch not included in this SBRM summary)	Pilot for fish
9	NE Large-mesh Gillnet	141	89	159	18	113%	Fish stock assessment optimization (276 days marine mammal bycatch not included in this SBRM summary)	
10	MA Large-mesh Gillnet	653	411	4	-649	1%	Fish stock assessment optimization	Pilot for fish
11	NE X-Large-mesh Gillnet	214	135	81	-133	38%	Fish stock assessment optimization	
12	MA X-Large-mesh Gillnet	468	295	52	-416	11%	Fish stock assessment optimization	Pilot for fish
13	NE Handline	72	45	0	-72	0%		Pilot
14	MA Handline	133	84	0	-133	0%		Pilot
15	NE Lobster Pot	439	276	0	-439	0%		Pilot
16	MA Lobster Pot	89	56	0	-89	0%		Pilot
17	NE Longline	35	22	25	-10	71%	Fish stock assessment optimization	
18	MA Longline	76	48	8	-68	11%	Economics data collection earmark	Pilot
19	NE Mid-Water Trawl	316	199	111	-205	35%	Atlantic herring bycatch monitoring (95), economics data (16)	
20	MA Mid-Water Trawl	35	22	103	68	294%	Atlantic herring bycatch monitoring (95), economics data(8)	
21	NE Small-mesh Trawl	2,024	1,274	175	-1,849	9%	Fish stock assessment optimization (171), economics data (4)	
22	MA Small-mesh Trawl	1,229	774	377	-852	31%	Fish stock assessment optimization (275), protected species mixed trawl (98), economics data (4)	
23	NE Large-mesh Trawl	730	460	1,494	764	205%	Fish stock assessment optimization	
24	MA Large-mesh Trawl	481	303	254	-227	53%	Fish stock assessment optimization (156), protected species mixed trawl (98)	
25	NE Purse Seine	19	12	94	75	495%	Atlantic herring bycatch monitoring	
26	MA Purse Seine	9	6	10	1	111%	Protected species	Pilot
27	NE Scallop Dredge OL	320	201	IF			Industry funded	
28	MA Scallop Dredge OL	114	72	IF			Industry funded	
29	NE Scallop Dredge CL	145	91	IF			Industry funded	
30	MA Scallop Dredge CL	108	68	IF			Industry funded	
31	NE Scallop Dredge OG	92	58	9	-83	10%	Fish stock assessment support	Pilot
32	MA Scallop Dredge OG	17	11	18	1	106%	Fish stock assessment support	
33	NE Scallop Dredge CG	24	15	IF				Pilot
34	MA Scallop Dredge CG	21	13	IF				Pilot
35	MA Scallop Trawl OL	95	60	0	-95	0%		Pilot
36	MA Scallop Trawl OG	51	32	131	80	257%	Protected species	Pilot
37	NE Scottish Seine	12	8	0	-12	0%		Pilot
38	NE Shrimp Trawl	42	26	19	-23	45%	Fish stock assessment support	
39	MA Shrimp Trawl	76	48	0	-76	0%		Pilot
40	SAP/B day/US-CAN			3,000	3,000		Days will be allocated according to call-in DAS procedures	
41	Discovery			60	60		Days are not allocated above but will be conducted under NEFOP schedule	
	Total Number Days	*9,874*	*6,217*	*6,217*	*-3,657*			
	Projected Cost	$11,355,100	$7,149,500	$7,149,500	$4,205,600			

OL= Open Area, Limited Access
CL= Closed Area, Limited Access
OG= Open Area, General Category
CG=Closed Area, General Category

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John Pappalardo, *Chairman* | Paul J. Howard, *Executive Director*

MEMORANDUM

DATE: June 2, 2008

TO: Paul Howard

FROM: Chris Kellogg

SUBJECT: Draft responses to Council Staff questions about proposed observer coverage levels

Attached are responses to some of the questions the Council Staff had asked the NEFSC about proposed observer coverage levels and which might provide some useful information for Council members.

General Response (Summary)

The 2008 Prioritized Coverage (2008 sea day schedule) was prepared using existing methods for allocating sea day coverage for various programs within the Region. The current methods must be expanded to support the SBRM.

NEFSC is currently working on expanding the methods (including the optimization tool) to include more species groups and more fleets in order to provide consistency with, and fully support, the SBRM. It should be recognized that the stratification of the optimization tool may be finer than the SBRM stratification (e.g. should include trip length category to ensure a representative sample within fleets). Given the size and scope of this project, a transition period between existing and new methods are required. A one month transition period between SBRM implementation (February 27, 2008) and the sea day schedule needed to deploy observers (April 1, 2008) is insufficient. The time needed to expand the optimization tool to incorporate all coverage needed within the Region (fish, protected species, economic/social science, quota monitoring) will be substantial.

Specific responses

1. For herring we are not sure why the optimization procedure would result in an allocation of trips for the MA mid-water trawl fishery of 294% compared to the Omnibus Amendment's preferred alternative but only 35% for the NE mid-water trawl fishery.

At this time, the Mid-Atlantic and New England mid-water trawl fleets are fleets that are not included in the optimization tool (Rago et al. 2005) used to optimize sea days for the 2008 sea day schedule. The 2008 coverage is assigned on the basis of percent effort (trips). The number of days assigned to these fleets is similar to previous years.

2. In light of the above question, we are not sure of the objective for allocating observers differently than proposed in the Omnibus Amendment. We understand that the optimization model minimizes the variance of the estimated bycatch for a number of gear modes simultaneously but are not sure why it results in coverage levels so different than those proposed in the Omnibus Amendment. Is the difference primarily due to the use of more recent data to estimate coverage levels?

The difference between the 2008 Prioritized Coverage and the SBRM Omnibus Amendment sea days is not due to the use of more recent data; it is due to the difference in methods and scope between the optimization tool and other methods (including percent effort coverage) and SBRM Omnibus Amendment filter. In the SBRM Omnibus Amendment, 15 species groups and 39 fleets (comprised of 14 gear types, 3 mesh groups, and 2 regions) are identified. The number of sea days needed to achieve a 30%CV across all 15 species groups are further refined using the Importance Filter with 95% discards and 98% mortality cut points. The Importance Filter is a form of optimization but is not the optimization tool used to minimize the variance over all fleets. The optimization tool used to schedule sea days currently accommodates 3 gear types, four mesh groups, six regions, and two trip length categories for three species groups (see Rago et al. 2005 for stratification details). The optimization tool uses a finer stratification scheme than the SBRM Omnibus Amendment and is a subset of the SBRM species groups and gear types. As indicated in Wigley et al. (2007), the optimization tool can be expanded to encompass more species and gear types.

Additionally, the optimization tool is used for only a portion of the NEFOP sea days. The optimization of sea days for protected species is described in Rossman 2007. The methods used to optimize sea day coverage for turtles are similar to, but not exactly the same, as for marine mammals (pers. comm. D. Palka).

Given the differences in methods and scope between the current methods used to optimize sea days and the SBRM filter approach, the Prioritized 2008 sea days may be greater or lesser than the Omnibus Amendment sea days for individual fleets.

3. We think too much coverage is proposed for the multispecies special management programs and would like to know how changes or reductions observer coverage would affect the CVs in these programs. The realized CV for GB YTF in 2005 and 2006 was in the range of 12-14 percent, compared to our desired standard of 30 percent. The only management reason to do so is to monitor the GB YTF TAC under the US/CA Resource Sharing Understanding. So in order to monitor one TAC, we are probably using close to 2000 observer sea days (assuming 500 are in the eastern area- which I doubt). Put another way - $2.3 million of observer dollars are being used to track $3.5 million of GB YT). Even a small 10 percent reduction in sea days allocated to the US/CA area would free up 250 sea days that could be used to double mid-water trawl coverage, NE small mesh trawl coverage, or increase levels in any number of modes. (For example, no days are allocated to lobster pots – yet we often hear they are catching cod in substantial amounts. Even 25-50 days might help us determine of that is true).

The 3,000 sea days to monitor the US/CAN and B-day special programs represents the Regional Administer's determined coverage of approximately 30% of trips to monitor total allowable catch (TAC) for various species. This coverage rate has been in place since 2003 and there is a NEFOP call-in requirement. This is an example of the multi-purpose nature of the Northeast Fisheries Observer program where observer coverage is used to achieve multiple goals.

The SBRM fleet definitions did not separate trips according to their participation in US/CAN or B-day programs; instead, these special program trips are included into the fleets defined by similar gear type,

mesh size, and region *due to the limitation of identifying these special program trips in the VTR database.*

With the implementation of SBRM, the Regional Office has relinquished the 30% coverage rate. Thus, these days will enter the optimization tool in the future. It is expected that the number of sea days needed to achieve a 30%CV for the vessels fishing on Georges Bank will be less than number of sea days associated with the mandated 30% coverage rate. Impacts to the TAC monitoring program, in terms of precision of the estimates of landings and discards for each TAC species, is not known at the time.

It is possible to include these 3,000 sea days in the optimization; however, a transition period will be needed to re-align observer staff if significant changes in the sea day schedule occur.

4. Are all the observer DAS in the table assigned to the monitoring of fish bycatch rather than protected resources or marine mammal bycatch?

All sea days in the "Prioritized 2008 Coverage" column are sea days with sampling protocols to monitor fish/turtle bycatch. However, the NEFOP sampling protocols for fish/turtle also support monitoring of marine mammal bycatch. For gillnets, fish/turtle sampling protocols differ from marine mammal sampling protocols. Only one type of sampling protocol can be used per trip, therefore, the sea days to monitor only marine mammals and the sea days to monitor fish/turtles in the gillnet fleets are separate. The numbers of sea days associated with protected species sampling protocols for gillnets are given in "Justification" column in rows 8 and 9 and are not included in the summary totals.

5. It isn't clear what level of coverage should apply to many parts of the scallop fishery - should it be the level in the amendment preferred alternative, the level identified in the second column or another level (because only minor segments were included in the optimization model)?

At this time, the scallop dredge fleets are not among the fleets included in the optimization tool to optimize sea days for the 2008 sea day schedule (Rago et al. 2005). The 2008 coverage for open-access general category trips is assigned on a percent effort (trips) basis. The number of days assigned to this fleet is similar to previous years.

Industry funded coverage is approximately 10% of trips for the other scallop dredge fleets. In the Scallop FMP fishing year 2007 (March 1 2007 to February 29, 2008), the industry funded coverage level has translates into approximately 300 trips (1890 sea days).

A1) It seems like 60 of the 337 sea days for estimation of sea turtle bycatch are not labeled in the table although the total number of days allocated matches sum of the days described under item 3 including the 60 held in reserve.

The 337 sea days mentioned in "3. Coverage Levels That Incorporate the Recommended prioritization; Justification for Priorization", paragraph 7, refers to the Atlantic Cost funding source and have been allocated to the following fleets in row 36 (131 days), row 26 (10 days); row 24 (98 days, see justification); and row 22, (98 days, see justification). Sea days for estimating individual species bycatch, including sea turtle bycatch, are not specifically label in the Table 1. Since it is not known *a priori* which species will be encountered, the sea day coverage assigned to each fleet supports bycatch estimates of all species encountered on the observed trips.

A2) The Council is scheduled to take up the issue on Wed p.m. Will there be some one from the Science Center there who is prepared to answer any questions.

Yes.

Literature Cited

Rago, P.J., S.E. Wigley, and M.J. Fogarty. 2005. NEFSC bycatch estimation methodology: allocation, precision and accuracy. US Dept Commer, *Northeast Fish Sci Cent Ref Doc*. 05-09; 44p. On-line version: http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0509/

Rossman, MC. 2007. Allocation observer sea days to bottom trawl and gillnet fisheries in the Northeast and Mid-Atlantic regions to monitor and estimate incidental bycatch of marine mammals. US Dept Commer, *Northeast Fish Sci Cent Ref Doc*. 07-19; 17 p. On-line version: http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0719/

Wigley S.E., P.J. Rago, K. Sosebee and D. Palka. 2007. The Analytic Component to the Standardized Bycatch Reporting Methodology Omnibus Amendment: Sampling Design, and Estimation of Precision and Accuracy (2nd Edition). US Dept Commer, *Northeast Fish Sci Cent Ref Doc*. 07-09; 156 p. On-line version: http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0709/