Framework Adjustment 5
To the
Northeast Skate Complex FMP
and 2018-2019 Specifications

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

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1.0 Executive Summary – To BE UPDATED

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; the ABC was set to equal the Annual Catch Limit (ACL).

This framework action and specifications would implement changes to specifications based on updated data and research and would add a new seasonal allocation of the skate wing fishery TAL.

The *need* for this action is to set the annual catch limit specifications (ABC, ACL, ACT, and TALs) for FY 2016 and FY 2017 to maintain the skate fisheries while adequately minimizing the risk of overfishing the seven skate stocks. This action also proposes to change the skate wing seasonal management by apportioning a percentage of the wing TAL to each season. There are several *purposes*: to adopt specifications, to adopt possession limits and to modify the seasonal management of the wing fishery.

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*
    - *Revised Annual Catch Limit Specifications.*

- *Barndoor Possession Limit Alternatives*
    - .

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 and 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 0. 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*
    - *Annual Catch Limit Specifications*.
- *Barndoor Skate Possession Limit Alternatives*

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

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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
GARFO	Greater Atlantic Regional Fisheries Office
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 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 stock complex. The FMP has been updated through a series of amendments and framework adjustments.

Amendment 3 to the FMP implemented a new ACL management framework that capped catches at levels determined from survey biomass indices and median exploitation ratios, and addressed the rebuilding of smooth and thorny skates. 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 ACL for the complex. Framework Adjustment 2 set specifications for FY 2014 and FY 2015, which decreased the ACL for the complex, and also modified the VTR and dealer reporting codes for the skate wing and bait fisheries. Framework Adjustment 3 set specifications for FY2016 and FY2017 for the skate wing and bait fisheries and established seasonal management for the wing fishery. Framework Adjustment 4 modified effort controls for the skate bait fishery.

Skates are harvested in two very different fisheries, one for lobster bait and one for wings for food. Fishery specific Total Allowable Landings (TALs) and possession limits are set as part of specifications. Both fisheries have independent seasonal management structures. Both fisheries are subject to effort controls and Accountability Measures. This framework is primarily intended to set specifications and possession limits for FY 2018 and FY 2019 and to remove the prohibition on possessing barndoor skate.

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 possession prohibitions) to 1) set an Annual Catch Limit (ACL) for FY 2018 and FY 2019 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) for FY 2018 and FY 2019 to maintain the skate fisheries while adequately minimizing the risk of overfishing for the seven skate species. 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, thorny skate is overfished and in a rebuilding plan. Smooth skate is also in a rebuilding plan. 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 sink gillnet gear are available for winter skate; all revised estimates are incorporated into the specifications. Barndoor skate have rebuilt; development of an appropriate possession limit is now necessary.

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 largely an incidental fishery that includes 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. However, a smaller component of the fishery targets skates and account for a large amount of landings. A description of available information about these fisheries can be found in Section 6.5.1.

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 (NEFSC, 2000). 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 lbs. 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 31, 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 ACL 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.

In June 2011, the Council requested 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 methodology; 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.

Framework Adjustment 2 (NEFMC, 2014) set specifications for FY 2014 and FY 2015 also following the Amendment 3 ACL methodology. It also incorporated final discard mortality rate estimates for little (22%), winter (9%), smooth (60%), and thorny (23%) skate for trawl gear. Framework Adjustment 2 also modified the VTR and dealer reporting codes for the skate wing and bait fisheries.

Framework Adjustment 3 (NEFMC, 2016) set specifications for FY2016 and FY 2017 also following the Amendment 3 ACL methodology. It also incorporated final discard mortality rate estimates for little (48%) and winter skates (34%). Seasonal management was also established int eh wing fishery that apportioned the TAL between two seasons: Season 1 (May 1 – August 31) and Season 2 (September 1 – April 30).

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

Principally, due to 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 was to set catch limits to 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).

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 2016-2017 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	2014-2016	MSY Target
Barndoor	2.76	1.60	1.57
Clearnose	2.94	0.59	0.66
Little	2.14	5.49	6.15
Rosette	2.25	0.047	0.048
Smooth	2.68	0.25	0.27
Thorny	1.44	0.18	4.13
Winter	1.87	6.65	5.66
Annual Catch Limit (ACL/ABC)		31,327	
MSY			36,794

Because the 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."

[1] The survey biomass value for little skate is the arithmetic average of the 2015-2017 spring surveys.

Although the Skate FMP had no 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 redefined 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 27,596 mt.

At current skate biomass, the ACT will be set at 23,495 mt, allowing for a 25% buffer from the ACL to account for scientific and management uncertainty. Deducting the 2014-2016 discards to account for bycatch results in an aggregate TAL of 13,281 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 2016 and the three year average stratified mean biomass for skates, using the 2015-2017 spring survey data for little skate and the 2014-2016 fall survey data for other managed skate stocks. For skates, the Council set the ACL 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 (2014-2016).

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 winter skate captured by sink gillnet gear.

3.6 Stock Status

Stock status is described in more detail in Section 6.1.2. Based on survey data through spring 2017 and catch data through calendar year 2016, barndoor and winter skate biomass are above the target, and clearnose, little, rosette, and smooth skate biomass are 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).

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.

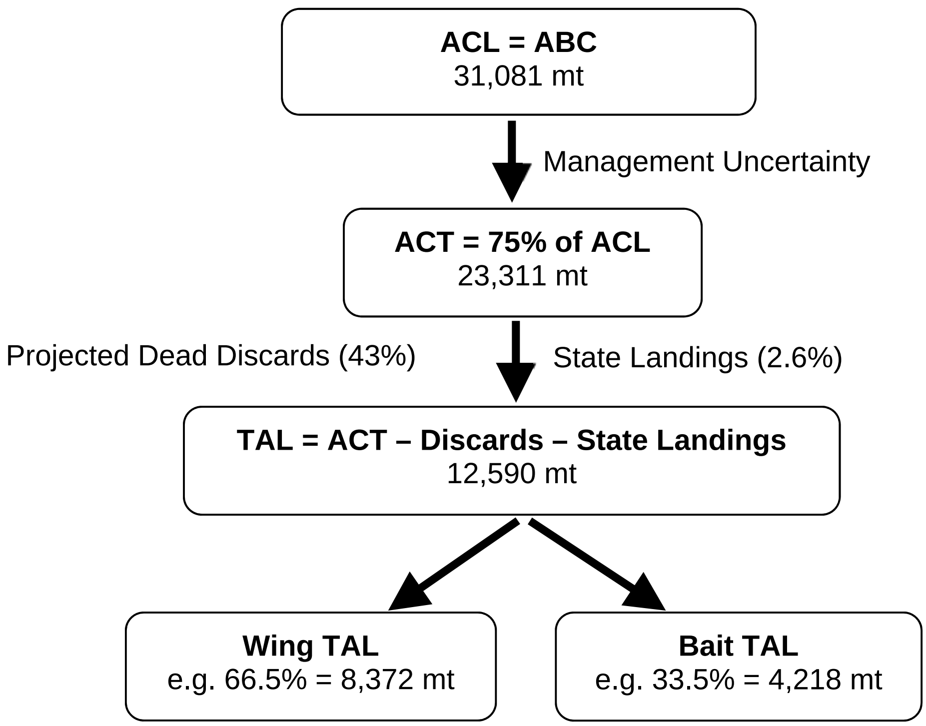
This specification document proposes no changes to skate EFH descriptions or designations, but Amendment 2 to the Skate FMP will be approved as a part of a developing Omnibus EFH Amendment that will re-evaluate skate EFH.

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 2016-2017 fishing years (see diagram below) in the final regulations for the specifications package and would not incorporate all of the updated scientific data and information.

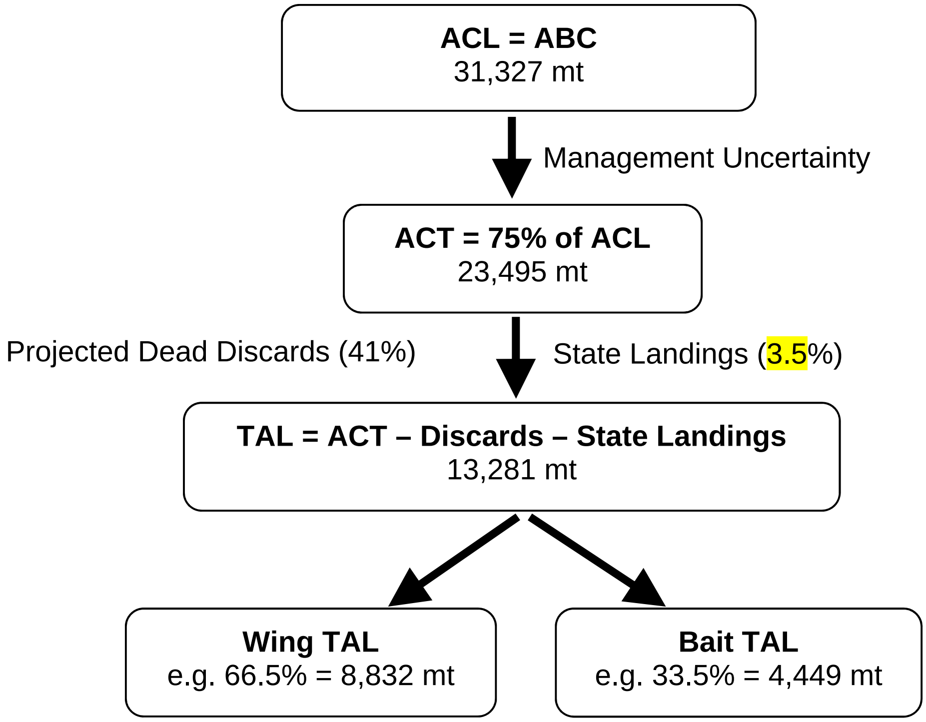


Rationale: The No Action alternative would not incorporate the updated survey biomass indices and discard mortality rate estimate. The ACL would be maintained at a lower level than the revised data would suggest is appropriate over the time period when specifications are being set. The No Action alternative may result in a slightly higher risk of not achieving optimum yield.

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 2017 and the three year average stratified mean biomass for skates, using the 2015-2017 spring survey data for little skate and the 2014-2016 fall survey data for the other managed skate species. For skates, the Council set the ACL to be equal to the ABC. TALs are set according to Amendment 3 procedures that assume that future discards would be equivalent to the average rate from the most recent three years (2014-2016); state landings would approximate to 3.5% of the total allowable landings, which represents the latest 3 year average of state landings.

The ABC/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/ACL would increase to **31,327** mt. The ACL is a limit that would trigger AMs if catches exceed this amount. The ACT would likewise increase to **23,495** mt. After deducting amounts for projected dead discards (calculated from applying the weighted discard mortality rate to the total discards from 2014-2016.The projected dead discards is calculated from the ratio between 2014-2016 dead discards and total catch), the TAL would increase to **13,281** mt. The proportion of dead discards in the catch decreased to **41%**, primarily due to an increase in overall skate discards. The incorporation of revised discard mortality rate in sink gillnet gear for winter (14%) skate slightly reduced the historic catch and affected the catch/biomass medians; it also slightly reduced the amount of discards attributed to dead discards for this gear type.



Rationale: This alternative would make the specifications (catch and landings limits) more consistent with the procedures approved in Amendment 3 and with updated science that has been analyzed by the Skate PDT and peer reviewed by the SSC. Framework 5 is not intended to develop alternative ACL/ACT/TAL calculation methodologies; instead it enacts the existing methodology in the FMP using updated data. 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 most recently available 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.

4.2 Barndoor Skate Possession Limits Alternatives

4.2.1 Option 1: No Action

The No Action alternative would not remove the prohibition on possessing barndoor skate.

Rationale: This alternative would allow for additional rebuilding of barndoor skate to continue.

4.2.2 Option 2: Barndoor Skate Possession Limit of 500 lb

This alternative would allow vessels to land a maximum of 500 lb of barndoor skate wings (1,135 lb whole weight) as part of their skate wing possession limit. Total pounds of skate wings on board would not be allowed to exceed 2,600 lb in Season 1 or 4,100 lb in Season 2. Vessels would not be required to land the maximum allowed poundage of barndoor skate.

Rationale: This alternative would take a cautious approach to landing barndoor skate. Barndoor skate was absent from the NEFSC trawl survey for roughly 3 decades and was petitioned to be listed under the ESA in 1999. Barndoor skate was declared rebuilt in 2016. This cautious approach would allow time for markets to develop and to see how the stock responds to commercial harvest.

4.2.3 Option 3: Proportional Barndoor Skate Possession limit

This alternative would establish a barndoor skate wing possession limit that reflected its contribution to overall observed catch based on observer data. For FY2018 and FY2019 this would result in a possession limit of 650 lb wings (25%) in Season 1 and 1,025 lb wings (25%) in Season 2.

Vessels would be allowed to land up to this amount on a trip. Total pounds of skate wings on board would not be allowed to exceed 2,600 lb in Season 1 or 4,100 lb in Season 2. Vessels would not be required to land the maximum allowed poundage of barndoor skate.

Rationale: This alternative would allow landings of barndoor skate in a higher amount in the fall when they are encountered more by the directed fleet. This would be expected to reduce regulatory discards of barndoor skate. The alternative would also allow the possession limit to be revisited in the next specifications cycle and potentially adjusted if any significant changes in the observed interactions with barndoor skates occurs.

4.2.4 Option 4: Mixed Skate Wing Possession limit

This alternative would not establish a specific barndoor skate possession limit. Total pounds of skate wings on board would not be allowed to exceed 2,600 lb in Season 1 or 4,100 lb in Season 2 but vessels could land wings from allowed species in desired quantities up to that amount. This would not restrict landings of barndoor skate and would allow vessels to shift their effort from winter skate to barndoor skate, if desired.

Rationale: This would not restrict fishing on barndoor skate beyond the overall skate wing possession limit.

4.2.5 Option 5: Discard restriction

Any skate species already winged would not be allowed to be then discarded in order to land barndoor skate.

Rationale: This would prevent any unnecessary mortality on skate and would formalize what is likely general practice by fishermen.

5.0 Considered but Rejected Alternatives

No management issues arose during the development of this specifications package that were not adopted as alternatives by the Council.

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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 are 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 FW 5.

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

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, 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, 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).

Little skate are found along the Mid-Atlantic, Southern New England, and Gulf of Maine coastline, in shallower waters than barndoor, rosette, smooth, thorny, and winter skates. Rosette, smooth, and thorny are typically deep-water species. The survey catches rosette skate along the shelf edge in the Mid-Atlantic region, while smooth and thorny are found in the Gulf of Maine and along the northern edge of Georges Bank. Winter skate are found on the continental shelf of the Mid-Atlantic and Southern New England regions, as well as Georges Bank 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.

6.1.2 Stock status

The stock status relies entirely on the annual NMFS trawl survey. The fishing mortality reference points are based on changes in survey biomass indices. If the three-year moving average of the survey biomass index for a skate species declines by more than the average CV of the survey time series, then fishing mortality is assumed to be greater than F_{MSY} and it is concluded that overfishing is occurring for that species (NEFSC 2007a). The average CVs of the indices are given by species in **Error! Not a valid bookmark self-reference.**. Except for little skates, the abundance and biomass trends are best represented by the fall survey, which has been updated through 2014 (**Error! Not a valid bookmark self-reference.**). Little skate abundance and biomass trends are best represented by the spring survey, which has been updated through 2015 (**Error! Not a valid bookmark self-reference.**). 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 7.1.2).

Based on survey data updated through fall 2014/spring 2015, only thorny skate remained in an overfished condition (**Error! Not a valid bookmark self-reference.**).

For barndoor skate, the 2014-2016 NEFSC autumn average survey biomass index of 1.60 kg/tow is above the biomass threshold reference point (0.78 kg/tow) and the B_{MSY} proxy (1.57 kg/tow) [**Error! Not a valid bookmark self-reference.**]. The 2014-2016 average index is above the 2013-2015 index by 0.5%. It is recommended that this stock is not overfished and overfishing is not occurring.

For clearnose skate, the 2014-2016 NEFSC autumn average biomass index of 0.59 kg/tow is above the biomass threshold reference point (0.33 kg/tow) but below the B_{MSY} proxy (0.66 kg/tow) [**Error! Not a valid bookmark self-reference.**]. The 2014-2016 index is below the 2013-2015 index by 19.5% which is less than the threshold percent change of 40%. It is recommended that this stock is not overfished and overfishing is not occurring.

For little skate, the 2015-2017 NEFSC spring average biomass index of 5.49 kg/tow is above the biomass threshold reference point (3.07 kg/tow) but below the B_{MSY} proxy (6.15 kg/tow) [**Error! Not a valid bookmark self-reference.**]. The 2015-2017 average index is below the 2014-2016 average by 2.6% which is less than the threshold percent change of 20%. It is recommended that this stock is not overfished and overfishing is not occurring.

For rosette skate, the 2014-2016 NEFSC autumn average biomass index of 0.047 kg/tow is above the biomass threshold reference point (0.024 kg/tow) but below the B_{MSY} proxy (0.048 kg/tow) [**Error! Not a valid bookmark self-reference.**]. The 2014-2016 index is below the 2013-2015 index by 7.9% which is less than the threshold percent change of 60%. It is recommended that this stock is not overfished and overfishing is not occurring.

For smooth skate, the 2014-2016 NEFSC autumn average biomass index of 0.25 kg/tow is above the biomass threshold reference point (0.134 kg/tow) but below the B_{MSY} proxy (0.27 kg/tow) [**Error! Not a valid bookmark self-reference.**]. The 2014-2016 index is above the 2013-2015 index by 21.4%. It is recommended that this stock is not overfished and overfishing is not occurring.

For thorny skate, the 2014-2016 NEFSC autumn average biomass index of 0.18 kg/tow is well below the biomass threshold reference point (2.06 kg/tow) [**Error! Not a valid bookmark self-reference.**]. The 2014-2016 index is higher than the 2013-2015 index by 3.7%. It is recommended that this stock is overfished but overfishing is not occurring.

For winter skate, the 2014-2016 NEFSC autumn average biomass index of 6.65 kg/tow is above the biomass threshold reference point (2.83 kg/tow) and above the B_{MSY} proxy (5.66 kg/tow) [**Error! Not a valid bookmark self-reference.**]. The 2014-2016 average index is above the 2013-2015 index by 24.2%. It is recommended that this stock is not overfished and overfishing is not occurring.

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)	**Autumn**	**Autumn**	**Spring**	**Autumn**	**Autumn**	**Autumn**	**Autumn**
Time Series Basis	**1963-1966**	**1975-2007**	**1982-2008**	**1967-2007**	**1963-2007**	**1963-2007**	**1967-2007**
Strata Set	**Offshore 1-30, 34-40**	**Offshore 61-76, Inshore 17,20,23,26,29,32,35,38,41,44**	**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**	**Offshore 61-76**	**Offshore 1-30, 34-40**	**Offshore 1-30, 34-40**	**Offshore 1-30, 34-40, 61-76**
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	1.07	0.77	6.90	0.056	0.14	0.11	2.95
2014	1.62	0.61	6.54[a]	0.053	0.22	0.21	6.95
2015	2.08	0.82	6.82	0.045	0.25	0.19	6.15
2016	1.09	.339	3.56[b]	0.044	0.27	0.13	6.84
2017			6.09				
2010-2012 3-year average	1.22	0.97	8.35	0.033	0.23	0.18	6.68
2011-2013 3-year average	1.21	1.01	7.11	0.042	0.22	0.12	4.96
2012-2014 3-year average	1.41	0.77	6.99[a]	0.048	0.19	0.13	5.06
2013-2015 3-year average	1.59	0.73	6.75 [a]	0.051	0.21	0.17	5.35
2014-2016 3-year average	1.60	0.59	5.64[b]	0.047	0.25	0.18	6.65
2015-2017 3-year average			5.49				
Percent change 2011-2013 compared to 2010-2012	-1.0	+3.1	-14.9	+28.8	-5.0	-31.9	-25.7
Percent change 2012-2014 compared to 2011-2013	+16.5	-23.3	-1.6	+14.6	-12.5	+8.7	+2.0
Percent change 2013-2015 compared to 2012-2014	+12.9	-4.8	-3.4	+6.0	+6.8	+26.3	+5.7
Percent change 2014-2016 compared to 2013-2015	+0.5	-19.5	-16.8	-7.9	+21.4	+3.7	+24.2
Percent change 2015-2017 compared to 2014-2016			-2.6				
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

[a] No survey tows completed south of Delaware in spring 2014. Values for 2014 were adjusted for missing strata (i.e., Offshore 61-68, Inshore 32,35, 38, 41, 44) but may not be fully comparable to other surveys which sampled all strata.

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 kg weight (Bigelow & Schroeder, 1953). The maximum observed length in the NEFSC trawl survey was 140 cm total length in the 2007 survey. 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. Coutré et al. (2013) re-examined life history parameters of barndoor skate in the Closed Areas I and II on Georges Bank; changes occurred in von Bertalanffy parameters (L_∞ = 155 cm TL; k = 0.10 yr^{-1}) and an increase in age at 50% maturity compared to Gedamke et al. (2005). Coutré et al. (2013) suggest barndoor skate are subject to density dependence effects based on the plasticity in life history parameters observed in the 10 year gap between studies. 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 (NEFSC, 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. Small skates (<=80 cm TL) consumed approximately 5 kg per year of prey items, while large skates (>80 cm TL) consumed approximately 10 to 20 kg per year (Link and Sosebee, 2008). 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. Small skates (<= 60 cm TL consumed approximately 1 - 2 kg per year of prey items, while large skates (>60cm TL) consumed approximately 5 kg per year (Link and Sosebee, 2008). 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 survivability in little skate when exposed to air; little skates in summer exhibited higher mortality 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. Small skates (<= 30 cm TL) consumed approximately 500 g per year of prey items, while large skates (>30 cm TL) consumed approximately 2.5 kg per year (Link and Sosebee, 2008). 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. Small skates (<= 30 cm TL) consumed approximately 0.5 - 1 kg per year of prey items, while large skates (>30 cm TL) consumed approximately 2 - 3 kg per year (Link and Sosebee, 2008). 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. Small skates (<=30 cm TL) consumed approximately 200 g per year of prey items, while large skates (>30 cm TL) consumed approximately 800 g per year (Link and Sosebee, 2008). 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 $k = 0.11$, $L_\infty = 127$ cm TL, $t_o = -0.37$; calculated estimates for female thorny skates were: $k = 0.13$, $L_\infty = 120$ 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 (<=30 cm TL) consumed approximately 500 g per year of prey items, while medium (30-60 cm TL) and large skates (>60 cm TL) consumed approximately 1.5 kg and 12 kg per year, respectively (Link and Sosebee, 2008). 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 $k = 0.074$, $L_\infty = 121.8$ cm TL, $t_o = -1.418$; calculated estimates for female winter skates were: $k = 0.059$, $L_\infty = 137.4$ 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).

Frisk and Miller (2006) examined vertebral samples of winter skate from the northwestern Atlantic. Maximum observed age was 20.5 years (a male winter skate of 74 cm TL); the oldest female was estimated to be 19.5 years (76 cm TL). Von Bertalanffy curves were fit for the northwestern Atlantic ($k = 0.07$, $L_\infty = 122.1$ cm TL, $t_o = -2.07$, $p < 0.0001$, $n = 229$) and for the GOM region ($k = 0.064$, $L_\infty = 131.40$ cm TL, $t_o = -1.53$).

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 and 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 (31-60 cm TL) skates consumed approximately 2 kg per year of prey items, while large skates (>60 cm TL) consumed approximately 9 kg per year (Link and Sosebee, 2008). 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; for an outline of these studies see the literature review in the 2012-2013 specifications package (NEFMC 2012). 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 ACL, based on this paper.

Since the Council adopted a 50% discard mortality assumption for setting the ACL 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 scallop dredge vessels. 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 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.

Knotek (2015) examined the immediate and short-term discard mortality rate of little, winter, and barndoor skates in scallop dredge gear by evaluating reflex impairment and injury indexes. A total of 295 tows were conducted on 6 research cruises; tow duration ranged from 10-90 minutes. On deck exposure time ranged from 0-30 minutes. The PDT recommended using the discard mortality rate estimates for little and winter skate only, as the researchers considered the sample size was insufficient for an accurate estimate for barndoor skate. The SSC approved revising the discard mortality rate estimates for little (48%) and winter skate (34%) for scallop dredge gear based on this study.

Sulikowski et al. (in review) estimated the discard mortality of winter skate in commercial sink gillnets. A total of 28 trips were made with soak time duration varying from 2-5 days, up to 14 days (to simulate longer soak times caused by bad weather). The models provided sex-specific final discard mortality rate estimates of 11% and 17% for males and females, respectively. The PDT recommended using an average discard mortality rate of 14% because it is not possible to determine the sex ratio of winter skate from the trawl survey at this time. The SSC approved revising the discard mortality rate estimate for winter skate (14%) for sink gillnet gear based on this study.

6.1.5 Estimated discards by gear

Another way to evaluate the potential interactions between skate fishing and smooth and thorny skate distributions is to examine estimated discards. Discards were estimated through calendar year 2016 by gear (Table 4). 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 2016 were 33,270 mt (Table 4). Discards decreased by 12.2% over the 2015 estimates. The assumed discard rate for 2016 is 41%. Projected dead discards are estimated to be 10,436 mt. Total live and dead discards for the Northeast Skate Complex for all gear types are contrasted in Table 5. 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, scallop dredge gear, which has been updated based on Knotek (2015), and sink gillnet gear, which has been updated based on Sulikowski et al (in review).

ards (mt) of skates (all species) by gear type from all areas combined, 1964 - 2016

Half 1						Half 2							
ter wl	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
14	0	12	6,434	60,321		402	37,992	0	7	8,288	46,690		107,011
44	0	17	5,029	64,115		491	41,212	0	5	8,940	50,647		114,762
21	0	26	5,543	68,701		625	35,869	0	7	6,524	43,025		111,726
72	0	22	2,882	60,095		470	35,053	0	8	4,735	40,267		100,362
09	0	37	3,672	60,142		414	34,010	0	10	4,890	39,324		99,466
79	0	32	2,294	57,602		669	29,299	0	6	3,017	32,991		90,593
78	0	22	1,838	46,069		584	26,802	0	7	2,742	30,135		76,204
09	0	21	1,916	36,965		769	20,097	0	8	2,552	23,426		60,391
61	0	31	2,000	34,718		711	17,965	0	13	2,559	21,248		55,966
82	0	31	2,103	37,134		724	19,738	0	15	1,846	22,323		59,457
49	0	58	1,994	39,099		778	17,754	0	24	2,845	21,401		60,499
97	283	61	2,615	28,883		744	17,313	36	26	4,757	22,875		51,758
35	66	99	4,086	27,200		441	19,650	0	37	8,313	28,441		55,641
17	39	169	7,210	34,564		314	21,679	0	47	10,106	32,146		66,710
94	0	190	9,048	45,161		661	23,484	0	66	14,452	38,662		83,823
30	26	157	9,186	48,918		971	27,982	0	67	13,540	42,560		91,478
19	23	195	9,900	50,993		354	29,633	0	96	11,104	41,186		92,179
86	92	264	9,502	53,547		257	26,460	0	93	12,818	39,628		93,175
61	117	95	7,779	51,853		197	37,880	7	84	12,572	50,740		102,593
54	116	118	8,655	58,714		226	33,711	22	70	11,965	45,994		104,708
49	152	126	8,337	57,442		87	31,261	53	94	9,903	41,398		98,840
53	214	119	6,821	47,628		173	23,506	70	81	9,483	33,314		80,941
13	256	173	7,821	45,569		171	25,517	83	88	12,080	37,938		83,508
41	264	143	12,687	49,927		364	21,178	46	86	18,953	40,627		90,554
53	158	166	13,791	50,106		341	21,180	46	91	19,077	40,734		90,840
63	73	74	18,206	56,558		264	20,260	17	111	19,452	40,104		96,661
63	223	347	17,162	67,986		273	39,008	71	73	23,458	62,883		130,869
82	232	99	19,314	43,366		297	17,478	44	113	18,812	36,744		80,110
19	255	269	13,679	30,072		1,270	19,609	0	107	22,823	43,809		73,881
86	35	211	11,268	19,442		28	26,825	1	110	12,700	39,663		59,105
47	11	190	6,484	64,165		28	17,856	1	230	5,621	23,735		87,900
80	8	443	7,385	29,846		30	11,215	1	350	19,481	31,077		60,922
22	26	414	8,376	25,066		27	30,622	8	125	11,258	42,039		67,105
84	34	388	10,130	18,166		30	7,398	4	90	6,059	13,581		31,747
03	9	218	9,069	15,425		30	10,488	1	252	8,543	19,314		34,739
55	4	598	8,542	11,823		24	9,857	0	261	6,149	16,291		28,113
83	6	181	9,024	16,009		26	18,175	0	791	4,959	23,951		39,960
75	0	404	3,615	24,114		22	8,449	0	207	3,249	11,927		36,040
68	1	392	6,655	19,237		25	10,067	0	2,718	8,046	20,857		40,094

Table 4 - Continued

	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 1		Grand Total
2003	38	18,258	8	522	7,222	26,048		18	17,728	0	442	7,965	26,154		52,203
2004	9	14,324	4	450	5,544	20,331		16	21,736	0	503	4,236	26,491		46,822
2005	88	14,304	2	1,041	6,412	21,848		51	19,269	0	559	4,746	24,626		46,473
2006	55	10,552	0	854	4,779	16,241		18	12,368	1	362	5,574	18,323		34,564
2007	70	14,566	0	990	5,812	21,438		22	16,214	0	756	6,488	23,481		44,919
2008	119	10,391	2	1,232	4,810	16,553		56	13,138	0	744	4,539	18,478		35,030
2009	164	11,054	1	1,634	4,903	17,756		185	14,698	0	609	4,193	19,685		37,441
2010	269	9,461	0	1,058	7,655	18,443		209	11,872	0	1,344	4,896	18,322		36,765
2011	172	11,768	3	1,976	5,063	18,982		171	14,760	0	1,205	3,642	19,777		38,759
2012	46	9,941	3	1,657	4,215	15,861		53	13,386	0	825	4,149	18,412		34,274
2013	308	14,444	0	1,401	3,647	19,800		454	16,940	0	523	4,957	22,874		42,673
2014	14	12,634	0	1,675	7,514	21,837		111	14,427	0	880	5,502	20,919		42,757
2015	60	11,596	0	976	6,099	18,731		307	14,605	0	696	3,556	19,164		37,895
2016	86	8,090	0	1,248	4,821	14,245		132	12,228	0	614	6,051	19,025		33,270

Table 5 - Total Live and Dead Discards (mt) of Skates (all species) for all gear types from 1968 - 2016

Year	Live Discards	Dead Discards
1968	99466	21620
1969	90593	18454
1970	76204	15914
1971	60391	13715
1972	55966	12102
1973	59457	12888
1974	60499	13357
1975	51758	12225
1976	55641	14481
1977	66710	16575
1978	83823	21350
1979	91478	22366
1980	92179	21131
1981	93175	20552
1982	102593	21514
1983	104708	22221
1984	98840	20856
1985	80941	16931
1986	83508	18493
1987	90554	23599
1988	90840	22969
1989	96661	25729
1990	130869	32904
1991	80110	24462
1992	73881	24182
1993	59105	17657
1994	87903	21617
1995	60924	19670
1996	67107	18683
1997	31748	10423
1998	34740	11364
1999	28154	9732
2000	39961	12631
2001	36041	8589
2002	40094	13095
2003	52204	14442
2004	46823	11397
2005	46474	13028
2006	34565	10290
2007	44920	13483
2008	35031	10367
2009	37441	10515
2010	36766	10953
2011	38760	11119
2012	34274	10452
2013	42674	11834
2014	42758	13023
2015	37894	10708
2016	33262	10703

6.1.6 Evaluation of Fishing Mortality and Stock Abundance

Benchmark assessment results from SAW 44 are given in NEFSC (2007a; 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 2016 (2017 spring survey for little skate) are given in Table 3. At this time, overfishing is not occurring on any skate species.

6.1.7 Non-Target Species

The skate wing fishery is largely an incidental fishery; fishing effort is expended targeting more profitable species managed under separate FMPs, e.g. NE multispecies and monkfish FMPs. These fisheries have ACLs, effort controls (DAS), possession limits, gear restrictions, and other measures that constrain overall effort on skates. For a full description of the fishing impacts on trips targeting NE multispecies and monkfish please refer to Framework 56 to the NE Multispecies FMP and Framework 10 of the Monkfish FMP (www.nefmc.org). A small number of trips could be described as targeting skates; bycatch on these trips are limited. Monkfish and dogfish comprise the majority of this bycatch and are described below.

NE Multispecies

The Northeast Multispecies FMP manages twenty stocks under a dual management system which breaks the fishery into two components: sectors and the common pool. For stocks that permit fishing, each sector is allotted a share of the each stock's ACL that consists of the sum of individual sector member's potential sector contribution based on their annual catch entitlements. Sector allocations are strictly controlled as hard total allowable catch limits and retention is required for all stocks managed under an ACL. Overages are subject to accountability measures including payback from the sector's allocation for the following year. Common pool vessels are allocated a number of days at sea (DAS) and their effort further is controlled by a variety of measures including trip limits, closed areas, minimum fish size and gear restrictions varying between stocks. Only a very small portion of the ACL is allotted to the common pool. For more detail regarding control of fishing effort on NE Multispecies, please see Framework 55 of the NE Multispecies FMP.

6.1.7.1 Monkfish

Life History: Monkfish, *Lophius americanus*, also called goosefish, occur in the western North Atlantic from the Grand Banks and northern Gulf of St. Lawrence south to Cape Hatteras, North Carolina. Monkfish occur from inshore areas to depths of at least 2,953 ft. (900 m). Monkfish undergo seasonal onshore-offshore migrations. These migrations may relate to spawning or possibly to food availability.

Female monkfish begin to mature at age 4 with 50 percent of females maturing by age 5 (about 17 in [43 cm]). Males generally mature at slightly younger ages and smaller sizes (50 percent maturity at age 4.2 or 14 in [36 cm]). Spawning takes place from spring through early autumn. It progresses from south to north, with most spawning occurring during the spring and early summer. Females lay a buoyant egg raft or veil that can be as large as 39 ft. (12 m) long and 5 ft. (1.5 m) wide, and only a few mm thick. The larvae hatch after about 1 to 3 weeks, depending on water temperature. The larvae and juveniles spend several months in a pelagic phase before settling to a benthic existence at a size of about 3 in (8 cm).

Population Management and Status: NMFS implemented the Monkfish FMP in 1999 (NEFMC and MAFMC 1998). The FMP included measures to stop overfishing and rebuild the stocks through a number of measures. These measures included:

- Limiting the number of vessels with access to the fishery and allocating DAS to those vessels;
- Setting trip limits for vessels fishing for monkfish; minimum fish size limits;
- Gear restrictions;
- Mandatory time out of the fishery during the spawning season; and
- A framework adjustment process.

The Monkfish FMP defines two management areas for monkfish (northern and southern), divided roughly by an east-west line bisecting Georges Bank. Monkfish in both management regions are not overfished and overfishing is not occurring. In recent years the monkfish fishery has fallen fall short of reaching its TAL, despite a healthy stock status. In 2017, limited access monkfish vessels were allocated 45.2 DAS, of which 37 could be used in the southern management area. Additional information on monkfish management can be found on the NEFMC website (http://www.nefmc.org/monk/index.html).

6.1.7.2 Dogfish

Life History: The spiny dogfish, *Squalus acanthias*, occurs in the western North Atlantic from Labrador to Florida. Regulators consider spiny dogfish to be a unit stock off the coast of New England. In summer, dogfish migrate northward to the Gulf of Maine-Georges Bank region and into Canadian waters. They return southward in autumn and winter. Spiny dogfish tend to school by size and, when mature, by sex. The species bears live young, with a gestation period of about 18 to 22 months, and produce between 2 to 15 pups with an average of 6. Size at maturity for females is around 31 in (80 cm), but can vary from 31 to 33 in (78 cm to 85 cm) depending on the abundance of females.

Population Management and Status: The NEFMC and MAFMC jointly develop the spiny dogfish FMP for federal waters. The Atlantic States Marine Fisheries Commission (ASMFC) also developed a plan for state waters. Spawning stock biomass of spiny dogfish declined rapidly in response to a directed fishery during the 1990's. NFMS initially implemented management measures for spiny dogfish in 2001. These measures have been effective in reducing landings and fishing mortality. NMFS declared the spiny dogfish stock rebuilt for the purposes of U.S. management in May 2010.Based upon the 2015 updated stock assessment performed by the Northeast Fisheries Science Center, the spiny dogfish stock is not presently overfished and overfishing is not occurring. The spiny dogfish fishery is managed with an ACL, commercial quota, and possession limits (currently 6,000 lb per trip). Similar to skates, there is a large degree of overlap between spiny dogfish and NE Multispecies trips where dogfish are landed incidentally to groundfish.

6.2 Protected Resources

6.2.1 Species Present in the Area

Numerous protected species inhabit the environment within the monkfish FMP management unit (Table 6). These species are under NMFS jurisdiction and are afforded protection under the Endangered Species Act (ESA) of 1973 and/or the Marine Mammal Protection Act (MMPA) of 1972.

Table 6 - Species protected under the ESA and/or MMPA that may occur in the affected environment of the monkfish fishery. Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks.

Species	Status[2]	Potentially affected by this action?
Cetaceans		
North Atlantic right whale (Eubalaena glacialis)	***Endangered***	***Yes***
Humpback whale, West Indies DPS (Megaptera novaeangliae)[3]	***Protected (MMPA)***	***Yes***
Fin whale (Balaenoptera physalus)	***Endangered***	***Yes***
Sei whale (Balaenoptera borealis)	***Endangered***	***Yes***
Blue whale (Balaenoptera musculus)	***Endangered***	***No***
Sperm whale (Physeter microcephalus)	***Endangered***	***No***
Minke whale (*Balaenoptera acutorostrata*)	Protected (MMPA)	Yes
Pilot whale (*Globicephala spp.*)[4]	Protected (MMPA)	Yes
Risso's dolphin (*Grampus griseus*)	Protected (MMPA)	Yes
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Protected (MMPA)	Yes
Short Beaked Common dolphin (*Delphinus delphis*)[5]	Protected (MMPA)	Yes
Spotted dolphin (*Stenella frontalis*)	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus)[6]	***Protected (MMPA)***	***Yes***
Harbor porpoise (Phocoena phocoena)	***Protected (MMPA)***	***Yes***
Sea Turtles		
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	Yes
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered	Yes
Green sea turtle, North Atlantic DPS (*Chelonia mydas*)[7]	Threatened	Yes
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic Ocean DPS	Threatened	Yes
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Shortnose sturgeon (*Acipenser brevirostrum*)	Endangered	No
Atlantic salmon (*Salmo salar*)	Endangered	Yes
Atlantic sturgeon *(Acipenser oxyrinchus)*		
Gulf of Maine DPS	Threatened	Yes
New York Bight DPS, Chesapeake Bay DPS, Carolina DPS & South Atlantic DPS	Endangered	Yes
Cusk (*Brosme brosme)*	Candidate	Yes
Pinnipeds		
Harbor seal (*Phoca vitulina*)	Protected (MMPA)	Yes

Gray seal (*Halichoerus grypus*)	Protected (MMPA)	Yes
Harp seal (*Phoca groenlandicus*)	Protected (MMPA)	Yes
Hooded seal (*Cystophora cristata*)	Protected (MMPA)	Yes
Critical Habitat		
North Atlantic Right Whale[8]	ESA (Protected)	No
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA (Protected)	No

Notes:
[1] A strategic stock is defined under the MMPA as a marine mammal stock for which: (1) the level of direct human-caused mortality exceeds the potential biological removal level; (2) based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Section 3 of the MMPA of 1972).
[2] The status of the species is defined by whether the species is listed under the ESA as endangered (species are at risk of extinction) or threatened (species at risk of endangerment), or protected under the MMPA. Note, marine mammals listed under the ESA are also protected under the MMPA. Candidate species are those species in which ESA listing may be warranted.
[3] On September 8, 2016, a final rule was issued revising the ESA listing status of humpback whales (81 FR 62259). Fourteen DPSs were designated: one as threatened, four as endangered, and nine as not warranting listing. The DPS found in U.S. Atlantic waters, the West Indies DPS, is delisted under the ESA; however, this DPS is still protected under the MMPA.
[4] There are two species of pilot whales: short finned (*G. melas melas*) and long finned (*G. macrorhynchus*). Due to the difficulties in identifying the species at sea, they are often just referred to as *Globicephala spp*.
[5] Prior to 2008, this species was called "common dolphin."
[6] This includes the following Stocks of Bottlenose Dolphins: Western North Atlantic Offshore, Northern Migratory Coastal (strategic stock), and Southern Migratory Coastal (strategic stock).
[7] On April 6, 2016, a final rule was issued removing the current range-wide listing of green sea turtles and, in its place, listing eight green sea turtle DPSs as threatened and three DPSs as endangered (81 FR 20057). The green sea turtle DPS located in the Northwest Atlantic is the North Atlantic DPS of green sea turtles; this DPS is considered threatened under the ESA.
[8] Originally designated June 3, 1994 (59 FR 28805); Expanded on January 27, 2016 (81 FR 4837).

Cusk are a NMFS "candidate species" under the ESA. Candidate species are those petitioned species for which NMFS has determined that listing may be warranted under the ESA and those species for which NMFS has initiated an ESA status review through an announcement in the Federal Register. If a species is proposed for listing the conference provisions under Section 7 of the ESA apply (see 50 CFR 402.10); however, candidate species receive no substantive or procedural protection under the ESA. As a result this species will not be discussed further in this and the following sections; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed action. Additional information on cusk can be found at http://www.nmfs.noaa.gov/pr/species/esa/candidate.htm.

6.2.2 Species and Critical Habitat Not Likely Affected by the Proposed Action

Based on available information, it has been determined that this action is not likely to affect multiple ESA listed and/or marine mammal protected species or any designated critical habitat (see Table 6). This determination has been made because either the occurrence of the species is not known to overlap with the area primarily affected by the action and/or there have never been documented interactions between the species and the primary gear type (i.e., gillnet and bottom trawl) used to prosecute the monkfish fishery (see Waring *et al*. 2014a, 2015, 2016; NMFS NEFSC FSB 2015, 2016;

http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; NMFS 2013). In the case of critical habitat, this determination has been made because the action will not affect the essential physical and biological features of North Atlantic right whale or loggerhead (NWA DPS) critical habitat and therefore, will not result in the destruction or adverse modification of any species critical habitat (NMFS 2013; NMFS 2014a; NMFS 2015a,b).

6.2.3 Species Potentially Affected by the Proposed Action

Table 6 provides a list of sea turtle, marine mammal, and fish species present in the affected environment of the monkfish fishery, and that may also be affected by the operation of this fishery. Of primary concern is the potential for the fishery to interact (e.g., bycatch, entanglement) with these species. To understand the potential risk of an interaction, it is necessary to consider (1) species occurrence in the affected environment of the fishery and how the fishery will overlap in time and space with this occurrence; and (2) data and observed records of protected species interaction with particular fishing gear types. Information on species occurrence in the affected environment of the monkfish fishery is provided in this section, while information on protected species interactions with specific fishery gear is provided in Section 6.2.4.

6.2.3.1 Sea Turtles

Green (North Atlantic DPS), Kemp's ridley, leatherback, and loggerhead (Northwest Atlantic Ocean DPS) sea turtle are the four ESA listed species of sea turtles that occur in the area of operation for the 13 GAR fisheries (see Table 6). Three of the four species are considered hard-shelled turtles (i.e., green, loggerhead, and Kemp's ridley). Additional background information on the range-wide status of the other four species, as well as a description and life history of the species, can be found in a number of published documents, including sea turtle status reviews and biological reports (NMFS and USFWS 1995; Turtle Expert Working Group [TEWG] 1998, 2000, 2007, 2009; Conant *et al*. 2009; NMFS and USFWS 2013; NMFS and USFWS 2015; Seminoff *et al*. 2015), and recovery plans for the loggerhead sea turtle (Northwest Atlantic DPS; NMFS and USFWS 2008), leatherback sea turtle (NMFS and USFWS 1992), Kemp's ridley sea turtle (NMFS *et al.* 2011), and green sea turtle (NMFS and USFWS 1991).

Hard-shelled sea turtles

Distribution

In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida (FL) to Cape Cod, Massachusetts (MA), although their presence varies with the seasons due to changes in water temperature (Shoop and Kenney 1992; Epperly *et al.* 1995a, 1995b; Braun and Epperly 1996; Mitchell *et al.* 2003; Braun-McNeill *et al.* 2008; TEWG 2009). While hard-shelled turtles are most common south of Cape Cod, MA, they are known to occur in the Gulf of Maine (GOM). Loggerheads, the most common hard-shelled sea turtle in the GAR, feed as far north as southern Canada. Loggerheads have been observed in waters with surface temperatures of 7 °C to 30 °C, but water temperatures ≥11 °C are most favorable (Shoop and Kenney 1992; Epperly *et al.* 1995b). Sea turtle presence in U.S. Atlantic waters is also influenced by water depth. While hard-shelled turtles occur in waters from the beach to beyond the continental shelf, they are most commonly found in neritic waters of the inner continental shelf (Mitchell *et al.* 2003; Braun-McNeill and Epperly 2002; Morreale and Standora 2005; Blumenthal *et al.* 2006; Hawkes *et al.* 2006; McClellan and Read 2007; Mansfield *et al.* 2009; Hawkes *et al.* 2011; Griffin *et al.* 2013).

Seasonality

Hard-shelled sea turtles occur year-round in waters off Cape Hatteras, North Carolina (NC) and south. As coastal water temperatures warm in the spring, loggerheads begin to migrate to inshore waters of the southeast United States and also move up the Atlantic Coast (Epperly *et al.* 1995a, 1995b, 1995c; Braun-McNeill and Epperly 2002; Morreale and Standora 2005; Griffin *et al.* 2013), occurring in Virginia (VA) foraging areas as early as late April and on the most northern foraging grounds in the GOM in June (Shoop and Kenney 1992). The trend is reversed in the fall as water temperatures cool. The large majority leave the GOM by September, but some remain in Mid-Atlantic and Northeast areas until late fall. By December, sea turtles have migrated south to waters offshore of NC, particularly south of Cape Hatteras, and further south (Shoop and Kenney 1992; Epperly *et al.* 1995b; Hawkes *et al.* 2011; Griffin *et al.* 2013).

Leatherback sea turtles

Leatherback sea turtles also engage in routine migrations between northern temperate and tropical waters (NMFS and USFWS 1992; James *et al*. 2005; James *et al*. 2006; Dodge *et al*. 2014). Leatherbacks, a pelagic species, are known to use coastal waters of the U.S. continental shelf (James *et al*. 2005; Eckert *et al*. 2006; Murphy *et al*. 2006; Dodge *et al*. 2014). They have a greater tolerance for colder water than hard-shelled sea turtles (NMFS and USFWS 2013). They are also found in more northern waters later in the year, with most leaving the Northwest Atlantic shelves by mid-November (James *et al*. 2005; James *et al*. 2006; Dodge *et al*. 2014).

6.2.3.2 Marine Mammals

6.2.3.2.1 Large Whales

As provided in Table 6, as North Atlantic right, humpback, fin, sei, and minke whales are found throughout the waters of the Northwest Atlantic Ocean, these species will occur in the affected environment of the monkfish fishery. In general, these species follow an annual pattern of migration between low latitude (south of 35°N) wintering/calving grounds and high latitude spring/summer foraging grounds (primarily north of 41°N; Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; NMFS 1991, 2005, 2010, 2011, 2012). This, however, is a simplification of whale movements, particularly as it relates to winter movements. It remains unknown if all individuals of a population migrate to low latitudes in the winter, although, increasing evidence suggests that for some species (e.g., right and humpback whales), some portion of the population remains in higher latitudes throughout the winter (Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; Khan *et al*. 2009, 2010, 2011, 2012; Brown *et al*. 2002; NOAA 2008; Cole *et al*. 2013; Clapham *et al*. 1993; Swingle *et al*. 1993; Vu *et al*. 2012). Although further research is needed to provide a clearer understanding of large whale movements and distribution in the winter, the distribution and movements of large whales to foraging grounds in the spring/summer is well understood. Movements of whales into higher latitudes coincide with peak productivity in these waters. As a result, the distribution of large whales in higher latitudes is strongly governed by prey availability and distribution, with large numbers of whales coinciding with dense patches of preferred forage (Mayo and Marx 1990; Kenney *et al*. 1986, 1995; Baumgartner *et al*. 2003; Baumgartner and Mate 2003; Payne *et al*.1986, 1990; Brown *et al.* 2002; Kenney and Hartley 2001; Schilling *et al.* 1992). For additional information on the biology, status, and range wide distribution of each whale species please refer to: Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; NMFS 1991, 2005, 2010, 2011, 2012.

To further assist in understanding how the skate fishery may overlaps in time and space with the occurrence of large whales, a general overview on species occurrence and distribution in the area of operation for the skate fishery is provided in the following table (Table 7).

Table 7 - Large whale occurrence in the area of operation for the skate fishery.

Species	Prevalence and Approximate Months of Occurrence
North Atlantic Right Whale	• Distributed throughout all continental shelf waters from the GOM to the South Atlantic Bight (SAB) throughout the year; however, increasing evidence of year round presence in the GOM. • New England waters (GOM and GB regions) = **Foraging Grounds (January through October)**. Seasonally important foraging grounds include, but not limited to: ›Cape Cod Bay (January-April); › Great South Channel (April-June); › western Gulf of Maine (April-May, and July-October); › Jordan Basin (August-October); › Wilkinson Basin (April-July); and › northern edge of GB (May-July); • Mid-Atlantic waters: Migratory pathway to/from northern (high latitude) foraging and southern calving grounds. • Increasing evidence of wintering areas (approximately November – January) in: › Cape Cod Bay; › Jeffreys and Cashes Ledges; › Jordan Basin; and › Massachusetts Bay (e.g., Stellwagen Bank).
Humpback	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year. • New England waters (GOM and GB regions) = **Foraging Grounds** (March-November). • Mid-Atlantic waters: Migratory pathway to/from northern (high latitude) foraging and southern (West Indies) calving grounds. • Increasing evidence of whales remaining in mid- and high-latitudes throughout the winter. Specifically, increasing evidence of wintering areas (for juveniles) in Mid-Atlantic (e.g., waters in the vicinity of Chesapeake and Delaware Bays; peak presence approximately January through March) and Southeastern coastal waters.
Fin	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year. • Mid-Atlantic waters:

Species	Prevalence and Approximate Months of Occurrence
	› Migratory pathway to/from northern (high latitude) foraging and southern (low latitude) calving grounds; and › Possible offshore calving area (October-January). • New England (GOM and GB)/SNE waters = **Foraging Grounds** (greatest densities March-August; lower densities September-November).Important foraging grounds include: > Massachusetts Bay (esp. Stellwagen Bank); > Great South Channel; > Waters off Cape Cod (~40-50 meter contour); > GOM; > Perimeter (primarily eastern) of GB; and > Mid-shelf area off the east end of Long Island. • Evidence of wintering areas in mid-shelf areas east of New Jersey (NJ), Stellwagen Bank; and eastern perimeter of GB.
Sei	• Uncommon in shallow, inshore waters of the Mid-Atlantic (SNE included), GB, and GOM; however, occasional incursions during peak prey availability and abundance. • Primarily found in deep waters along the shelf edge, shelf break, and ocean basins between banks. • Spring through summer, found in greatest densities in offshore waters of the GOM and GB; sightings concentrated along the northern, eastern (into Northeast Channel) and southwestern (in the area of Hydrographer Canyon) edge of GB.
Minke	• Widely distributed throughout continental shelf waters (<100m deep) of the Mid-Atlantic (SNE included), GOM, and GB. • Most common in the EEZ from spring through fall, with greatest abundance found in New England waters.

***Sources*:** NMFS 1991, 2005, 2010, 2011, 2012; Hain *et al.* 1992; Payne *et al*. 1984; Good 2008; Pace and Merrick 2008; McLellan *et al*. 2004; Hamilton and Mayo 1990; Schevill *et al*. 1986; Watkins and Schevill 1982; Payne *et al*.1990; Winn *et al.* 1986; Kenney et al. 1986, 1995; Khan *et al*. 2009, 2010, 2011, 2012; Brown *et al*. 2002; NOAA 2008; 50 CFR 224.105; CETAP 1982; Clapham *et al*. 1993; Swingle *et al*. 1993; Vu *et al*. 2012; Baumgartner *et al*. 2011; Cole *et al*. 2013; Risch *et al*. 2013; Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; 81 FR 4837(January 27, 2016); NMFS 2015b, Bort et al. 2015.

6.2.3.2.2 Small Cetacean

As provided in Table 6, as Atlantic white sided dolphins, short and long finned pilot whales, Risso's dolphins, short beaked common dolphins, harbor porpoise, and several stocks of bottlenose dolphins are found throughout the year in the Northwest Atlantic Ocean, these species will occur in the affected environment of the monkfish fishery (Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016). Within this range; however, there are seasonal shifts in species distribution and abundance. To further assist in understanding how fisheries may overlap in time and space with the occurrence of small cetaceans, a general overview of species occurrence and distribution in the area of operation for the monkfish fishery is provided in the following table (Table 8). For additional information on the biology, status, and range wide distribution of each species please refer to Waring *et al*. (2014a), Waring *et al.* (2015), and Waring *et al*. (2016).

Table 8 - Small cetacean occurrence in the area of operation of the monkfish fishery

Species	Prevalence and Approximate Months of Occurrence
Atlantic White Sided Dolphin	• Distributed throughout the continental shelf waters (primarily to 100 meter isobath) of the Mid-Atlantic (north of 35°N), SNE, GB, and GOM ; however, most common in continental shelf waters from Hudson Canyon (~ 39°N) to GB, and into the GOM. • **January-May**: low densities found from GB to Jeffreys Ledge. • **June-September**: Large densities found from GB, through the GOM. • **October-December**: intermediate densities found from southern GB to southern GOM. • South of GB (SNE and Mid-Atlantic), low densities found year round, with waters off Virginia (VA) and NC representing southern extent of species range during winter months.
Short Beaked Common Dolphin	• Regularly found throughout the continental shelf-edge-slope waters (primarily between the 100-2,000 meter isobaths) of the Mid-Atlantic, SNE, and GB (esp. in Oceanographer, Hydrographer, Block, and Hudson Canyons). • Less common south of Cape Hatteras, NC, although schools have been reported as far south as the Georgia (GA)/South Carolina (SC) border. • **January-May**: occur from waters off Cape Hatteras, NC, to GB (35° to 42°N).

Species	Prevalence and Approximate Months of Occurrence
	• **Mid-summer-autumn**: Occur primarily on GB with small numbers present in the GOM; *Peak abundance* found on GB in the autumn.
Risso's Dolphin	• **Spring through fall**: Distributed along the continental shelf edge from Cape Hatteras, NC, to GB. • **Winter**: distributed in the Mid-Atlantic Bight, extending into oceanic waters. • Rarely seen in the GOM; primarily a Mid-Atlantic continental shelf edge species (can be found year round).
Harbor Porpoise	• Distributed throughout the continental shelf waters of the Mid-Atlantic (north of 35°N), SNE, GB, and GOM. • **July-September**: Concentrated in the northern GOM (waters < 150 meters); low numbers can be found on GB. • **October-December**: widely dispersed in waters from NJ to Maine (ME); seen from the coastline to deep waters (>1,800 meters). • **January-March**: intermediate densities in waters off NJ to NC; low densities found in waters off New York (NY) to GOM. • **April-June**: widely dispersed from NJ to ME; seen from the coastline to deep waters (>1,800 meters).
Bottlenose Dolphin	**Western North Atlantic Offshore Stock** • Distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic from GB to FL. • Depths of occurrence: ≥40 meters **Western North Atlantic Northern Migratory Coastal Stock** • Warm water months (e.g., July-August): distributed from the coastal waters from the shoreline to approximately the 25-meter isobaths between the Chesapeake Bay mouth and Long Island, NY. • Cold water months (e.g., January-March): stock occupies coastal waters from Cape Lookout, NC, to the NC/VA border. **Western North Atlantic Southern Migratory Coastal Stock**

Species	Prevalence and Approximate Months of Occurrence
	• **October-December**: stock occupies waters of southern NC (south of Cape Lookout) • **January-March**: stock moves as far south as northern FL. • **April-June**: stock moves north to waters of NC. • **July-August**: stock is presumed to occupy coastal waters north of Cape Lookout, NC, to the eastern shore of VA.
Pilot Whales: *Short- and Long-Finned*	<u>**Short- Finned Pilot Whales**</u> • Except for area of overlap (see below), primarily occur south of 40^{o}N (Mid-Atl and SNE waters); although low numbers have been found along the southern flank of GB, but no further than 41^{o}N. • May through December (approximately): distributed primarily near the continental shelf break of the Mid-Atlantic and SNE; individuals begin shifting to southern waters (i.e., 35^{o}N and south) beginning in the fall. <u>**Long-Finned Pilot Whales**</u> • Except for area of overlap (see below), primarily occur north of 42^{o}N. • Winter to early spring (November through April): primarily distributed along the continental shelf edge-slope of the Mid-Atlantic, SNE, and GB. • Late spring through fall (May through October): movements and distribution shift onto/within GB, the Great South Channel, and the GOM. <u>**Area of Species Overlap:**</u> between approximately 38^{o}N and 41^{o}N.

Notes : [1]
Information presented in table is representative of small cetacean occurrence in the Northwest Atlantic continental shelf waters out to the 2,000 meter isobath.

***Sources*:** Waring *et al*. 1992, 2007**,** 2014a, 2015, 2016**;** Payne and Heinemann 1993; Payne *et al.* 1984; Jefferson *et al*. 2009.

6.2.3.2.3 Pinnipeds

As provided in Table 6, harbor, gray, harp, and hooded seals will occur in the affected environment of the monkfish fishery. Specifically, pinnipeds are found in the nearshore, coastal waters of the Northwest Atlantic Ocean. They are primarily found throughout the year or seasonally from New Jersey to Maine; however, increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, North Carolina (35ºN) (Waring *et al*. 2007, 2014a, 2015, 2016). To further assist in understanding how the monkfish fishery may overlap in time and space with the occurrence of pinnipeds, a general overview of species occurrence and distribution in the area of operation of the monkfish fishery is provided in the following table (Table 9). For additional information on the biology, status, and range wide distribution of each species of pinniped please refer to Waring *et al*. (2007), Waring *et al*. (2014a), Waring *et al*. (2015), Waring *et al*. (2016).

Table 9 - Pinniped occurrence in the area of operation of the monkfish fishery.

Species	Prevalence
Harbor Seal	• Primarily distributed in waters from NJ to ME; however, increasing evidence indicates that their range is extending into waters as far south as Cape Hatteras, NC (35ºN). • **Year Round**: Waters of ME • **September-May**: Waters from New England to NJ.
Gray Seal	• Distributed in waters from NJ to ME. • **Year Round**: Waters from ME to MA. • **September-May**: Waters from Rhode Island to NJ.
Harp Seal	• Winter-Spring (approximately January-May): Waters from ME to NJ.
Hooded Seal	• Winter-Spring (approximately January-May): Waters of New England.
Sources**:** Waring *et al*. 2007 (for hooded seals); Waring *et al*. 2014a; Waring *et al*. 2015;Waring *et al*. 2016.	

6.2.3.3 Atlantic Sturgeon

Table 6 lists the 5 DPSs of Atlantic sturgeon that occur in the affected environment of the monkfish fishery and that may be affected by the operation of this fishery. The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. All five DPSs of Atlantic sturgeon have the potential to be located anywhere in this marine range; in fact, results from genetic studies show that, regardless of location, multiple DPSs can be found at any one location along the Northwest Atlantic coast (ASSRT 2007; Dovel and Berggren 1983; Dadswell *et al*. 1984; Kynard *et al*. 2000; Stein *et al*. 2004a; Dadswell 2006; Laney *et al*. 2007; Dunton *et al*. 2010; Dunton *et al*. 2012; Dunton *et al*. 2015; Erickson *et al*. 2011; Wirgin *et al*. 2012; O'Leary *et al*. 2014; Waldman *et al*. 2013; Wirgin *et al*. 2015).

Based on fishery- independent and dependent data, as well as data collected from tracking and tagging studies, in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour (Stein *et al*. 2004 a,b; Erickson *et al*. 2011; Dunton *et al*. 2010); however, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Timoshkin 1968; Collins and Smith 1997; Stein *et al*. 2004a,b; Dunton *et al*. 2010; Erickson *et al*. 2011). Data from fishery-independent surveys and tagging and tracking studies also indicate that some Atlantic sturgeon may undertake seasonal movements along the coast (Erickson *et al.* 2011; Dunton *et al*. 2010; Wipplehauser 2012). For instance, tagging and tracking studies found that satellite-tagged adult sturgeon from the Hudson River concentrated in the southern part of the Mid-Atlantic Bight, at depths greater than 20 meters, during winter and spring, while in the summer and fall, Atlantic sturgeon concentrations shifted to the northern portion of the Mid-Atlantic Bight at depths less than 20 meters (Erickson *et al.* 2011).

Within the marine range of Atlantic sturgeon, several marine aggregation areas have been identified adjacent to estuaries and/or coastal features formed by bay mouths and inlets along the U.S. eastern seaboard (i.e., waters off North Carolina, Chesapeake Bay, and Delaware Bay; New York Bight; Massachusetts Bay; Long Island Sound; and Connecticut and Kennebec River Estuaries); depths in these areas are generally no greater than 25 meters (Bain *et al.* 2000; Savoy and Pacileo 2003; Stein *et al.* 2004a; Laney *et al*. 2007; Dunton *et al*. 2010; Erickson *et al*. 2011; Oliver *et al*. 2013; Waldman *et al.* 2013; O'Leary *et al*. 2014). Although additional studies are still needed to clarify why these particular sites are chosen by Atlantic sturgeon, there is some indication that they may serve as thermal refuge, wintering sites, or marine foraging areas (Stein *et al*. 2004a; Dunton *et al*. 2010; Erickson *et al*. 2011).

6.2.3.4 Atlantic Salmon (Gulf of Maine DPS)

The wild populations of Atlantic salmon are listed as endangered under the ESA. Their freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, while the marine range of the GOM DPS extends from the GOM (primarily northern portion of the GOM), to the coast of Greenland (Fay *et al*. 2006; NMFS & USFWS 2005, 2016). In general, smolts, post-smolts, and adult Atlantic salmon may be present in the GOM and coastal waters of Maine in the spring (beginning in April), and adults may be present throughout the summer and fall months (Baum 1997; Fay *et al*. 2006; Hyvarinen *et al*. 2006; Lacroix & Knox 2005; Lacroix & McCurdy 1996; Lacroix *et al*. 2004; NMFS & USFWS 2005, 2016; Reddin 1985; Reddin & Friedland 1993; Reddin & Short 1991). For additional information on the on the biology, status, and range wide distribution of the GOM DPS of Atlantic salmon, refer to NMFS and USFWS (2005; 2016); and Fay et al. (2006). Based on the above information, as the monkfish fishery operates throughout the year, and is known to operate in the GOM, it is possible that the fishery will overlap in time and space with Atlantic salmon migrating northeasterly between U.S. and Canadian waters.

6.2.4 Interactions Between Gear and Protected Resources

Protected species are vulnerable to interactions with various types of fishing gear, with interaction risks associated with gear type, quantity, and soak or tow time. Available information on gear interactions with a given species (or species group) is provided in the sections below. These sections are not a comprehensive review of all fishing gear types known to interact with a given species; emphasis is only being placed on the primary gear types used to prosecute the monkfish fishery (i.e., sink gillnet and bottom trawl gear).

6.2.4.1 Marine Mammals

Depending on species, marine mammals have been observed seriously injured or killed in bottom trawl and/or sink gillnet gear. Pursuant to the MMPA, NMFS publishes a List of Fisheries (LOF) annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery (i.e., Category I=frequent; Category II=occasional; Category III=remote likelihood or no known interactions). In the Northwest Atlantic, the 2017 LOF (82 FR 3655 (January 12, 2017)) categorizes commercial gillnet fisheries (Northeast or Mid-Atlantic) as Category I fisheries and commercial bottom trawl fisheries (Northeast or Mid-Atlantic) as Category II fisheries.

6.2.4.1.1 Large Cetaceans

Bottom Trawl Gear

With the exception of minke whales, there have been no observed interactions with large whales and bottom trawl gear. In bottom trawl gear, to date, interactions have only been observed in the northeast bottom trawl fisheries. From the period of 2008-2012, the estimated annual mortality attributed to this fishery was 7.8 minke whales for 2008, and zero minke whales from 2009-2012; no serious injuries were reported during this time (Waring *et al*. 2015). Based on this information, from 2008-2012, the estimated annual average minke whale mortality and serious injury attributed to the northeast bottom trawl fishery was 1.6 (CV=0.69) whales (Waring *et al*. 2015). Lyssikatos (2015) estimated that from 2008-2013, mean annual serious injuries and mortalities from the northeast bottom trawl fishery were 1.40 (CV=0.58) minke whales. Based on this information, bottom trawl gear is likely to pose a low interaction risk to any large whale species. However, should an interaction occur, serious injury or mortality to any large whale is possible; however, relative to other gear types discussed below (i.e., fixed gear), trawl gear represents a low source serious injury or mortality to any large whale.

Fixed Fishing Gear (e.g., Sink Gillnet Gear)

The greatest entanglement risk to large whales is posed by fixed fishing gear (e.g., sink gillnet and trap/pot gear) comprised of lines (vertical or ground) that rise into the water column. Any line can become entangled in the mouth (baleen), flippers, and/or tail of the whale when the animal is transiting or foraging through the water column (Johnson *et al*. 2005; NMFS 2014b; Kenney and Hartley 2001; Hartley *et al*. 2003; Whittingham *et al*. 2005a,b). For instance, in a study of right and humpback whale entanglements, Johnson *et al*. (2005) attributed: (1) 89% of entanglement cases, where gear could be identified, to fixed gear consisting of pot and gillnets and (2) entanglement of one or more body parts of large whales (e.g., mouth and/or tail regions) to four different types of line associated with fixed gear (the buoy line, groundline, floatline, and surface system lines).[2] Although available data, such as Johnson *et al*. (2005), provides insight into large whale entanglement risks with fixed fishing gear, to date, due to uncertainties surrounding the nature of the entanglement event, as well as unknown biases associated with reporting effort and the lack of information about the types and amounts of gear being used, determining which part of fixed gear creates the most entanglement risk for large whales is difficult (Johnson *et al.* 2005). As a result, any type or part of fixed gear is considered to create an entanglement risk to large whales and should be considered potentially dangerous to large whale species (Johnson *et al.* 2005).

The effects of entanglement to large whales range from no injury to death (NMFS 2014b; Johnson *et al*. 2005; Angliss and Demaster 1998; Moore and Van der Hoop 2012). The risk of injury or death in the event of an entanglement may depend on the characteristics of the whale involved (species, size, age, health, etc.), the nature of the gear (e.g., whether the gear incorporates weak links designed to help a whale free itself), human intervention (e.g., the feasibility or success of disentanglement efforts), or other

[2] Buoy line connects the gear at the bottom to the surface system. Groundline in trap/pot gear connects traps/pots to each other to form trawls; in gillnet gear, groundline connects a gillnet, or gillnet bridle to an anchor or buoy line. Floatline is the portion of gillnet gear from which the mesh portion of the net is hung. The surface system includes buoys and high-flyers, as well as the lines that connect these components to the buoy line.

variables (NMFS 2014b). Although the interrelationships among these factors are not fully understood, and the data needed to provide a more complete characterization of risk are not available, to date, available data indicates that entanglement in fishing gear is a significant source of serious injury or mortality for Atlantic large whales (Table 10; Henry *et al*. 2016; Waring *et al*. 2016).

Table 10 summarizes confirmed human-caused injury and mortality to humpback, fin, sei, minke, and North Atlantic right whales along the Gulf of Mexico Coast, U.S. East Coast, and Atlantic Canadian Provinces from 2010 to 2014 (Henry *et al.* 2016); the data provided in Table 10 is specific to confirmed injury or mortality to whales from entanglement in fishing gear. As many entanglement events go unobserved, and because the gear type, fishery, and/or country of origin for reported entanglement events are often not traceable, it is important to recognize that the information presented in Table 10 likely underestimates the rate of large whale serious injury and mortality due to entanglement. Further studies looking at scar rates for right whales and humpbacks suggests that entanglements may be occurring more frequently than the observed incidences indicate (NMFS 2014b; Robbins 2009; Knowlton *et al.* 2012).

Table 10 - Summary of confirmed human-caused injury or mortality to fin, minke, humpback, sei, and North Atlantic right whales from 2010-2014 due to entanglement in fishing gear.[1]

Species	Total Confirmed Entanglement: Serious Injury[2]	Total Confirmed Entanglement: Non-Serious Injury	Total Confirmed Entanglement: Mortality	Entanglement Events: Total Average Annual Injury and Mortality Rate (US waters/Canadian waters/unassigned waters)
North Atlantic Right Whale	16	31	8	4.65 (0.4/0/4.25)
Humpback Whale	30	53	8	6.85 (1.55/0/5.3)
Fin Whale	6	1	4	1.8 (0.2/0.8/0.8)
Sei Whale	0	0	0	0
Minke Whale	20	11	16	6.4 (1.7/2.45/2.25)

Notes:
[1]Information presented in Table 10 is based on confirmed human-caused injury and mortality events along the Gulf of Mexico Coast, US East Coast, and Atlantic Canadian Provinces; it is not specific to US waters only.
[2] NMFS defines a serious injury as an injury that is more likely than not to result in mortality (for additional details see: http://www.nmfs.noaa.gov/pr/pdfs/serious_injury_procedure.pdf)

***Source*:** Henry *et al.* 2016

As noted in section 6.2.4.1, pursuant to the MMPA, NMFS publishes a LOF annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injurious and mortalities of marine mammals in each fishery. Large whales, in particular, humpback, fin, minke, and North Atlantic right whales, are known to interact with Category I and II fisheries in the (Northwest) Atlantic Ocean. As fin and North Atlantic right whales are listed as endangered under the ESA, these species are considered strategic stocks under the MMPA (see Table 6). Section 118(f)(1) of the MMPA requires the preparation and implementation of a Take Reduction Plan (TRP) for any strategic marine mammal stock that interacts with Category I or II fisheries. In response to its obligations under the MMPA, in 1996, NMFS established the Atlantic Large Whale Take Reduction Team (ALWTRT) to develop a plan (Atlantic Large Whale Take Reduction Plan (ALWTRP or Plan)) to reduce serious injury to, or mortality of large whales, specifically, humpback, fin, and North Atlantic right whales, due to incidental entanglement in U.S. commercial fishing gear.[3] In 1997, the ALWTRP was implemented; however, since 1997, the Plan has been modified; recent adjustments include the Sinking Groundline Rule and Vertical Line Rules (72 FR 57104, October 5, 2007; 79 FR 36586, June 27, 2014; 79 FR 73848, December 12, 2014; 80 FR 14345, March 19, 2015; 80 FR 30367, May 28, 2015).

The Plan consists of regulatory (e.g., universal gear requirements, modifications, and requirements; area- and season- specific gear modification requirements and restrictions; time/area closures) and non-regulatory measures (e.g., gear research and development, disentanglement, education and outreach) that, in combination, seek to assist in the recovery of North Atlantic right, humpback, and fin whales by addressing and mitigating the risk of entanglement in gear employed by commercial fisheries, specifically trap/pot and gillnet fisheries (http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/; 73 FR 51228; 79 FR 36586; 79 FR 73848; 80 FR 14345; 80 FR 30367). The Plan recognizes trap/pot and gillnet Management Areas in Northeast, Mid-Atlantic, and Southeast regions of the U.S, and identifies gear modification requirements and restrictions for Category I and II gillnet and trap/pot fisheries in these regions; these Category I and II fisheries must comply with all regulations of the Plan.[4] For further details on the ALWTRP please see: http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/.

6.2.4.1.2 Small Cetaceans and Pinnipeds

Sink Gillnet and Bottom Trawl Gear

Small cetaceans and pinnipeds are vulnerable to interactions with sink gillnet and bottom trawl gear. Species that have been observed incidentally injured and/or killed by MMPA LOF Category I (frequent interactions) and/or II (occasional interactions) gillnet or trawl fisheries that operate in the affected environment of Greater Atlantic Region (GAR) fisheries are provided in Table 11 (Waring *et al*. 2014a,b; Waring *et al*. 2015; Waring *et al*. 2016; 82 FR 3655 (January 12, 2017)).[5] Of the species provided in Table 11, gray seals, followed by harbor seals, harbor porpoises, short beaked common dolphins, harps seals, and Atlantic white sided dolphins are the most frequently bycaught small cetacean and pinnipeds in sink gillnet gear in the GAR (Hatch and Orphanides 2014, 2015, 2016). In terms of bottom trawl gear, short-beaked common dolphins and Atlantic white-sided dolphins are the most frequently observed bycaught marine mammal species in the GAR, followed by gray seals, long-finned pilot whales, and risso's dolphins, bottlenose dolphin (offshore), harbor porpoise, and harp seals (Lyssikatos 2015). Incidental bycatch of these latter species, as well as those provided in Table 11, have been observed in the skate fishery (Hatch and Orphanides 2014, 2015, 2016; Lyssikatos 2015;

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[3] The measures identified in the ALWTRP are also beneficial to the survival of the minke whale, which are also known to be incidentally taken in commercial fishing gear.

[4] The fisheries currently regulated under the ALWTRP include: Northeast/Mid-Atlantic American lobster trap/pot; Atlantic blue crab trap/pot; Atlantic mixed species trap/pot; Northeast sink gillnet; Northeast anchored float gillnet; Northeast drift gillnet; Mid-Atlantic gillnet; Southeastern U.S. Atlantic shark gillnet; and Southeast Atlantic gillnet (NMFS 2014c).

[5] "GAR Fisheries" are in reference to the 13 fisheries in the Greater Atlantic Region (GAR) (i.e., Northeast multispecies (including the whiting/small mesh multispecies complex); monkfish; spiny dogfish; Atlantic bluefish; northeast skate complex; mackerel/squid/butterfish; summer flounder/scup/black sea bass; American lobster; Atlantic herring; Atlantic sea scallop; red crab; surfclam/ocean quahog; and golden tilefish) in which fishery management plans (FMPs) have been developed and authorized; the NMFS-Greater Atlantic Regional Fisheries Office, in association with the New England and Mid-Atlantic Fisheries Management Councils (FMCs), is charged with conserving and managing these FMPs.

http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html), which is comprised of Category I Northeast and Mid-Atlantic sink gillnet and Category II Northeast and Mid-Atlantic bottom trawl fisheries (82 FR 3655 (January 12, 2017)). Specifically, observed bycatch in sink gillnet hauls primarily targeting monkfish, and also landing skates, has shown that interactions primarily occur in sink gillnet gear with mesh sizes >11 inches, and with soak duration ≥ 50 hours (Hatch and Orphanides 2014, 2015). In regards to bottom trawl hauls, regardless of target fish species, general tow time and net mesh size associated with observed bycatch of small cetaceans and pinnipeds are not available (Lyssikatos 2015; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html).

Based on the best available information provided in Table 11, Waring *et al*. (2014a,b), Waring *et al*. (2015), Waring *et al*. (2016), and the January 12, 2017, LOF (82 FR 3655), of the gear types primarily used to prosecute fisheries in the GAR (i.e., bottom trawl; mid-water trawl; gillnets (sink); scallop dredge; trap/pot; bottom longline; hydraulic clam dredge; purse seine; and hook and line), Northeast and Mid-Atlantic gillnet fisheries, followed by the Northeast and Mid-Atlantic bottom trawl fisheries (Category I and II fisheries, respectively) pose the greatest risks of serious injury and mortality to small cetaceans and pinnipeds (i.e., approximately 80.6% of the estimated total mean annual mortality to marine mammals [small cetaceans + seals, large whales excluded] is attributed to gillnet fisheries, 18.9% attributed to bottom trawl, 0.14% attributed to mid-water trawl; 0.16% attributed to pot/trap (bottlenose dolphin stocks only); and 0.12% attributed to hook and line (bottlenose dolphin stocks only); Figure 1).[6]

Table 11 - Small cetacean and pinniped species observed seriously injured and/or killed by Category I and II gillnet or trawl fisheries in the affected environment of GAR fisheries.

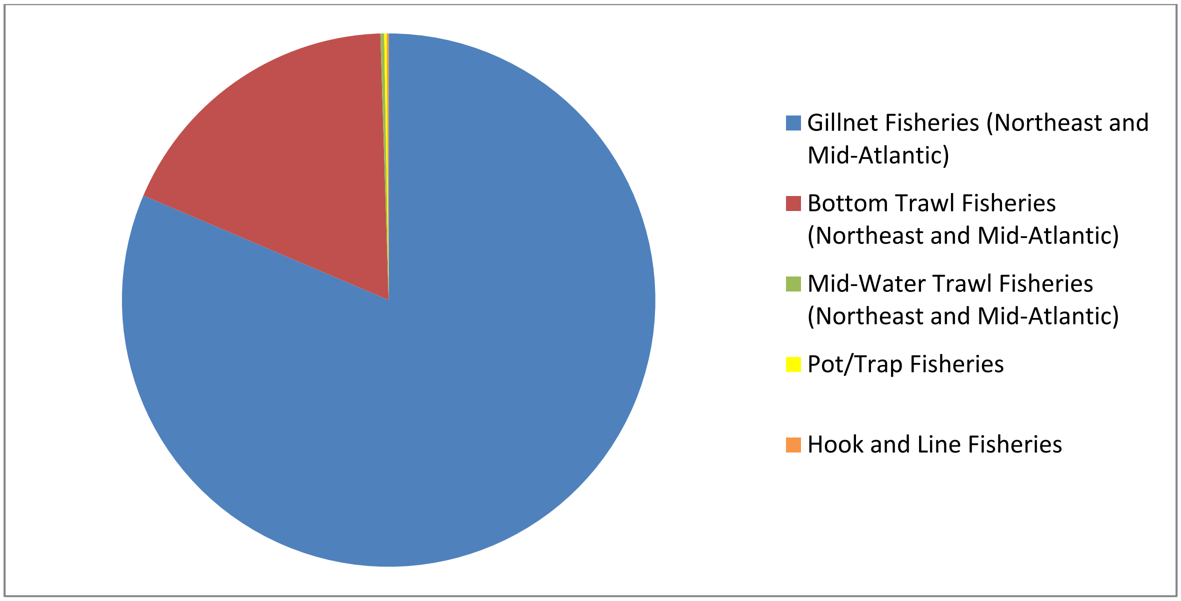
Fishery	Category	Species Observed or reported Injured/Killed
Northeast Sink Gillnet	I	Bottlenose dolphin (offshore)
		Harbor porpoise
		Atlantic white sided dolphin
		Short-beaked common dolphin
		Risso's dolphin
		Pilot whales (spp)
		Harbor seal
		Hooded seal
		Gray seal
		Harp seal
Mid-Atlantic Gillnet		Bottlenose dolphin (Northern Migratory coastal)
		Bottlenose dolphin (Southern Migratory coastal)

[6] Data used in the assessment was from 2009-2013 (Waring *et al*. 2016; MMPA LOF 82 FR 3655). Northeast anchored float gillnet, Southeast Atlantic gillnet, and Southeastern U.S. Atlantic shark gillnet fisheries were not included in the analysis as mean annual mortality estimates have not been provided for the species affected by these fisheries (Waring *et al*. 2016). As there are no known small cetaceans or pinniped interactions with bottom longlines, hydraulic clam dredges, or sea scallop dredges, these fishing gear types were also not included in the assessment. In addition, for harp seals, the assessment used data from Waring *et al.* (2014a) as serious injury and mortality estimates for harp seals have not been updated since Waring *et al*. (2014a).

		Bottlenose dolphin (offshore)
		White-sided dolphin
		Harbor porpoise
		Short-beaked common dolphin
		Risso's dolphin
		Harbor seal
		Harp seal
		Gray seal
Mid-Atlantic Mid-Water Trawl-Including Pair Trawl	II	Risso's dolphin
		White-sided dolphin
		Harbor seal
		Pilot whales (spp)
		Gray seal
Northeast Mid-Water Trawl-Including Pair Trawl	II	Short-beaked common dolphin
		Pilot whales (spp)
		Gray seal
		Harbor seal
Northeast Bottom Trawl	II	Harp seal
		Harbor seal
		Gray seal
		Long-finned pilot whales
		Short-beaked common dolphin
		White-sided dolphin
		Harbor porpoise
		Bottlenose dolphin (offshore)
		Risso's dolphin
Mid-Atlantic Bottom Trawl	II	White-sided dolphin
		Pilot whales (spp)
		Short-beaked common dolphin
		Risso's dolphin
		Bottlenose dolphin (offshore)
		Gray seal
		Harbor seal
Northeast Anchored Float Gillnet	II	Harbor seal
		White-sided dolphin

Sources: Waring *et al*. 2014a,b; Waring *et al*. 2015; Waring *et al*. 2016; LOF 82 FR 3655 (January 12, 2017).

Figure 1 - Estimated total mean annual mortality of small cetaceans and pinnipeds by GAR fisheries from 2009-2013 (*source* Waring *et al*. 2014a, b; Waring *et al*. 2015; Waring *et al*. 2016).

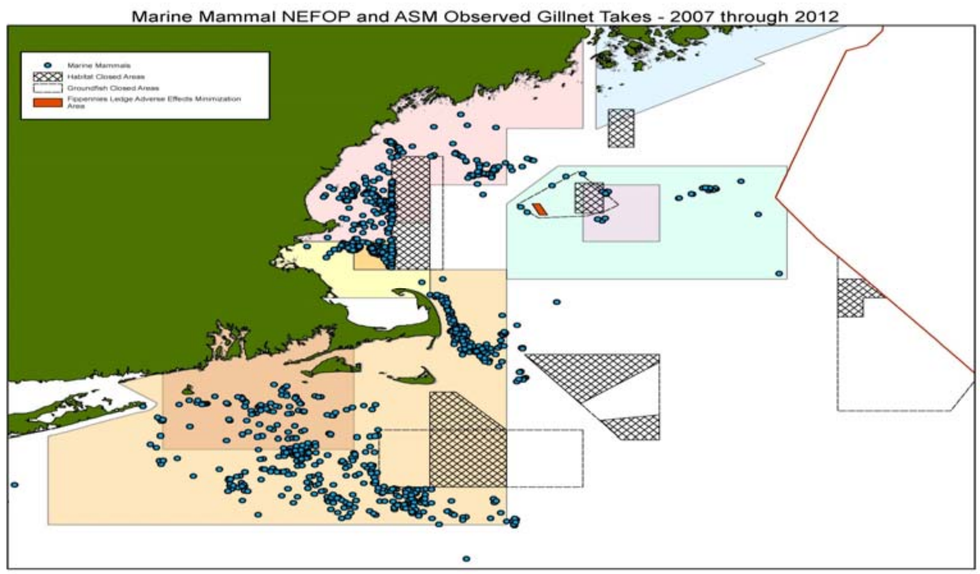


Although there are multiple Category I and II fisheries that have the potential to result in the serious injury and morality of small cetaceans and pinnipeds in the GAR, the risk of an interaction with a specific fishery is affected by multiple factors, including where and when fishing effort is focused, the type of gear being used, and how effort overlaps in time and space with specific species in the affected area. For instance, the following figures (Figure 2 and Figure 3) depict observed marine mammal takes (large whales excluded) in gillnet and trawl gear in waters of the GOM, GB, and SNE from 2007-2012 or 2007-2011, respectively.[7] As depicted in Figure 2 and Figure 3, over the last 5 years, there appears to be particular areas in the GOM, GB, and SNE where fishing effort is overlapping in time and space with small cetacean or pinniped occurrence. Although uncertainties, such as shifting fishing effort patterns and data on true density (or even presence/absence) for some species remain, the available observer data, as depicted in Figure 2 and Figure 3, does provide some insight into areas in the ocean where the likelihood of interacting with a particular species is high and therefore, provides a means to consider potential impacts of future shifts or changes in fishing effort on small cetaceans and pinnipeds. For additional maps depicting observed small cetacean and pinniped interactions with Northeast or Mid-Atlantic bottom trawl or gillnet gear, please see Appendix III in Waring *et al*. (2014a,b), Waring *et al*. (2015), and Waring *et al*. (2016).

[7] For harp seals, mean annual mortality estimates from 2007-2011 were considered as serious injury and mortality estimates have not been updated since Waring *et al.* (2014a).

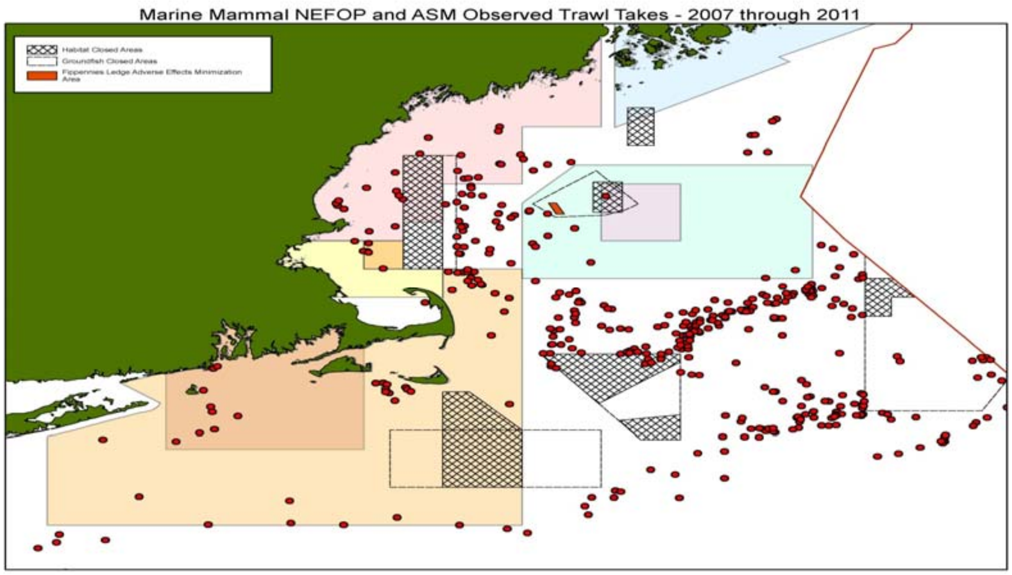
[8] Additional maps of marine mammal takes in various fishing gear can be found in Waring *et al*. 2014a, Waring *et al*. 2015, and Waring *et al*. 2016.

Figure 2 - Map of marine mammal bycatch in gillnet gear in the New England region (excluding large whales) observed by Northeast Fisheries Observer Program (NEFOP) and At Sea Monitoring (ASM) program between 2007 and 2012.



Notes: Small cetacean and pinnipeds have been observed taken primarily in: (1) the waters west of the GOM Habitat/Groundfish closed area: Harbor seals, harp seals, and harbor porpoise; (2) off of Cape Cod, MA: Gray seals, harbor seals, and harbor porpoise; (3) west of the Nantucket Lightship Closed Area: Harbor porpoise, short-beaked common dolphin, gray seals, harp seals, and harbor seals; and (4) waters off southern MA and RI: Gray seals and harbor seals, and some harbor porpoise and short-beaked common dolphin.

Figure 3 - Map of marine mammal bycatch in trawl gear in the New England region (excluding large whales) observed by the Northeast Fisheries Observer Program (NEFOP) and At Sea Monitoring (ASM) program between 2007 and 2011.



Notes**:** Small cetacean and pinnipeds observed taken primarily in: (1) the waters between and around CA I and CA II (Groundfish closed areas): Short-beaked common dolphin, pilot whales, white-sided dolphins, gray seals, and some risso's dolphins and harbor porpoise; and (2) eastern side of the GOM Habitat/Groundfish closed area: White-sided dolphins, and some pilot whales and harbor seals.

As noted above, numerous species of small cetaceans and pinnipeds interact with Category I and II fisheries in the GAR; however, several species in Table 11 have experienced such great losses to their populations as a result of interactions with Category I and/or II fisheries that they are now considered strategic stocks under the MMPA (see Table 6). These species include several stocks of bottlenose dolphins, and until recently, the harbor porpoise.[8] Section 118(f)(1) of the MMPA requires the preparation and implementation of a TRP for any strategic marine mammal stock that interacts with Category I or II fisheries. As a result, the Harbor Porpoise TRP (HPTRP) and the Bottlenose Dolphin TRP (BDTRP) were developed and implemented for these species.[9] In addition, due to the incidental mortality and serious injury of small cetaceans incidental to bottom and mid-water trawl fisheries operating in both the Northeast and Mid-Atlantic regions, the Atlantic Trawl Gear Take Reduction Strategy (ATGTRS) was implemented. The following provides a brief overview and summary for each HPTRP, BDTRP, and ATGTRS; however, additional information on each TRP can be found at: http://www.greateratlantic.fisheries.noaa.gov/protected/porptrp/ or
http://www.nmfs.noaa.gov/pr/interactions/trt/bdtrp.htm
http://www.greateratlantic.fisheries.noaa.gov/Protected/mmp/atgtrp/

Harbor Porpoise Take Reduction Plan (HPTRP)

To address the high levels of incidental take of harbor porpoise in the groundfish sink gillnet fishery, a Take Reduction Team was formed in 1996. A rule (63 FR 66464) to implement the Harbor Porpoise Take Reduction Plan, and therefore, to reduce harbor porpoise bycatch in U.S. Atlantic gillnets was published on December 2, 1998, and became effective on January 1, 1999; the Plan was amended on February 19,

[8] In the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Waring *et al*. 2016); harbor porpoise are no longer designated as a strategic stock.
[9] Although the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Waring *et al.* 2016) no longer designates harbor porpoise as a strategic stock, HPTRP regulations are still in place per the mandates provided in Section 118(f)(1).

2010 (75 FR 7383), and October 4, 2013 (78 FR 61821). Since gillnet operations differ between the New England and Mid-Atlantic regions, the follow sets of measures were devised for each region:

- **New England Region**: The New England component of the HPTRP pertains to all fishing with sink gillnets and other gillnets capable of catching multispecies in New England waters from Maine through Rhode Island. It includes five management areas and three closure areas. Per specified periods of time, fishing with sink gillnets is restricted in closed areas. In management areas, depending on location, seasonal restrictions include complete closure to sink gillnet fishing to closures to sink gillnet fishing unless pingers are used in the manner prescribed in the TRP regulations.

- **Mid-Atlantic Region:** The Mid-Atlantic portion of the HPTRP pertains to the Mid-Atlantic shoreline from the southern shoreline of Long Island, New York to the North Carolina/South Carolina border. It includes four management areas, each with time and area closures to sink gillnet fishing unless the gear meets certain specifications (e.g., floatline length, twine size, tie downs, net size, net number, nets in a string). Additionally, during regulated periods, sink gillnet fishing in each management area of the Mid-Atlantic is regulated differently for small mesh (> 5 inches to < 7 inches) and large (7-18 inches) mesh gear. The Plan also includes some time and area closures in which sink gillnet fishing is prohibited regardless of the gear specifications.

Bottlenose Take Reduction Plan (BDTRP)

In April 2006, NMFS published a final rule to implement the BDTRP for the WNA coastal stock of bottlenose dolphin (April 26, 2006, 71 FR 24776) to reduce the incidental mortality and serious injury in the Mid-Atlantic gillnet fishery and eight other coastal fisheries operating within the dolphin's distributional range.[10] The measures contained in the BDTRP include gillnet effort reduction, gear proximity requirements, gear or gear deployment modifications, and outreach and educational measures to reduce dolphin bycatch below the marine mammals stock's PBR. On July 31, 2012 (77 FR 45268), the BDTRP was amended to permanently continue nighttime fishing restrictions of medium mesh gillnets operating in North Carolina coastal state waters. The Bottlenose Dolphin TRP was most recently amended on February 9, 2015 (80 FR 6925) to reduce the incidental serious injury and mortality of strategic stocks of bottlenose dolphins in Virginia pound net fishing gear, and to provide consistent state and federal regulations for Virginia pound net fishing gear.

Atlantic Trawl Gear Take Reduction Strategy (ATGTRS)

In addition to the HPTRP and the BDTRP, in 2006, the Atlantic Trawl Gear Take Reduction Team (ATGTRT) was convened to address the incidental mortality and serious injury of long-finned pilot whales (*Globicephala melas*), short-finned pilot whales (*Globicephala macrorhynchus*), common dolphins (*Delphinus delphis*), and white sided dolphins (*Lagenorhynchus acutus*) incidental to bottom and mid-water trawl fisheries operating in both the Northeast and Mid-Atlantic regions. Because none of the marine mammal stocks of concern to the ATGTRT are classified as a "strategic stock," nor do they currently interact with a Category I fishery, it was determined at the time that development of a take reduction plan was not necessary.[11]

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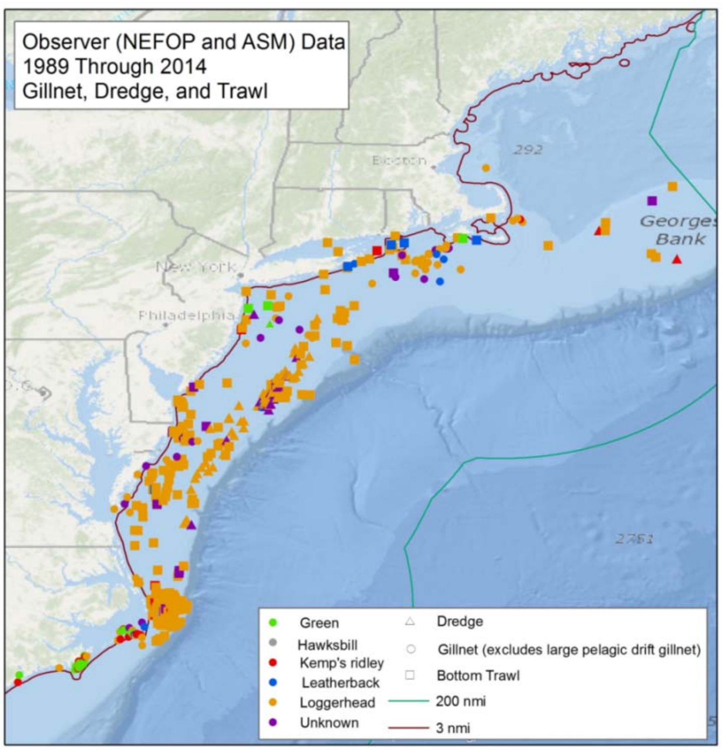
[10] The final rule issued on April 26, 2006, for the BDTRP also revised the large mesh size restriction under the Mid-Atlantic large mesh gillnet rule for conservation of endangered and threatened sea turtles to provide consistency among Federal and state management measures.
[11] A strategic stock is defined under the MMPA as a marine mammal stock: for which the level of direct human-caused mortality exceeds the potential biological removal level; which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable

In lieu of a take reduction plan, the ATGTRT agreed to develop an ATGTRS. The ATGTRS identifies informational and research tasks, as well as education and outreach needs the ATGTRT believes are necessary, to provide the basis for decreasing mortalities and serious injuries of marine mammals to insignificant levels approaching zero mortality and serious injury rates. The ATGTRS also identifies several potential voluntary measures that can be adopted by certain trawl fishing sectors to potentially reduce the incidental capture of marine mammals.

6.2.4.2 Sea Turtles

As provided in Figure 4, sea turtle interactions with gillnet, bottom trawl, and other bottom tending gear have been observed in the GOM, GB, and the Mid-Atlantic; however, most of the observed interactions have occurred in the Mid-Atlantic (see Warden 2011a,b; Murray 2013; Murray 2015). As few sea turtle interactions have been observed in the GOM and GB regions of the Northwest Atlantic, there is insufficient data available to conduct a robust model-based analysis on sea turtle interactions with gillnet or bottom trawl gear in these regions and therefore, produce a bycatch estimate for these regions. As a result, the bycatch estimates and the discussion below are based on observed sea turtle interactions in gillnet or bottom trawl gear in the Mid-Atlantic.

Figure 4 - Observed locations of turtle interactions in bottom tending gears in the GAR from 1989-2014.



future; or which is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA.

Bottom Trawl Gear

Green, Kemp's ridley, leatherback, loggerhead, and unidentified sea turtles have been documented interacting with bottom trawl gear. However, estimates are available only for loggerhead sea turtles. Warden (2011a,b) estimated that from 2005-2008, the average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic was 292 (CV=0.13, 95% CI=221-369), with an additional 61 loggerheads (CV=0.17, 95% CI=41-83) interacting with trawls, but released through a Turtle Excluder Device (TED).[12] The 292 average annual observable loggerhead interactions equates to approximately 44 adult equivalents (Warden 2011a,b). Most recently, Murray (2015) estimated that from 2009-2013, the total average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic was 231 (CV=0.13, 95% CI=182-298); this equates to approximately 33 adult equivalents (Murray 2015). Bycatch estimates provided in Warden (2011a) and Murray (2015b) are a decrease from the average annual loggerhead bycatch in bottom otter trawls during 1996-2004, which Murray (2008) estimated at 616 sea turtles (CV=0.23, 95% CI over the nine-year period: 367-890). This decrease is likely due to decreased fishing effort in high-interaction areas (Warden 2011a,b).

Sink Gillnet Gear

Murray (2013) conducted an assessment of loggerhead and unidentified hard-shell turtle interactions in Mid-Atlantic gillnet gear from 2007-2011. Based on Northeast Fisheries Observer Program data from 2007-2011, interactions between loggerhead and hard-shelled sea turtles (loggerheads plus unidentified hard-shelled) and commercial gillnet gear in the Mid-Atlantic averaged 95 hard-shelled turtles and 89 loggerheads (equivalent to 9 adults) annually (Murray 2013).[13] However, average estimated interactions in large mesh gear in warm, southern Mid-Atlantic waters have declined relative to those from 1996-2006 (Murray 2009), as did the total commercial effort (Murray 2013). Murray (2013) also estimated interactions by managed species landed in (Mid-Atlantic) gillnet gear from 2007-2011. For instance, an estimated average annual bycatch of loggerhead and non-loggerhead hard shelled sea turtles for trips primarily landing skate was 16 loggerheads (95% CI =9-23) and one non-loggerhead hard shelled sea turtles (95% CI=1-2).

6.2.4.3 Atlantic Sturgeon

Sink Gillnet and Bottom Trawl Gear

Atlantic sturgeon interactions (i.e., bycatch) with sink gillnet and bottom trawl gear have been observed since 1989; these interactions have the potential to result in the injury or mortality of Atlantic sturgeon (NMFS NEFSC FSB 2015, 2016). Three documents, covering three time periods, that use data collected by the Northeast Fisheries Observer Program to describe bycatch of Atlantic sturgeon in gillnet and bottom trawl gear: Stein et al. (2004b) for 1989-2000; ASMFC (2007) for 2001-2006; and Miller and Shepard (2011) for 2006-2010; none of these documents provide estimates of Atlantic sturgeon bycatch by Distinct Population Segment. Miller and Shepard (2011), the most of the three documents, analyzed fishery observer data and VTR data in order to estimate the average annual number of Atlantic sturgeon interactions in gillnet and otter trawl in the Northeast Atlantic that occurred from 2006 to 2010. This timeframe included the most recent, complete data and as a result, Miller and Shepard (2011) is

[12] TEDs allow sea turtles to escape the trawl net, reducing injury and mortality resulting from capture in the net. Approved TEDs are required in the shrimp and summer trawl fishery. For further information on TEDs see 50 CFR 223.206 and 68 FR 8456 (February 21, 2003).

[13] At Sea Monitoring (ASM) data was also considered in Murray (2013); however, as the ASM program began 1 May 2010, trips (1,085 hauls), trips observed by at-sea monitors from May 2010 – December 2011 were pooled with the NEFOP data. Further, as most of the ASM trips occur in the Gulf of Maine, only a small portion (9%) of ASM data was used in the Murray (2013) analysis.

considered to represent the most accurate predictor of annual Atlantic sturgeon interactions in the Northeast gillnet and bottom trawl fisheries (NMFS 2013).

Based on the findings of Miller and Shepard (2011), NMFS (2013) estimated that the annual bycatch of Atlantic sturgeon in gillnets to be 1,239 sturgeon and 1,342 sturgeon in bottom otter trawl gear. Miller and Shepard (2011) observed Atlantic sturgeon interactions in trawl gear with small (< 5.5 inches) and large (≥ 5.5 inches) mesh sizes, as well as gillnet gear with small (< 5.5 inches), large (5.5 to 8 inches), and extra-large mesh (>8 inches) sizes. Although Atlantic sturgeon were observed to interact with trawl and gillnet gear with various mesh sizes, Miller and Shepard (2011) concluded that, based on NEFOP observed sturgeon mortalities, gillnet gear, in general, posed a greater risk of mortality to Atlantic sturgeon than did trawl gear. Estimated mortality rates in gillnet gear were 20.0%, while those in otter trawl gear were 5.0% (Miller and Shepard 2011; NMFS 2013). Similar conclusions were reached in Stein et al. (2004b) and ASMFC (2007) reports; after review of observer data from 1989-2000 and 2001-2006, both studies concluded that observed mortality is much higher in gillnet gear than in trawl gear. However, an important consideration to these findings is that observed mortality is considered a minimum of what actually occurs and therefore, the conclusions reached by Stein et al. (2004b), ASMFC (2007), and Miller and Shepard (2011) are not reflective of the total mortality associated with either gear type. To date, total Atlantic sturgeon mortality associated with gillnet or trawl gear remains uncertain.

6.2.4.4 Atlantic Salmon

Sink Gillnet and Bottom Trawl Gear

Atlantic salmon interactions (i.e., bycatch) with gillnet and bottom trawl have been observed since 1989; in many instances, these interactions have resulted in the injury and mortality of Atlantic salmon (NMFS NEFSC FSB 2015, 2016). According to the Biological Opinion issued by NMFS Greater Atlantic Regional Fisheries Office on December 16, 2013, NMFS Northeast Fisheries Science Center's (NEFSC) Northeast Fisheries Observer and At-Sea Monitoring Programs documented a total of 15 individual salmon incidentally caught on more than 60,000 observed commercial fishing trips from 1989 through August 2013 (NMFS 2013; Kocik *et al*. 2014). Atlantic salmon were observed caught in gillnet (11/15)[14] and bottom otter trawl gear (4/15), with 10 of the incidentally caught salmon listed as "discarded" and five reported as mortalities (Kocik (NEFSC), pers. comm (February 11, 2013) in NMFS 2013).The genetic identity of these captured salmon is unknown; however, the NMFS 2013 Biological Opinion considers all 15 fish to be part of the Gulf of Maine Distinct Population Segment, although some may have originated from the Connecticut River restocking program (i.e., those caught south of Cape Cod, Massachusetts). Since 2013, no additional Atlantic salmon have been observed in gillnet or bottom trawl (NMFS NEFSC FSB 2015, 2016). Based on the above information, interactions with Atlantic salmon are likely rare (NMFS 2013; Kocik *et al*. 2014).

[14] Of the 11 observed Atlantic salmon in gillnet gear, 10/11 Atlantic salmon were observed in sink gillnet gear; only one Atlantic salmon was observed in drift gillnet gear (NMFS NEFSC FSB 2015, 2016).

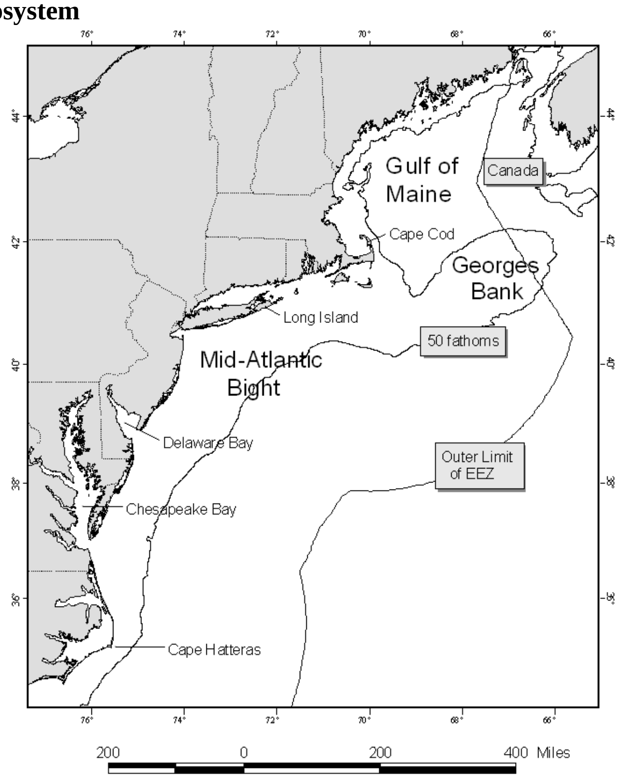
6.3 Physical Environment

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 1 and Map 2).

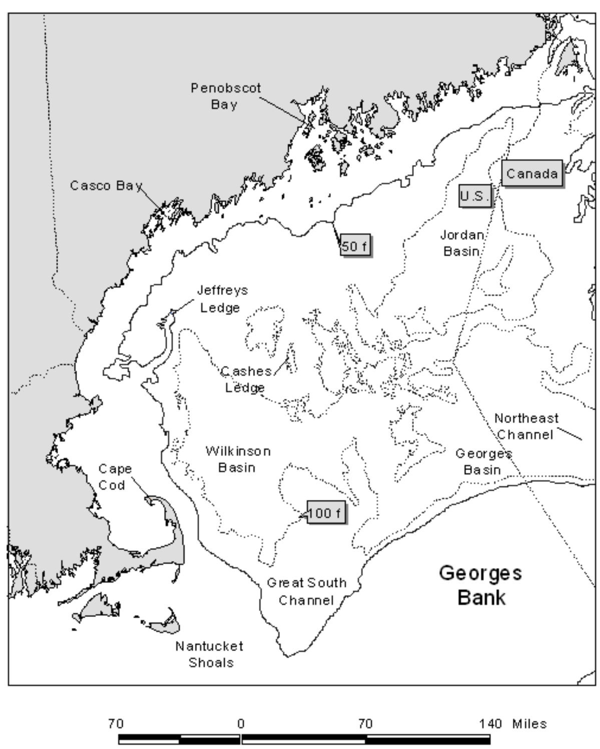
The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern 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 1 - Northeast shelf ecosystem



Map 2 - 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.).

Mid-Atlantic Bight

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.

6.4 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.

6.5 Human Communities/Socio-Economic Environment

The purpose of this section is to describe and characterize the various fisheries in which skates are caught. Descriptive information on the fisheries is included, and where possible, quantitative commercial fishery and economic information is presented.

6.5.1 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). Skates are not known to undertake large-scale migrations, but they do move seasonally in response to changes in water temperature, moving offshore in summer and early autumn and returning inshore during winter and spring. Members of the skate family lay eggs that are enclosed in a hard, leathery case commonly called a mermaid's purse. Incubation time is six to twelve months, with the young having the adult form at the time of hatching (Bigelow and Schroeder 1953). A description of the available biological information about these species can be found in Section 6.1.

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, and catch 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 land 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).

6.5.1.1 Catch

The skate fishery caught 109% of the overall ACL in FY 2016 (Table 13); this was a decrease on FY 2015 landings (Table 12). AMs were triggered in FY 2016 as there was overage. The wing fishery caught 109% of the wing TAL; the bait fishery also caught 109% of the bait TAL. State landings in FY 2015 were 941 mt, and Recreational catch was 416 mt (not shown in table). Total live discards in 2015 were XXX mt and dead discards were XXX. FY2016 landings are preliminary, and State, Dead Discards, and Recreational catch are not available yet.

Table 12 - FY 2015 Catch and Landings of Skates Compared to Management Specifications

Management Specification	Specification Amount	Catch/Landings (mt)	Percent Landed or Caught
ABC/ACL	35,479	28,111	79.2 %
ACT (75% of ABC)	26,609	28,111	105.6 %
Assumed Discards + State Landings	10,224	12,130	NA
TAL Bait	5,489	5,214	94.9 %
TAL Wings	10,896	10,350	94.9 %

Table 13 – Skate catch and landings (mt) in FY 2016

Management Specification	Specification Amount	Catch/Landings (mt)	Percent Landed or Caught
ABC/ACL	31,081	-	-
ACT (75% of ABC)	23,311	-	-
Assumed Discards + State Landings	10,721	-	NA
TAL Bait	4,218	4,602*	109 %
TAL Wings	8,372	9,166*	109 %

*preliminary

6.5.1.2 Recreational skate catches

In general, skates have little to no recreational value and are not intentionally pursued in any recreational fisheries. Catch information (2010-2016) for Atlantic coast skates from MRIP is presented in Table 14. Recreational skate catches have fluctuated between 2010 and 2014 with a high of 51,962 lbs occurring in 2013 (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 (please refer to the MRIP website for these data http://www.st.nmfs.noaa.gov/st1/recreational/queries/). The vast majority of skates caught by recreational anglers are 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 (please refer to the MRIP website for these data http://www.st.nmfs.noaa.gov/st1/recreational/queries/). 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 (please refer to the MRIP website for these data http://www.st.nmfs.noaa.gov/st1/recreational/queries/).

Reliability of skate recreational catch estimates from MRFSS is a concern. 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 (lbs) by species, 2010-2014 (A+B1)

	Winter	Smooth	Clearnose	Little	Total
2010	4,505	0	45,432	0	49,937
2011	0	173	37,130	1,423	38,726
2012	1,772	0	4,818	0	6,590
2013	359	0	31,949	21,589	53,897
2014	110	0	7,755	39,543	47,408
2015	21,296		33,924	13,607	68,827
2016	15,226		11,523	422	27,171

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.

6.5.1.3 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, 2009). Total skate landings have fluctuated between two levels between FY 2010 and 2016 (Table 15). The fluctuations in landings are largely attributable to the wing fishery as landings in the bait fishery have remained relatively stable (Table 16). 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 15 – Total Landings in the Skate Fisheries

Fishing Year	Landings (in live lbs)
2010	32,698,753
2011	41,302,586
2012	33,193,745
2013	30,896,762
2014	34,090,696
2015	33,825,878
2016	30,354,217

Grand Total	236,362,637

Table 16 – Landings by Skate Fishery Type

FY	Disposition	Landings (in live lbs)
2010	Bait	9,698,695
	Wing	23,000,058
2011	Bait	10,837,172
	Wing	30,465,414
2012	Bait	10,766,626
	Wing	22,427,119
2013	Bait	11,176,451
	Wing	19,720,311
2014	Bait	9,386,666
	Wing	24,704,030
2015	Bait	10,882,990
	Wing	22,942,888
2016	Bait	10,146,208
	Wing	20,208,009
Grand Total		236,362,637

Total fishing revenue from all species on active skate vessels increased in 2016 (Table 17).

Table 17 - Total fishing revenue (all species) from active skate vessels

Year	Total Revenue
2010	198,924,262
2011	235,439,028
2012	194,252,170
2013	165,798,785
2014	173,074,746
2015	172,801,405
2016	184,729,451
Grand Total	1,325,019,847

Landings by DAS declaration show that, during FY2014, that a large portion of bait is landed while on a multispecies (sector and common pool) trip (Table 18). Landings under a monkfish declaration may be underestimated because of reporting. A large amount of total skate landings had no associated declaration. The majority of wing landings are associated with multispecies trips, however, those associated with monkfish trips closely followed. The skate wing fishery is predominantly an incidental fishery, where skate wings are harvested on trawl and gillnet trips primarily targeting more valuable NE multispecies (cod, haddock, flounders, etc.) and/or monkfish. Therefore, the fishing effort associated with the skate wing fishery can be directly tied to effort patterns and constraints in these other fisheries. Fishing effort for skate wings will tend to only increase when DAS allocations and usage increase (and vice versa), which may occur independently of skate quotas. Similarly, the rate and magnitude of skates discarded by these fisheries are directly proportional to DAS usage.

Table 18 - Total skate landings (lbs live weight) by DAS program, FY2014- To Be Updated

VMS Declaration	Bait	Wing
Mults Sector	3,104,650	10,640,649
Mults Common	303,450	332,955
Monkfish	29,864	9,811,186
Scallop	NA	42,082
Unmatched/No Declaration	4,212,412	2,293,265
DOF	1,736,170	988,655
Total	9,386,546	24,108,792

Source: NMFS, Fisheries Statistics Office

6.5.1.4 Trends in number of vessels

The number of skate permits continues to decline between FY 2009 and 2016. On a broader time-scale, between FY2003 and 2016, there was an increase in skate permits with a high occurring in 2007 (Table 19).

Table 19 - 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	2,202
2014	2,148
2015	2,084
2016	2,074
2017	1,919

The number of active permits has decreased between 2009 and 2016 (Table 20). This decrease may contribute to the observed trend in wing landings shown in Table 16, with fewer active permits in years with lower landings.

Table 20 - Number of Active Permits between 2009 and 2012

FY	Number of active permits
2009	572
2010	550
2011	567

2012	527
2013	455
2014	452
2015	440
2016	415

6.5.1.5 Trends in revenue

Skate revenue increased until FY2014, and was likely driven by the high percentage of the wing TAL being achieved (Table 21). The increase in revenue is largely attributable to changes in wing revenue and landings (Table 22), with subsequent declines during 2015 and 2016.

Table 21 – Total Skate Revenue

FY	Revenue
2010	$ 6,298,968
2011	$ 9,338,329
2012	$ 7,554,998
2013	$ 7,593,669
2014	$ 8,991,842
2015	$ 6,269,341
2016	$ 5,433,469
Grand Total	$ 51,480,616

Table 22 - Total Skate Revenue by Fishery (Bait and Wing)

FY	Disposition	Revenue
2010	Bait	$ 1,161,331
	Wing	$ 5,137,637
2011	Bait	$ 1,711,431
	Wing	$ 7,626,898
2012	Bait	$ 1,391,065
	Wing	$ 6,163,933
2013	Bait	$ 1,199,273
	Wing	$ 6,394,396
2014	Bait	$ 1,161,520
	Wing	$ 7,830,322
2014	Bait	$ 1,128,315
	Wing	$ 5,141,026
2016	Bait	$ 1,120,241
	Wing	$ 4,313,228
Grand Total		$ 51,480,616

6.5.2 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, dealer, or individual.

6.5.2.1 Overview of Ports

There were a total of 78 ports where skate were landed for food, and 16 ports where skates were landed for bait, during 2015-2016. They include ports from all states in the Northeast Skate Complex management area (ME to NC). This represented a decrease in revenues (from $14.2 million to $9.5 million) and number of ports for the wing fishery during 2015-2016, while the bait fishery decreased slightly in terms of revenues (from $2.3 million to $2.2 million) and number of ports. Skate bait was landed in 19 ports during 2013-2014, with skate wings landed in 86 ports. Landings held steady, around 21 million pounds, for both bait and food fisheries, during these two periods. Chatham and New Bedford dominate skate wing landings, while Point Judith dominates skate bait landings.

Only 23 ports received at least $10,000 during FY 2016 from skate for food; 10 ports received at least $100,000 per year. Point Judith, RI, Chatham, MA, New Bedford, MA, were the highest grossing ports. There are 6 ports that landed at least 10,000 lbs of skate for bait, in FY 2016. The top ports in bait landings were Point Judith, New London, and Newport.

Table 23 outlines commercial landings of skates by individual states from FY2010 – FY2016. Massachusetts and Rhode Island continue to dominate the skate fishery. Skate landings fluctuate by year in both fisheries. Skate bait was landed primarily in Point Judith, Newport, Sea Isle City, and New

London, during 2010-2016. Point Judith's landings have accounted for 42% of bait landings between 2012 and 2016. New London landings have increased somewhat in recent years, while landings in Point Judith, Newport, Fall River, and New Bedford have decreased. Other ports such as Montauk have individual vessels which sell skate directly to lobster and other pot fishermen for bait, because there are no major skate bait dealers there. 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).

Chatham is one of the major skate wing or food skate ports. Skate wings are also landed significantly in Point Judith and New Bedford. 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 and 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.

Table 23 - Total Skate landings by fishery and state

FY	Disposition	State	Revenue (in $)	Landings (in lbs)
2012	Bait	CT	5,394	23,425
		MA	195,430	1,533,632
		MD	104	10,400
		NJ	326,415	752,578
		NY	62	357
		RI	868,893	8,467,734
		VA	91	905
	Bait Total		1,396,389	10,789,031
	Food	CT	147,345	644,500
		MA	2,932,446	11,788,996
		MD	8,664	23,433
		ME	1,182	3,707
		NC	114	411
		NH	1,592	4,737
		NJ	394,687	1,551,747
		NY	515,501	2,182,001
		RI	1,376,632	5,220,311
		VA	81,920	359,282
	Food Total		5,460,083	21,779,125
2013	Bait	CT	13,265	68,572
		MA	217,023	1,856,490
		MD	619	14,591
		NJ	144,415	998,360
		NY	15	68
		RI	836,709	8,306,442
		VA		
	Bait Total		1,212,046	11,244,523
	Food	CT	171,096	605,048
		MA	3,106,360	9,398,122
		MD	13,835	47,618
		ME	451	651
		NC	6,806	17,766
		NH	13,247	1,030
		NJ	515,258	2,004,837
		NY	515,603	1,889,876
		RI	1,495,381	4,779,463
		VA	113,296	442,659
	Food Total		5,951,333	19,187,070
2014	Bait	CT	56,557	557,668
		MA	11,173	91,007
		MD	402	18,660
		NJ	288,027	780,849

		NY	**472**	**9,186**
		RI	**793,369**	**7,929,296**
		VA		
	Bait Total		**1,150,000**	**9,386,666**
	Food	**CT**	**142,925**	**493,959**
		MA	**4,446,038**	**13,335,943**
		MD	**9,066**	**28,237**
		ME	**201**	**511**
		NC	**13,644**	**46,701**
		NH	**37,338**	**47,892**
		NJ	**603,064**	**2,032,391**
		NY	**648,489**	**2,088,751**
		RI	**1,818,667**	**6,026,349**
		VA	**47,316**	**210,670**
	Food Total		**7,766,748**	**24,311,404**
2015	**Bait**	**CT**	**260,840**	**2,579,600**
		MA	**41,194**	**398,260**
		MD	**143**	**9,614**
		ME	**645**	**1,171**
		NJ	**65,115**	**737,093**
		NY	**302**	**2,872**
		RI	**760,076**	**7,149,250**
	Bait Total		**1,128,315**	**10,877,860**
	Food	**CT**	**477,327**	**1,759,158**
		MA	**2,747,403**	**5,708,286**
		MD	**5,702**	**18,560**
		ME	**456**	**899**
		NC	**9,317**	**21,483**
		NH	**2,564**	**13,196**
		NJ	**402,446**	**943,156**
		NY	**518,015**	**1,017,647**
		RI	**935,281**	**2,085,362**
		VA	**42,515**	**93,014**
	Food Total		**5,141,026**	**11,660,761**
2016	**Bait**	**CT**	**375,781**	**3,732,800**
		MA	**19,422**	**188,575**
		MD	**121**	**11,764**
		NJ	**64,009**	**707,726**
		NY	**669**	**6,630**
		RI	**660,239**	**5,534,233**
	Bait Total		**1,120,241**	**10,181,728**
	Food	**CT**	**373,634**	**988,672**
		MA	**2,344,838**	**5,263,566**
		MD	**20,501**	**54.473**
		NC	**9,973**	**21,889**
		NH	**3,758**	**14,274**

		NJ	**269,802**	**690,985**
		NY	**374,346**	**793,008**
		RI	**884,932**	**2,429,642**
		VA	**31,444**	**74,021**
	Food Total		**4,313,228**	**10,330,530**

6.5.3 Skate Fishing Areas

Vessels landing bait skate generally fish in the inshore waters of SNE, are most often trawlers, and frequently fish in an exempted fishery (Figure 5).

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 (Figure 6). 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.

Figure 5 - Skate bait landings by statistical area for FY 2014

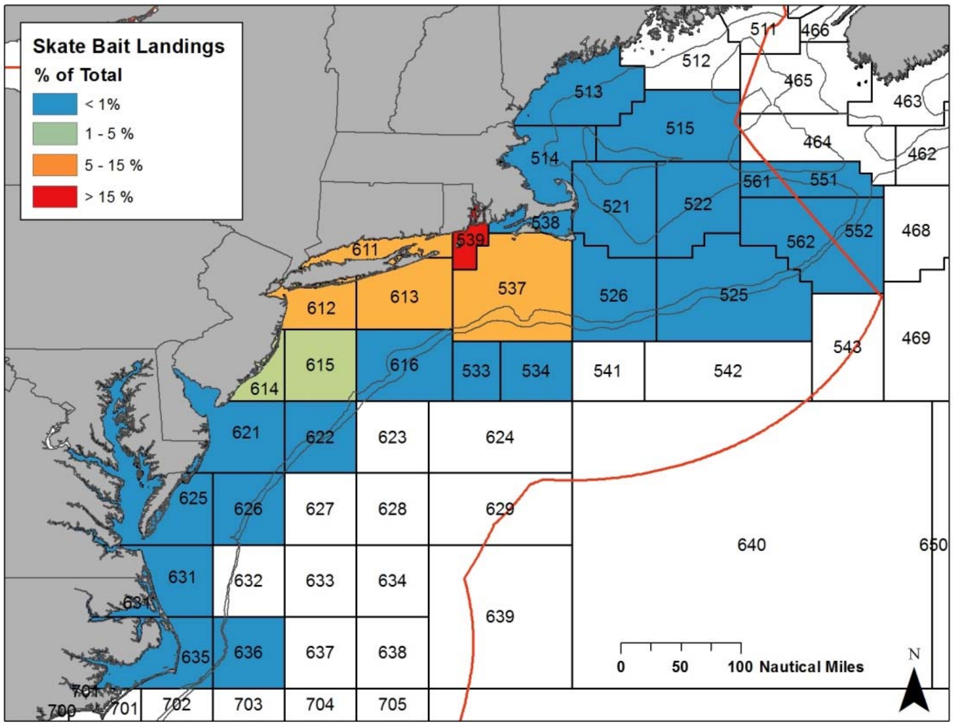
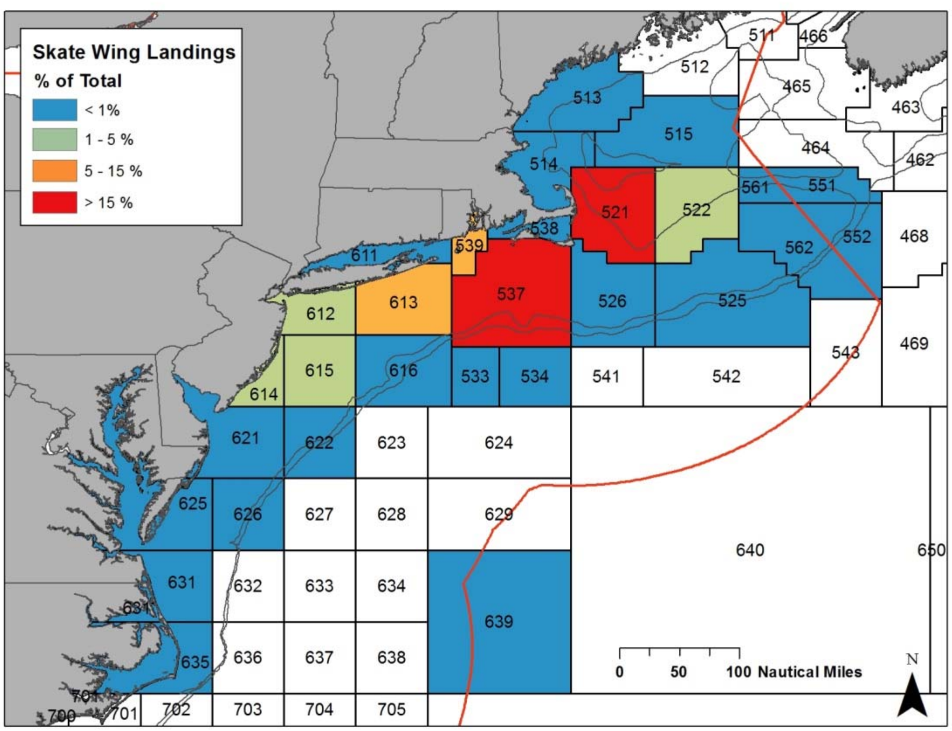


Figure 6 - Skate wing landings by statistical area for FY 2014



7.0 Environmental Consequences of the Alternatives

7.1 Biological Impacts

7.1.1 Updates to Annual Catch Limits

7.1.1.1 Option 1: No Action (ACL= ABC of 31,081 mt, ACT of 23,311 mt, TAL of 12,590 mt, Wing TAL =8,372 mt, Bait TAL 4,218 mt)

The No Action alternative would maintain the ACL specifications as those established in Framework 3 (NEFMC, 2016). This would allow a lower than recommended catch than the Preferred Alternative and could reduce the overall long-term yield from the skate resource. The No Action alternative was appropriate when the survey indices, used as biomass indicators, were at a lower level and before there was improved science on the discard mortality rate estimate for winter skate in gillnet gear. Thorny and smooth skates are in rebuilding plans, but only thorny skate is overfished. Overfishing is no longer occurring on thorny skate, however, the 0.1 kg/tow increase in three year moving average from 2014-2016 does not indicate a vast improvement in rebuilding. The survey index three year moving average of the remaining six species are at or near the B_{MSY} proxy indicating the current management paradigm has had a positive biological impact on the complex.

This alternative would reduce the ability of the fishery to achieve optimum yield by not incorporating the updated survey indices and discard mortality rate estimate that increase the ACL. The lower ACL under the No Action alternative would be expected to have a low positive impact on overall biomass because if landings are lower biomass would be expected to continue to increase. However, given the small difference between the ACL, and therefore the TALs, between the No Action alternative and Option 2 this positive effect would not be expected to be significant. Overall, Option 1 would be expected to have neutral to low positive impacts compared to Option 2.

7.1.1.2 Option 2: Revised Annual Catch Limit Specifications (ACL= ABC of 31,327 mt, ACT of 23,495 mt, TAL of 13,281 mt, Wing TAL =8,832 mt, Bait TAL 4,449 mt)

Option 2 would revise the ACL for the skate complex using the most recent best available science – revised survey indices and discard mortality rate estimate. The revised ACL was calculated using the revised median catch/biomass exploitation ratio (updated with the revised discard mortality rate estimate for sink gillnet gear for winter skate) and the most recent 3 year moving average of the relevant NEFSC trawl survey (Table 27). 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 ACL and allocations to discards and catch result mainly from minimizing the risk of overfishing and keeping catches below a level that has been shown in Amendment 3 to produce larger and more frequent increases in skate biomass[15]. Variations in landings and discards may cause catch to exceed the ACT and any overages of the risk-averse ACT will be absorbed by the 25% management uncertainty buffer. Any overage of the TAL greater than 5% will trigger accountability measures, which results in a reduction of the in-season possession limit trigger for the relevant fishery. If the ACL is exceeded then the management uncertainty buffer would be increased by 1% for each 1%

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

ACL overage. Thus it is highly unlikely that skate catches will exceed the ACL. 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. A smaller number of trips landed the full wing possession limit, in either season 1 or season 2, indicating a smaller directed fishery (Figure 7); the majority of landings were below the incidental wing possession limit, suggesting that the incidental fishery takes advantage of the additional revenue from skates. The impact on fisheries is a little uncertain; the wing fishery had not achieved its TAL between FYs 2010 and 2013, however, it achieved 97.3% of the TAL in FY 2016 (Table 24). If the assumption is made that FY2016 is more representative of the current wing fishery, then the increased ACL may positively affect fishing (both incidental and directed) by reducing the likelihood that overfishing could occur. The increased ACL may impact fisheries that also land skate, e.g. monkfish because of the high levels of skates also caught in this fishery. The bait fishery achieved the highest level of its TAL in FY 2016 (100.9%) when an effective closure was implemented when the incidental possession limits in both the wing and the bait fisheries went into effect for six weeks (Table 25).

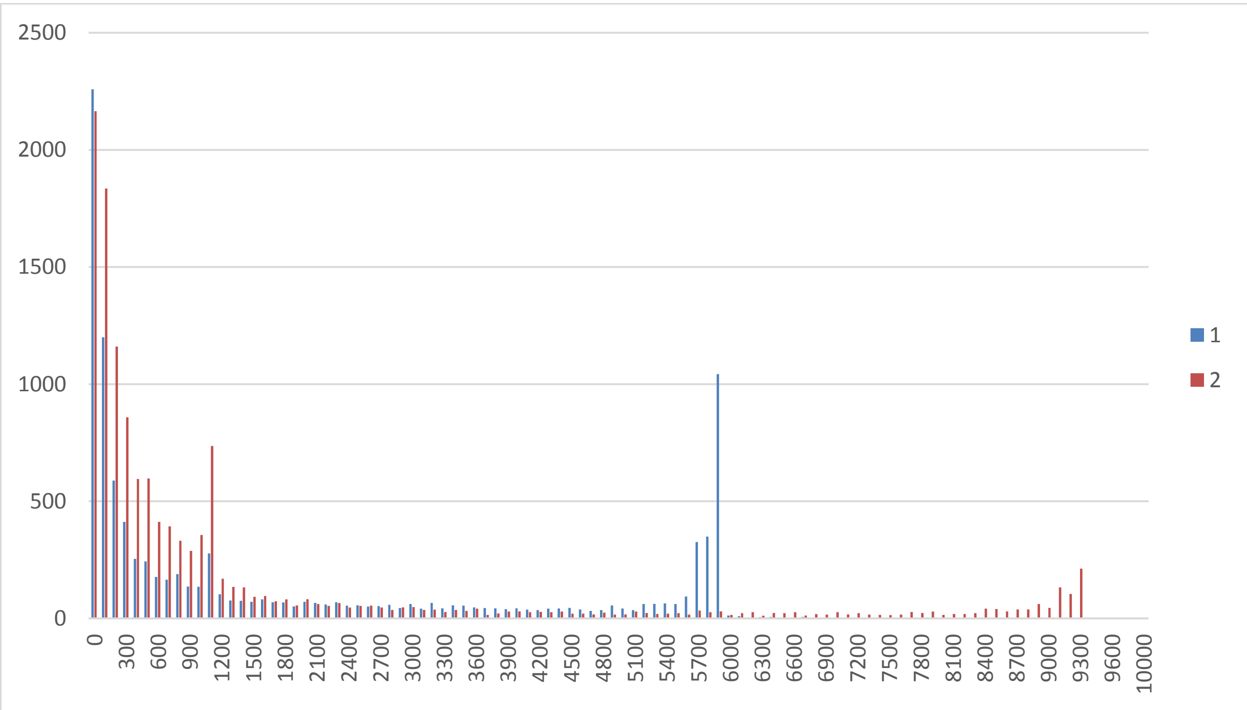


Figure 7 - Frequency of trips landing wings (disposition food) by weight for FYs 2015 and 2016 for Season 1 (May – August 31) and Season 2 (September 1 – April 30)

Table 24 – Landings and percent of TAL achieved in the wing fishery between FY2010 and FY2016

Fishing year	TAL	Landings	Percent of TAL
2010	9,209	4,330	47
2011	14,338	11,790	82
2012	15,538	10,113	65
2013	14338	7,981	56
2014	11,169	10,605	97
2015	10,896	8,911	81.8

2016

Table 25 – Landings and percent of TAL achieved in the bait fishery between FY2010 and FY2016

Fishing year	TAL	Landings	Percent of TAL
2010	4,639	4,571	99
2011	7223	4132	57
2012	7827	5504	70
2013	7223	5596	77
2014	5626	4499	82
2015	5,489	5,541	100.9
2016			

The increase in ACL would be expected to negatively impact overall skate biomass based on the relationship between catch and biomass. The increased ACL would potentially increase overall skate landings, however, the extent of such an increase is uncertain as it depends on the ability of the wing fishery to achieve its TAL, which would result in low positive impacts. However, increased landings may reduce discards. Increased discards of targeted skates in the wing fishery would occur if the incidental trip limit was triggered early in the fishing year; once 85% of the wing TAL is achieved in-season, the RA has the discretion, based on projections, to allow fishing to continue or to implement the incidental trip limit. Increased discards would increase the proportion of dead discards, which could have further impacts on the TAL when setting specifications (dead discards decreased between 2014-2016, which was further reduced by revising the discard mortality rate estimate for winter skate in sink gillnet gear). Recent work on discard mortality rate estimate of winter skate resulted in a reduction from the assumed discard mortality rate estimate (50%) for sink gillnet gear established in A3 to 14%. Total and dead skate discards increased in 2013 and 2014 (Table 26) and decreased again despite no large changes occurring in the distribution of pounds of skate landed in recent fishing years (Figure 7).

Table 26 – Total and dead skate discards for calendar years 2012 - 2016

Year	Total Discards (mt)	Dead Discards (mt)
2012	36,277	10,270
2013	42,716	12,093
2014	42,758	12,673
2015	37,894	10,417
2016	33,271	10,436

A certain level of discarding is expected as landing barndoor, thorny and smooth skate (in the GOM) is currently prohibited (this action is proposing landing barndoor skate). It is important to note that how landings and discards are currently apportioned by species, barndoor skate contribute to both landings and discards. Only if effort shifts away from where these species are found could a change positively impact these species. Therefore we expect a neutral impact on the skate resource, and slightly more positive impacts when compared to the No Action.

Table 27 - Current and proposed 2016-2017 specifications including changes in input parameters: C/B exploitation medians, updated stratified mean biomass in FSV Albatross IV units, and an average mean discard mortality rate weighted by estimated discards by species and fishing gear.

	Current Specifications	Proposed 2018-2019 Specifications
	2012-2014 survey; 2012-2014 discards	2018-2019* survey; 2014-2016 discards

ACL specifications		
ABC/ACL (mt)	31,081	31,327
ACT (mt)	23,311	23,495
TAL (mt)	12,926	13,762
Assumed state landings		481
Federal TAL	12,872	13,281
Wing TAL	8,560	8,832
Bait TAL	4,312	4,449
C/B medians		
Barndoor	2.76	2.76
Clearnose	3.35	2.94
Little	2.09	2.14
Rosette	2.51	2.25
Smooth	2.74	2.68
Thorny	1.40	1.44
Winter	1.91	1.87
Survey biomass (mean kg/tow)		
Barndoor	1.41	1.60
Clearnose	0.77	0.59
Little	6.75	5.49
Rosette	0.048	0.047
Smooth	0.19	0.25
Thorny	0.13	0.18
Winter	5.06	6.65
Discard rate	43%	41%

* 2017 spring survey index used for little skate

The Skate FMP primarily controls skate landings, while deducting projections of anticipated dead skate discards from the ACT. Variability in the skate discard rate, and uncertainty in discard mortality rates is part of the reason why the buffer between the ACL and ACT has been specified at 25%. In some years when dead skate discards have ended up higher than originally projected, the ACT has been exceeded, but never the ACL, minimizing the risk of overfishing. If this alternative was implemented, the TAL may be achieved and/or some level of discards may be converted to landings depending on whether fishing resembled the 2015 or 2016 fishing year as compared to Option 2. Therefore, this alternative does have a slightly lower risk of negatively impacting the stock by potentially allowing higher landings than that suggested by the most recent information described in Option 2. However, overall impacts of this alternative are only expected to be slightly negative and would most likely not result in overfishing.

7.1.2 Barndoor Skate Possession Limit Alternatives

7.1.3 Option 1: No Action

The No Action alternative would maintain the current prohibition on possessing barndoor skate. This would have positive biological impacts on the barndoor skate component of the skate complex because it would minimize mortality on barndoor skate. This would be expected to have positive biological impacts on the overall stock complex because as long as the possession limit was not exceeded the risk of overfishing would be minimized. The No Action alternative would maintain current fishing pressure on winter skate, however, given its current high survey index compared to barndoor skate, it could withstand heavier fishing pressure compared to barndoor skate. Option 1 would have positive impacts on barndoor skate and neutral impacts on the skate complex itself because it would not allow increased mortality on barndoor skate or the skate complex as a whole. Compared to Options 2, 3, 4, and 5, Option 1 would have similar low positive impacts on overall skate biomass.

7.1.4 Option 2: Barndoor Skate Possession Limit of 500 lb

This alternative would allow vessels to land a maximum of 500 lb of barndoor skate wings (1,135 lb whole weight) per trip not to exceed the overall skate wing possession limit, i.e. vessels would have to land 500 lb less of winter skate wings in order to keep barndoor. The wing possession limit has been set to reduce the likelihood of exceeding the ACL. Because this 500 lb limit would be within the current wing possession limit (not separate or in addition to), and because the possession limits are set for all skates in the complex, overall skate biomass would not be expected to be affected, provided the wing TAL, which is based on all seven species, was not exceeded.

Currently a 50% discard mortality rate estimate is assumed for barndoor skate in all gear types. By converting barndoor skate discards to landings, this would increase mortality of those landed barndoor skate to 100%, which would have a negative biological impact on barndoor skate. The total level of impact on barndoor skate would depend on whether fishing behavior changed in order to target barndoor skate. The total number of trips landing skate wings has declined in recent years (Table 28). A simple estimation of barndoor skate that could be landed would be to take the total number of trips made in recent fishing years and multiply that by the barndoor skate possession limit. This calculation results in a conservative estimate of expected barndoor landings because it assumes each trip would maximize its barndoor skate limit. Figure 7 shows that the majority of trips land incidental amounts of skate wings. However, if a market develops for barndoor skate with a higher price than winter skate wings currently earn vessels may target barndoor skate. However, reducing landings of winter skate would have a positive biological impact on that species because it would reduce winter skate mortality. Research into the discard mortality of winter skate in trawl (9%), scallop dredge (34%), and sink gillnet gear (14%) indicates the species is resilient given the high level of survivability.

Compared to Option 1, Option 2 would have more negative biological impacts on barndoor skate because of increased mortality caused by allowing landings. Option 2 would have lower negative biological impacts on barndoor skate compared to Options 3 and 4 because it would result in lower mortality of barndoor skate. Conversely, Option 2 would have low positive impacts on winter skate compared to Option 1 because it could reduce mortality on winter skate, which are the dominant species in wing landings. Option 2 would have similar low positive impacts on winter skate compared to Options 3 and 4 because they would reduce mortality on winter skate. With regards to overall skate biomass, Option 2 would have similar low positive impacts compared to Options 1, 3, 4, and 5 because the wing possession limits are set to prevent the ACL from being exceeded and reduce the likelihood of overfishing occurring.

Table 28 - Total number of trips taken between FY2010 and FY2016 landing skate wings

Fishing year	Total number of trips encountering skate	Total number of observed trips encountering barndoor skate
2010	14,710	
2011	18,361	
2012	15,507	663
2013	13,168	652
2014	13,190	874
2015	12,494	814
2016	11,140	960

7.1.5 Option 3: Proportional Barndoor Skate Possession Limit

Option 3 would set a possession limit based on the proportion of barndoor skate to all skates from observer data. For FY2018 and FY2019, this would result in a 650 lb possession limit for barndoor skate in Season 1 and 1,025 lb in Season 2, representing 25% of each seasonal possession limit, not to exceed the overall skate wing possession limit, i.e. vessels would have to land 650 lb (or 1,025 lb) less of winter skate wings in order to keep barndoor.. The wing possession limit has been set to reduce the likelihood of exceeding the ACL. Therefore by allowing barndoor to be landed on a trip, overall skate biomass would not be expected to be affected, provided the wing TAL, which is based on all seven species, was not exceeded.

Currently a 50% discard mortality rate estimate is assumed for barndoor skate in all gear types. By converting barndoor skate discards to landings, this would increase mortality of those landed barndoor skate to 100%, which would have a negative biological impact on barndoor skate. The total level of impact on barndoor skate would depend on whether fishing behavior changed in order to target barndoor skate. The total number of trips landing skate wings has declined in recent years (Table 28). A simple estimation of barndoor skate that could be landed would be to take the total number of trips made in recent fishing years and multiply that by the barndoor skate possession limit. This calculation results in a conservative estimate of expected barndoor landings because it assumes each trip would maximize its barndoor skate limit. Figure 7 shows that the majority of trips land incidental amounts of skate wings. However, if a market develops for barndoor skate with a higher price than winter skate wings currently earn vessels may target barndoor skate. However, reducing landings of winter skate would have a positive biological impact on that species because it would reduce winter skate mortality. Research into the discard mortality of winter skate in trawl (9%), scallop dredge (34%), and sink gillnet gear (14%) indicates the species is resilient given the high level of survivability.

Compared to Options 1 and 2, Option 3 would have more negative biological impacts on barndoor skate because of increased mortality caused by allowing landings. Option 3 would have lower negative biological impacts on barndoor skate compared to Option 4 because it could result in lower mortality of barndoor skate. Conversely, Option 3 would have low positive impacts on winter skate compared to Options 1 because it could reduce mortality on winter skate, which are the dominant species in wing landings. Option 3 would have similar low positive impacts on winter skate compared to Options 2 and 4 because they would reduce mortality on winter skate. With regards to overall skate biomass, Option 3 would have similar low positive impacts compared to Options 1, 2, 4, and 5 because the wing possession limits are set to prevent the ACL from being exceeded and reduce the likelihood of overfishing occurring.

7.1.6 Option 4: Mixed Skate Wing Possession Limit

Option 4 would remove the prohibition on landing barndoor skates but would not establish a specific barndoor skate possession limit. Total pounds of skate wings on board would not be allowed to exceed 2,600 lb in Season 1 or 4,100 lb in Season 2 but vessels could land wings from allowed species in desired quantities up to that amount. The wing possession limit has been set as a complex to reduce the likelihood of exceeding the ACL for the skate complex. Therefore by allowing barndoor to be landed on a trip, overall skate biomass would not be expected to be affected, provided the wing TAL, which is based on all seven species, was not exceeded.

Currently a 50% discard mortality rate estimate is assumed for barndoor skate in all gear types. By converting barndoor skate discards to landings, this would increase mortality of those landed barndoor skate to 100%, which would have a negative biological impact on barndoor skate. The total level of impact on barndoor skate would depend on whether fishing behavior changed in order to target barndoor skate. The total number of trips landing skate wings has declined in recent years (Table 28). A simple estimation of barndoor skate that could be landed would be to take the total number of trips made in recent fishing years and multiply that by the barndoor skate possession limit. This calculation results in a conservative estimate of expected barndoor landings because it assumes each trip would maximize its barndoor skate limit. Figure 7 shows that the majority of trips land incidental amounts of skate wings. However, if a market develops for barndoor skate with a higher price than winter skate wings currently earn vessels may target barndoor skate. Option 4 would allow the entire possession limit to be landed as barndoor skate, which could greatly increase mortality on barndoor skate. However, reducing landings of winter skate would have a positive biological impact on that species because it would reduce winter skate mortality. Research into the discard mortality of winter skate in trawl (9%), scallop dredge (34%), and sink gillnet gear (14%) indicates the species is resilient given the high level of survivability.

Compared to Options 1, 2, and 3, Option 4 would have more negative biological impacts on barndoor skate because of increased mortality caused by allowing the maximum amount of barndoor skate to be landed. Conversely, Option 4 could have low positive impacts on winter skate compared to Options 1, 2, and 3 because it could reduce mortality on winter skate, which are currently the dominant species in wing landings. With regards to overall skate biomass, Option 4 would have similar low positive impacts compared to Options 1, 2, 3, and 5 because the wing possession limits are set to prevent the ACL from being exceeded and reduce the likelihood of overfishing occurring.

7.1.7 Option 5: Discard Restriction

Option 5 could mitigate mortality on individual skate species and overall skate biomass by prohibiting the discarding of any skate species already winged in order to land barndoor skate. This would be expected to have a positive biological impact on skate species because it prevents additional mortality by prohibiting discarding of skate wings once a more favorable skate species is encountered. Option 5 would be expected to have similar positive biological impacts on skate biomass compared to Options 1, 2, 3, and 4 because it would work in conjunction with the other alternatives to reduce the likelihood of overfishing from occurring.

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

7.2.1 Annual Catch Limit Alternatives

The skate wing fishery is largely an incidental fishery prosecuted during fishing under other FMPs as previously mentioned. Catch of non-skate species on trips landing skates are controlled by the DAS limits, sector rules, or other discard limiting measures in other FMPs. For information regarding recent limits in other fisheries, please refer to the discussion of cumulative effects (Section **Error! Reference source not found.**). On the small portion of trips where skates are directly targeted, common non-target species include monkfish and spiny dogfish.

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. Because these discards are controlled by measures in other fisheries, the impacts to non-skate species from annual catch limit alternatives are negligible above those already analyzed for actions in the other FMPs.

7.2.2 Barndoor Skate Wing Possession Limit Alternatives

The Skate FMP requires that all vessels landing skates on a DAS trip comply with the wing possession limit; any non-DAS trip has an incidental trip limit of 500 lbs of skate wing. Allowing landings of barndoor skate would not affect the overall wing possession limit. If fishing effort is similar to FY2016, status quo possession limits would be expected the full TAL to be achieved but not exceeded, but the incidental possession limit could be 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. Because the catch of the other species, including landings and discards, are accounted for under other FMPs, the wing possession limit alternatives are expected to have negligible impacts to non-skate species above those already analyzed for actions in the other FMPs.

7.3 Essential Fish Habitat (EFH) Impacts

7.3.1 Updates to Annual Catch Limits

7.3.1.1 Option 1: No Action (ACL= ABC of 31,081 mt, ACT of 23,311 mt, TAL of 12,590 mt, Wing TAL =8,372 mt, Bait TAL 4,218 mt)

Option 1 would maintain current specification levels from FYs 2016 and 2017 for FYs 2018 and 2019.

- The aggregate skate ABC/ACL would stay at 31,081 mt.
- The ACT would stay at 23,311 mt.
- The TAL would stay at 12,590 mt.

The TAL is allocated amongst the bait and wing fisheries. Each fishery has its own possession limit. By regulation, the wing fishery can only land clearnose and winter skates, unless modified by this action, as they are above the preferred market size (little skates are too small) and are not prohibited from possession like barndoor (unless modified by this action after being declared rebuilt in 2016), 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. The wing fishery almost fully achieved its TAL in FY2016 (Table 24). In FYs 2015 and 2016, the bait fishery fully achieved its TAL (Table 25). Vessels operating under a Letter of Authorization are required to land skates less than 23 inches total length.

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 (Stevenson *et al*. 2004, NEFMC 2011[16]). In addition, EFH for northeast skate species was determined to have a low vulnerability to sink gillnet gear (Stevenson *et al*. 2004). Combining these two findings, the gillnet component of the skate fishery is not causing adverse effects to EFH. Bottom otter trawls, on the other hand, have a relatively large area swept footprint and also a larger per unit area impact (Stevenson et al. 2004, NEFMC 2011). Bottom trawl per unit area impact aggregated over this larger footprint causes adverse effects to EFH. Because the skate fishery is largely an incidental fishery, measures that affect fishing effort in fisheries such as NE multispecies and monkfish may influence EFH impacts attributed to the skate fishery.

Option 1 would produce minor negative impacts to the EFH resource as effort is largely controlled by regulations in other fisheries, but the magnitude of impacts is not expected to differ from the status quo. Option 1 may have similar low negative impacts on EFH compared to Option 2 as fishing effort would be reduced by a small amount under this Option.

7.3.1.2 Option 2: Revised Annual Catch Limit Specifications (ACL= ABC of 31,327 mt, ACT of 23,495 mt, TAL of 13,281 mt, Wing TAL =8,832 mt, Bait TAL 4,449 mt)

Option 2 would adjust skate specifications for fishing years 2018-2019 as follows:

- The aggregate skate ABC/ACL would increase from 31,081 to **31,327** mt.

[16] New England Fishery Management Council (2011). The Swept Area Seabed Impact (SASI) approach: a tool for analyzing the effects of fishing on Essential Fish Habitat. 257pp. Available online at www.nefmc.org/library/omnibus-habitat-amendment-2.

- The ACT would likewise increase from 23,311 to **23,495** mt.
- The TAL would increase from 12,872 to **13,281** mt. (8,832 wing, 4,449 bait)

The higher Option 2 TALs are similar to the landings in 2016, as shown in Table 24 and Table 25, and are not expected to incentivize increased fishing effort on skate because of the small increase in proposed TAL. Thus, under Option 2, catch and effort in the wing fishery is expected to remain at a similar level relative to Option 1/No Action, and therefore the adverse impacts of Option 2 are similar to the impacts associated with Option 1.

7.3.2 Barndoor Skate Possession Limit Alternatives

7.3.2.1 Option 1: No Action

Option 1 would maintain the prohibition on landing barndoor skate. EFH impacts are related to the amount and location of fishing effort, and the gear type used. Option 1 would not modify the existing possession limit and therefore overall fishing effort on skate would not be expected to change. As described in Section 7.3.1.1, otter trawl gear would have negative impacts on EFH. Fishing for skate occurs using both otter trawl and sink gillnet gear. Therefore Option 1 would be expected to have low negative impacts on EFH. Compared to Options 2, 3, 4, and 5, Option 1 would have similar low negative impacts on EFH.

7.3.2.2 Option 2: Barndoor Skate Possession Limit of 500 lb

Option 2 would allow 500 lb of the wing possession limit to be comprised of barndoor skate. This would not modify the existing wing possession limit and therefore overall fishing effort on skate would not be expected to change. Additional potential impacts would occur if a small targeted fishery for barndoor skate occurred and fishing effort shifted to areas where barndoor skate are more abundant. Barndoor skate and winter skate overlap in distribution and it is unclear if effort would need to shift in order to land barndoor skate. It is not possible to predict how the market would respond to barndoor skate and subsequent changes in fishing effort. However, overall fishing effort on skate is restricted by the wing possession limit and regulations in other fisheries. Therefore, Option 2 would have low negative impacts on EFH. Compared to Options 1, 3, 4, and 5, Option 2 would have similar low negative impacts.

7.3.2.3 Option 3: Proportional Barndoor Skate Possession Limit

Option 3 would allow 650 lb in Season 1 and 1,025 lb in Season 2 of the wing possession limit to be comprised of barndoor skate. This would not modify the existing wing possession limit and therefore overall fishing effort on skate would not be expected to change. Additional potential impacts would occur if a small targeted fishery for barndoor skate occurred and fishing effort shifted to areas where barndoor skate are more abundant. Barndoor skate and winter skate overlap in distribution and it is unclear if effort would need to shift in order to land barndoor skate. It is not possible to predict how the market would respond to barndoor skate and subsequent changes in fishing effort. However, overall fishing effort on skate is restricted by the wing possession limit and regulations in other fisheries. Therefore, Option 3 would have low negative impacts on EFH. Compared to Options 1, 2, 4, and 5, Option 3 would have similar low negative impacts.

7.3.2.4 Option 4: Mixed Skate Wing Possession Limit

Option 4 would allow barndoor skate to be landed in any amount up to the wing possession limit. This would not modify the existing wing possession limit and therefore overall fishing effort on skate would not be expected to change. Additional potential impacts would occur if a small targeted fishery for barndoor skate occurred and fishing effort shifted to areas where barndoor skate are more abundant. Barndoor skate and winter skate overlap in distribution and it is unclear if effort would need to shift in order to land barndoor skate. It is not possible to predict how the market would respond to barndoor skate and subsequent changes in fishing effort. However, overall fishing effort on skate is restricted by the wing possession limit and regulations in other fisheries. Therefore, Option 4 would have low negative impacts on EFH. Compared to Options 1, 2, 3, and 5, Option 4 would have similar low negative impacts.

7.3.2.5 Option 5: Discard Restriction

Option 5 could mitigate mortality on individual skate species and overall skate biomass by prohibiting the discarding of any skate species already winged in order to land barndoor skate. This would be expected to have a positive biological impact on skate species because it prevents additional mortality by prohibiting discarding of skate wings once a more favorable skate species is encountered. It may help to reduce fishing effort if vessels don't extend a trip to maximize barndoor skate landings. However, since the overall wing possession limits would not be reduced Option 5 would still be expected to have similar low negative impacts on EFH compared to Options 1, 2, 3,and 4.

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 6.2.

7.4.1 Updates to Annual Catch Limits

7.4.1.1 Option 1: No Action (ACL= ABC of 31,081 mt, ACT of 23,311 mt, TAL of 12,590 mt, Wing TAL =8,372 mt, Bait TAL 4,218 mt)

The No Action alternative would maintain the ACL limits as those established in Framework 3 (NEFMC, 2016). As a result, fishing behavior would remain similar to current operating conditions (e.g., no spatial or temporal shifts in effort; no changes in gear type, quantity, or relative soak/tow time).

MMPA Protected Species Impacts

Impacts of the No Action on marine mammals (i.e., species of cetaceans and pinnipeds) are somewhat uncertain as quantitative analysis has not been performed. However, we have considered, to the best of our ability, available information on marine mammal interactions with commercial fisheries, including the skate fishery over the last 5 or more years (Waring *et al*. 2014, Waring et al. 2015, NEFOP/ASM observer site). Aside from several large whale species (e.g., North Atlantic right, humpback, and fin), harbor porpoise, and several stocks of bottlenose dolphin, there has been no indication that takes of any other marine mammal species in commercial fisheries has exceeded potential biological removal (PBR) thresholds, and therefore, gone above and beyond levels which would result in the inability of each species population to sustain itself (Waring *et al*. 2014, 2015). Although, as noted above, several species of large whales, harbor porpoise and several stocks of bottlenose dolphin have experienced levels of take that have resulted in the exceedance of each species PBR threshold, take reduction plans have been implemented to reduce bycatch in the fisheries affecting these species (Atlantic Large Whale Take Reduction Plan, Harbor Porpoise Take Reduction Plan, and the Bottlenose Dolphin Take Reduction Plan; see affected environment for details); these plans are still in place and are continuing to assist in decreasing bycatch levels for these species. Although the information presented in Waring *et al*. (2014, 2015) is a collective representation of commercial fishery interactions with marine mammals, and does not address the effects of any FMP specifically, the information does demonstrate that fishery operations over the last 5 or more years have not resulted in a collective level of take that threatens the continued existence of marine mammal populations (aside from those species noted above).

In conjunction with the above, additional analysis on the impacts of the operation of fisheries in the northeast region have also been conducted by NMFS, pursuant to section 7 of the ESA, for ESA-listed species of marine mammals. Specifically, in a Biological Opinion issued by NMFS in 2013, it was concluded that the operation of the skate fishery, in addition to seven other FMPs, may affect, but will not jeopardize the continued existence of any ESA listed species of marine mammals. Since issuance of the 2013 Opinion, there has been no indication that these fisheries have changed in any significant manner such that levels of take have gone above and beyond those considered by NMFS in its assessment of fisheries affects to listed species (if they had, NMFS would have re-reinitiated the Opinions). As a result, we do not expect impacts to ESA-listed species of marine mammals under the No Action (i.e., status quo conditions) to be different from those already considered by NMFS (NMFS 2013). Specifically, fishing behavior under the No Action is not expected to introduce any new risks or additional takes to ESA listed species that have not already been considered by NMFS to date. As a result, the No Action is not expected to result in interactions with protected species that are above and beyond levels previously considered by NMFS. Based on this, the No Action, and the resultant fishing behavior under this Alternative, is not, as concluded by NMFS, expected to result in levels of take that would jeopardize the continued existence of ESA listed species of marine mammals.

Based on the above information, and the fact that the skate fishery must comply with specific take reduction plans (i.e., HPTRP, the BDTRP, ALWTRP); and that voluntary measures exist that reduce serious injury and mortality to marine mammal species incidentally caught in trawl fisheries (see the Atlantic Trawl Gear Take Reduction Team), the No Action is expected to have low negative to neutral impacts on marine mammal species. Relative to Option 2, Option 1, which has a higher Annual Catch Limits than Option 2, may result in more negative impacts to marine mammals as higher allocations may result in increases in fishing effort, which may equate to increased interactions with marine mammals.

ESA Listed Species

Ascertaining the potential impacts of the No Action on ESA-listed species (i.e., certain species of whales, sea turtles, and fish) are difficult and somewhat uncertain, as quantitative analysis has not been performed. However, we have considered, to the best of our ability, how the fishery has operated in regards to listed species since 2013, when NMFS issued a Biological Opinion (Opinion) on the operation of seven commercial fisheries, including the skate FMP, and its impact on ESA listed species (NMFS 2013). The 2013 Opinion concluded that the seven fisheries may affect, but would not jeopardize the continued existence of any ESA listed species. The Opinion included an incidental take statement authorizing the take of specific numbers of ESA listed species of sea turtles, Atlantic salmon, and Atlantic sturgeon [17]. The skate FMP is currently covered by the incidental take statement authorized in NMFS 2013 Opinion.

Since 2013, the specifications for the skate fishery has either increased, decreased, or remained stable; however, fishing behavior over this time period has never resulted in the exceedance of NMFS authorized take of any ESA listed species (NMFS 2013). Therefore, the specifications under *status quo* conditions, and the resultant fishing behavior under these conditions, are not expected to introduce any new risks or additional takes to ESA listed species that have not already been considered and authorized by NMFS to date. As a result, impacts of the No Action on ESA listed species are not expected to be different from those already considered by NMFS (NMFS 2013) and therefore, are not, as concluded by NMFS, expected to result in levels of take that would jeopardize the continued existence of ESA listed species. For these reasons, the *status quo* conditions would likely have low negative impacts on ESA listed species.

Relative to Option 2, Option 1, with slightly lower Annual Catch Limits than Option 2, may result in more positive impacts to ESA listed species as lower allocations may result in decreased fishing effort, which may equate to decreased interactions with ESA listed species.

7.4.1.2 Option 2: Revised Annual Catch Limit Specifications (ACL= ABC of 31,327 mt, ACT of 23,495 mt, TAL of 13,281 mt, Wing TAL =8,832 mt, Bait TAL 4,449 mt)

Option 2 would revise the ACL for the skate complex; specifically, annual catch limit specifications will be increased from the 2016-2017 fishing year. The increase in the ACL may result in more directed fishing effort. However, a small component of the skate fishery targets skates. A large number of trips only land incidental amounts of wings and are likely targeting non-skate species (Figure 7). Since the

[17] The 2013 Opinion did not authorize take of ESA listed species of whales; however, it assessed interaction risks to these species and based on the best available information, concluded that the summer flounder, scup, and black sea bass fisheries, in addition to the other six FMPs assessed, would not jeopardize the continued existence of any ESA listed species of whales (NMFS 2013).

possession of skates mostly requires vessels to be fishing on a NE Multispecies, Scallop, or Monkfish DAS, fishing effort on skates are also largely constrained by regulations set by other FMPs. Catch of non-skate species on trips landing skates are controlled by the DAS limits, sector rules, or other discard limiting measures in other FMPs. Fishing effort would be restricted by the revised specifications, but also by regulations restricting fishing for non-skate species, and the associated AMs that account for any overage of ACLs. The increase in TAL is moderately small and would not be expected to incentivize increased fishing effort on skate. It may allow additional discards to be converted to landings.

Based on this information, impacts to protected species are not expected to be much greater than those under status quo conditions (see Option 1, Section 7.1.1.1), but may also not differ greatly from status quo conditions. The small increase in total allowable landings may allow for discards to be converted to landings, while potentially not increasing overall effort. An increase in fishing effort potentially equates to slightly more fishing time, and therefore, gear being present in the water for a longer duration. As protected species (ESA listed and MMPA species) interactions with gear, regardless of listing status, is greatly influenced by the amount of gear, and the duration of time gear is in the water, any increase in either of these factors will increase the potential for protected species interactions with gear and therefore, increase the potential for serious injury or mortality to these species. As a result, Option 2 may have some negative impacts on protected species. Taking this into consideration, Option 2 is likely to have similar low negative impacts on protected species relative to Option 1 (No Action), as interactions may still occur under Option 1, and the increase in specifications is not significant relative to status quo allocations (Option 1).

As noted above, relative to Option 1, Option 2 is likely to have similar low negative impacts on protected species as fishing effort would not be expected to greatly increase under Option 2.

7.4.2 Barndoor Skate Wing Possession Limit Alternative

7.4.2.1 Option 1: No Action

The No Action alternative would maintain the prohibition on landing barndoor skate and 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. Based on this information, impacts on protected species (ESA listed and MMPA species) are expected to be similar to those described in Section 7.4.1.1 (i.e., low negative to neutral).

Relative to Options 2, 3, 4, and 5, Option 1 would have similar low negative impacts on protected resources.

7.4.2.2 Barndoor Skate Possession Limit of 500 lb

Option 2 would allow 500 lb of barndoor skate wings to be landed on a trip but the seasonal wing possession limits as established in FW1 would not be modified. It is not clear that changing the skate possession limit changes the level of fishing effort as an analysis of the frequency of pounds landed indicates that the majority of trips are landing at or below the incidental possession limit of 500 lbs of skate wings (Figure 7). Barndoor and winter skates overlap in geographic distribution (see EFH source documents for survey distributions between 1964 and 2002 and Amendment 3 [NEFMC, 2010] for survey distributions between 2000 and 2007) and therefore occur in the same areas where fishing for skate wings currently takes place. Possession of barndoor skate has been prohibited since 2003 but they are currently caught and discarded while fishing for non-skate species and other skate species. Option 2 would allow these discards to be converted to landings and may not greatly increase fishing effort. However, if a small market for barndoor skate develops and incentivizes targeting barndoor skate effort may shift to localized areas of higher barndoor abundance but this is not expected to be outside of the statistical area being fished in. If changes in location of fishing effort occurred it could result in increased interactions with protected resources in the new area but could decrease interactions in a previously utilized area. Any trips over the incidental possession limit would be considered to be part of the directed fishery. Since there is no change in the overall wing possession limit, the potential for changes in fishing patterns could be restricted and result in impacts similar to Option 1. As a result, we expect impacts to protected species to be similar to those described in Section 7.1.1.2 (i.e. low negative to neutral).

Relative to Options 1, 3, 4, and 5, Option 2 is expected to have similar low negative to neutral impacts on protected species as fishing effort may slightly increase or shift under this Option and therefore, interactions with protected species also have the potential to increase.

7.4.2.3 Option 3: Proportional Barndoor Skate Possession Limit

Option 3 would allow 650 lb of barndoor skate wings to be landed in Season 1 and 1,025 lb in Season 2 on a trip but the seasonal wing possession limits as established in FW1 would not be modified. It is not clear that changing the skate possession limit changes the level of fishing effort as an analysis of the frequency of pounds landed indicates that the majority of trips are landing at or below the incidental possession limit of 500 lbs (Figure 7). Barndoor and winter skates overlap in geographic distribution (see EFH source documents for survey distributions between 1964 and 2002 and Amendment 3 [NEFMC, 2010] for survey distributions between 2000 and 2007) and therefore occur in the same areas where fishing for skate wings currently takes place. Possession of barndoor skate has been prohibited since 2003 but they are currently caught and discarded while fishing for non-skate species and other skate species. Option 2 would allow these discards to be converted to landings and may not greatly increase fishing effort. However, if a small market for barndoor skate develops and incentivizes targeting barndoor skate effort may shift to localized areas of higher barndoor abundance but this is not expected to be outside of the statistical area being fished in. If changes in location of fishing effort occurred it could result in increased interactions with protected resources in the new area but could decrease interactions in a previously utilized area. Any trips over the incidental possession limit would be considered to be part of the directed fishery. Since there is no change in the overall wing possession limit, the potential for changes in fishing patterns could be restricted and result in impacts similar to Option 1. As a result, we expect impacts to protected species to be similar to those described in Section 7.1.1.2 (i.e. low negative to neutral).

Relative to Options 1, 2, 4, and 5, Option 3 is expected to have similar low negative to neutral impacts on protected species as fishing effort may slightly increase or shift under this Option and therefore, interactions with protected species also have the potential to increase.

7.4.2.4 Option 4: Mixed Skate Wing Possession Limit

Option 4 would not establish a specific barndoor skate possession limit. Total pounds of skate wings on board would not be allowed to exceed 2,600 lb in Season 1 or 4,100 lb in Season 2 but vessels could land wings from allowed species in desired quantities up to that amount.. It is not clear that changing the skate possession limit changes the level of fishing effort as an analysis of the frequency of pounds landed indicates that the majority of trips are landing at or below the incidental possession limit of 500 lbs (Figure 7). Barndoor and winter skates overlap in geographic distribution (see EFH source documents for survey distributions between 1964 and 2002 and Amendment 3 [NEFMC, 2010] for survey distributions between 2000 and 2007) and therefore occur in the same areas where fishing for skate wings currently takes place. Possession of barndoor skate has been prohibited since 2003 but they are currently caught and discarded while fishing for non-skate species and other skate species. Option 2 would allow these discards to be converted to landings and may not greatly increase fishing effort. However, if a small market for barndoor skate develops and incentivizes targeting barndoor skate effort may shift to localized areas of higher barndoor abundance but this is not expected to be outside of the statistical area being fished in. If changes in location of fishing effort occurred it could result in increased interactions with protected resources in the new area but could decrease interactions in a previously utilized area. Any trips over the incidental possession limit would be considered to be part of the directed fishery. Since there is no change in the overall wing possession limit, the potential for changes in fishing patterns could be restricted and result in impacts similar to Option 1. As a result, we expect impacts to protected species to be similar to those described in Section 7.1.1.2 (i.e. low negative to neutral).

Relative to Options 1, 2, 3, and 5, Option 4 is expected to have similar low negative to neutral impacts on protected species as fishing effort may slightly increase or shift under this Option and therefore, interactions with protected species also have the potential to increase.

7.4.2.5 Option 5: Discard Restrictions

Option 5 could mitigate mortality on individual skate species and overall skate biomass by prohibiting the discarding of any skate species already winged in order to land barndoor skate. This would be expected to have a positive biological impact on skate species because it prevents additional mortality by prohibiting discarding of skate wings once a more favorable skate species is encountered. It may help to reduce fishing effort if vessels don't extend a trip to maximize barndoor skate landings. However, since the overall wing possession limits would not be reduced Option 5 would still be expected to have similar low negative to neutral impacts on protected resources compared to Options 1, 2, 3,and 4.

7.5 Economic Impacts

7.5.1 Updates to Annual Catch Limits Alternatives

Alternatives for updating the ACL are described in Section 4.1. The Preferred Alternative (Option 2) would increase TAL for both the skate wing and bait fisheries.

7.5.1.1 Option 1: No Action (ACL= ABC of 31,081 mt, ACT of 23,311 mt, TAL of 12,590 mt, Wing TAL =8,372 mt, Bait TAL 4,218 mt)

Under the No Action Alternative, no changes to the ACL or TAL would be made. Economic impacts analyzed in previous plan amendments and framework adjustments underestimated (the status quo ACL would increase the risk of closing the directed skate wing fishery before the end of the fishing year; refer to A3 and FW1 for the complete analyses). Recent landings have been above the TAL, and this alternative has a higher possibility of allowing landings to exceed the TAL compared with Option 2, which uses updated survey data (see 7.5.1.2). Based on dealer data, total skate revenue in FY 2015 and 2016 was $6,269,341 and $5,443,469 respectively; if the average price per pound of skate wings remains within the recent range (~$0.25.lb), the total revenue from skate wings would not be expected to significantly decrease. Long-term, Option 1 would be expected to result in future increases in biomass and potential catch, less restrictive regulations to reach optimum yield, which would result in a positive economic impact to the fishery when the potential catch is realized. Option 1 would be expected to have overall negative economic impacts because the TAL would be set too low, forgoing potential economic gains within a sustainable TAL. Compared to Option 2, Option 1 would have more negative short-term and long-term economic impacts.

Table 29 - Total Skate Landings and Revenue by Fishing Year (Source: NMFS Dealer data)

	Total Landings (in live lbs)	Total Revenue
2010	32,698,753	$ 6,298,968
2011	41,302,586	$ 9,338,329
2012	33,193,745	$ 7,554,998
2013	30,896,762	$ 7,593,669
2014	34,090,696	$ 8,991,842
2015	33,825,878	$ 6,269,341
2016	30,354,217	$ 5,443,469

7.5.1.2 Option 2: Revised Annual Catch Limit Specifications (ACL= ABC of 31,327 mt, ACT of 23,495 mt, TAL of 13,281 mt, Wing TAL =8,832 mt, Bait TAL 4,449 mt)

Under this alternative, the TAL would be increased from 12,590 metric tons to 13,281 metric tons. Increases in the ACL and TAL themselves do not necessarily mandate changes in management measures, increases in fishery effort, or changes in fishery profits. Under Option 2, the TAL (13,281 mt) is below the total catch by federally reporting vessels in FY 2015 (15,343 mt) and FY 2016 (13,768 mt). Relative to Option 1: No Action, this alternative has less probability of triggering AMs because the increase in the TAL decreases the likelihood of it being exceeded if fishing behavior and the possession limit does not change. The overall impact of Option 2 would depend largely on future fishing behavior, which is difficult to predict. If fishing effort does not increase, Option 2 would be expected to have positive long-term economic impacts because landings would likely be similar to recent fishing years. If the incidental possession limit was triggered before the end of the fishing year, Option 2 could have low negative short-term impacts because this would reduce revenue per trip or affect fishing for other more economically valuable species. Alternatively, compared to Option 1, Option 2 would have low positive long-term economic impacts.

An in-season adjustment to possession limits, subject to the discretion of the Regional Administrator, is triggered when catch of skate wings reaches 85% of the, seasonal or annual, wing TAL (8,832 mt) or 90% for the skate bait fishery (4,449 mt), as established in Framework Adjustment 3 to the Northeast Skate Complex FMP. However, if FW4 is implemented before this Framework, the bait fishery trigger will change to 80%. For either fishery, a higher TAL decreases the likelihood of triggering the in-season adjustment. There would be low positive short-term economic impacts with no triggering, but low or medium negative impacts depending on when in the fishing year the in-season trigger was reached for either fishery; the incidental possession limit would effectively prevent any directed fishing for skate (either wing or bait). Again, if FW4 is implemented before this Framework, then the bait fishery would have scheduled but higher, seasonal incidental possession limits imposed. While the long-term economic benefits of both skate fisheries depend on meeting, but not exceeding, the TAL, short-term and long-term positive economic impacts may accrue to the targeted skate fishery as a result of this alternative.

The magnitude of the impact of an early triggering of the in-season possession limit adjustment depends on two factors: the number of vessels that target skates, which would therefore be affected by reduced trip possession limits, and the lower probability of triggering AMs under this alternative compared to the status quo.

7.5.2 Barndoor Possession Limit Alternatives

7.5.2.1 Option 1: No Action – 2,600 lbs from May 1 to Aug 31; 4,100 lbs from Sept 1 to Apr 30, possession of barndoor skates is prohibited

When combined with Updates to ACL **Alternative 1: No Action (Section 7.5.1.1)**, this alternative would not affect short-term economic benefits beyond those analyzed in Framework Adjustment 3, which set seasonal skate wing possession limits and specifications. Also, if FW4 is implemented before this Framework, then the bait fishery would have scheduled but higher, seasonal incidental possession limits imposed, as well. Long-term, negative economic impacts would occur because ACL is set at an amount lower than that determined by the most recent survey data; the fishery would not reach its optimum yield.

When combined with Updates to ACL **Alternative 2: Revised ACL Specifications (Section 7.5.1.2)**, the wing possession limits associated with this alternative could potentially result in less frequent triggering of AMs, and the incidental possession limit, due to the combination of the in-season adjustment threshold remaining at 85% of TAL and a higher TAL. And, if FW4 is implemented before this Framework, the bait fishery TAL would decrease to 80% but have scheduled and higher, seasonal incidental possession limits (see economic impacts of that action). The distribution and estimated magnitude of the economic impact of a higher TAL combined with status quo possession limits is different for FY2015 and FY2016 (Table 30).

Table 30 - Landings in excess of Option 1, with Revised ACL Specifications (FY2015-FY2016)

	Actual Landings			Option 2: Revised ACL Specifications				
	Total Landings (1,000 lbs.)	**Total Revenue ($1,000)**	**TAL (1,000 lbs.)**	**Proposed TAL (1,000 lbs.)**	**Revenue loss of Opt. 1 ($1,000)**	**Landings in excess of Opt. 1 (1,000 lbs.)**	**Truncated total landings (1,000 lbs.)**	**Percent of "Option 2: Revised Annual Catch Limit Specification" TAL**
2015	34,312	6,359	36,122	29,279	933 (14.7%)	5,033	29,279	115.5%
2016	30,354	5,433	27,756	29,279	192 (3.5%)	1,075	29,279	103.7%

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

Based on the comparative analysis, Option 1: No Action, combined with the preferred Updates to ACL Alternative – Option 2: Revised ACL Specifications, would trigger an in-season possession limit adjustment, as happened in 2016 but with lower negative effect, because it occurs later in the fishing year. This is reflected in the second column from the right where landings are truncated to the new ACL of 29,279 thousand pounds, for 2016, resulting in a 1,075 thousand pound and 192 thousand-dollar loss, under 2016 conditions. The last column represents the effect if the Regional Administrator decides not to close the fishery, with no losses but with the new ACL exceeded by 3.7 %. Notice that the latter effect is less than the 109% of the original ACL (27,756 thousand pounds; 31,081 mt) in Table 20. Under 2015 conditions, there would be a medium-high revenue loss of 14.7%, or TAL would be exceeded by 17.2%. The implementation of FW4 would mitigate these losses/overages, under both conditions.

Option 1 (with revised ACL) would have overall positive economic impacts, depending on the Regional Administrator's (RA) decision. If the RA closes the fishery, under 2016 conditions, a low negative, short-term economic impact is the result (3.5% loss in revenues), but long-term economic impact remains positive (Optimum Yield is achieved). If the RA does not close the fishery and ACL is exceeded by 1,075 thousand pounds, the short-term economic impact is low-positive (because ACL is higher) but there may be a low-negative economic impact in the future (if ACL is exceeded in subsequent years as well).

7.5.2.2 Option 2: Barndoor Skate Possession Limit of 500 lb

This alternative would allow vessels to land a maximum of 500 lb of barndoor skate wings (1,135 lb whole weight) as part of their skate wing possession limit. Total pounds of skate wings on board would not be allowed to exceed 2,600 lb in Season 1 or 4,100 lb in Season 2. This cautious approach would allow time for markets to develop and to see how the stock responds to commercial harvest.

There is little or no catch of barndoor skate; possession was prohibited since 2004. Some experimental fishing trips for barndoor skate were allowed so some evidence is available, particularly in 2014 and 2015 (landings were 29,532 and 116,107 pounds, respectively). Prices for barndoor skate, based on extremely low landings, were consistently higher than all skates. In 2015, slightly over 20 million pounds of skates were landed at an average price of 27.8 cents, and 116 thousand pounds of barndoor skates were landed with a price of 43.2 cents. Adding barndoor into the skate landings mix will increase revenues compared to what they would have been, under the overall skate wing possession limits. This will have a positive economic impact on the skate fishery, all else being equal.

A possession limit of 500 pounds represents 19.2 % of the Season 1 wing limit and 12.2 % of the Season 2 wing limit, if the barndoor limit were caught on every trip. This represents a maximum economic effect, if barndoor prices maintain a premium.

7.5.2.3 Option 3: Proportional Barndoor Skate Possession Limit

This alternative would establish a barndoor skate wing possession limit that reflected its contribution to the overall observed catch base on observer data. For FY 2018 and FY2019 this would result in a possession limit of 130 lb wings (5%) in Season 1 and 205 lb wings (5%) in Season 2.

If the price premium described under Option 2 above holds, this Options would have a positive economic impact on the skate fishery, albeit not as great as Option 2.

7.5.2.4 Option 4: Mixed Skate Wing Possession Limit

This alternative would not establish a specific barndoor skate possession limit. Total pounds of skate wings on board would not be allowed to exceed 2,600 lb in Season1 or 4,100 lb in Season 2, but vessels could land wings from allowed species, including barndoor, in desired quantities up to that amount.

The extent to which vessels would shift their effort from winter to barndoor skate cannot be known, based on history, but must be learned experientially. If the full possession limit for both Seasons 1 and 2 is composed of barndoor skate, then the economic impact of Option 4 will exceed all other options, given that the price premium for barndoor is maintained.

7.5.2.5 Option 5: Discard Restriction

Any skate species already winged would not be allowed to be discarded, in order to land barndoor skate. This option will mitigate the positive economic benefits of Options 2 through 4. On the other hand, the value of all non-barndoor skates that are discarded may exceed the value of the barndoor skates landed, even with the price premium, but the levels of non-barndoor discards isn't known to estimate this amount.

Table 31 – Summary of impacts for Options 1 through 5 – barndoor possession limits

	Short run:		Long run:	
Option:	**Without Option 5**	**With Option 5**	**Without Option 5**	**With Option 5**
1	Neutral	N.A.	Negative	N.A.
2	Medium-high positive	Medium positive	Medium-high positive	Medium positive
3	Medium-low positive	Low positive	Medium-low positive	Low positive
4	High positive	Medium-high positive	Medium negative	Neutral

No Action, Option 1, has negative long-term impacts because Optimum Yield is not reached. The short-term and long-term economic impacts are the same for each of Options 2 and 3, because it is assumed that the barndoor possession limits chosen are correct. The long-term impacts of Option 4, without the restriction on discards of non-barndoor, winged skates, are expected to turn negative because high-grading is encouraged.

7.6 Social Impacts

7.6.1 Updates to Annual Catch Limits

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

7.6.1.1 No Action (ACL= ABC of 31,081 mt, ACT of 23,311 mt, TAL of 12,590 mt, Wing TAL =8,372 mt, Bait TAL 4,218 mt)

Under the No Action Alternative, the skate catch limits would be those proposed in FW3. The result of that action was negative economic and social benefits, more than expected, mainly from triggering the AM and exceeding the TAL. The bait fishery was impacted by a *de facto* closure in Season 3 of FY2016, and a subsequent *ad hoc* increase in the incidental possession limit to restart that fishery. Maintaining the status quo possession limits, as well, increases the probability of triggering that AM, but FW4 modified both the bait fishery triggers and increased the incidental possession limits and awaits implementation. The FW3 specifications for TAL were below FY2016 total catch, wing catch, and bait catch.

In FY2016, 109 % of both wing and bail TAL was achieved under the status quo specifications and possession limits. Option 1 would have more negative impacts than Option 2 by keeping lower TALs and would not achieve Optimum Yield by forgoing economic benefits.

7.6.1.2 Option 2: Revised Annual Catch Limit Specifications (ACL= ABC of 31,327 mt, ACT of 23,495 mt, TAL of 13,281 mt, Wing TAL =8,832 mt, Bait TAL 4,449 mt) (*Preferred Alternative*)

Under Option 2, the specifications are calculated using updated NEFSC trawl survey data and revised discard mortality rate estimates for winter skate in sink gillnet gear. The increased ACL and TAL have the potential to impact fishing behavior and profits; the increase also would decrease the potential of the AM being triggered before the end of the fishing year. Based on FY2016 landings, the revised specifications still may result in an overage of the skate (wing and bait) TAL; the proposed 29.3 million pounds commercial TAL would be exceeded by 3.7 % under those conditions (Table 37). Compared to Option 1, Option 2 would have less likelihood of triggering the incidental possession limit of 500 lbs by exceeding the TAL. The incidental possession limit may have low negative impacts because it reduces additional revenue from skate resources and may impede harvesting of other targeted species if large amounts of skate are encountered that cannot be landed, thus negatively affecting communities. These impacts may be mitigated further, if FW4 is implemented before this Framework, and the bait fishery has scheduled but higher, seasonal incidental possession limits imposed. Overall, Option 2 would have more positive social impacts compared to Option 1.

7.6.2 Barndoor Possession Limit Alternatives

7.6.2.1 Option 1: No Action – 2,600 lbs from May 1 to Aug 31; 4,100 lbs from Sept 1 to Apr 30, possession of barndoor skates is prohibited

This option would maintain the current skate wing possession limits established in FW3. Option 1 would have neutral social impacts if the incidental possession limit was not triggered during the fishing year. Option 1 might have more negative impacts compared to Option 2 if in-season incidental limit is triggered before the end of the fishing year. Based on FY2016 landings, the proposed 29.3 million pounds commercial TAL would be exceeded by 3.7 % under similar conditions (Table 37), and the incidental limit most likely would be implemented, albeit later in the fishing year. However, if FW4 is implemented before this Framework, and the bait fishery has scheduled but higher, seasonal incidental possession limits imposed, the incidental limits would be even later in the fishing year and may not occur at all. The combination of the increased TAL and status quo possession limit could result in negative impacts if the incidental possession limit was triggered, particularly if fishing for other, more economically valuable species is affected. Option 1 would have negative social impacts when compared to the other possession limit options.

7.6.2.2 Option 2: Barndoor Skate Possession Limit of 500 lb

All options that allow any amount of barndoor skate within the overall skate wing possession limit will increase economic and social benefits, when compared to No Action (Option 1). No evidence is available to quantitatively assess the impact of a barndoor fishery, with the exception of a small number of exempted/experimental fishing trips between 2012 and 2015; the greatest amount of barndoor landed was only 0.6 % in 2015. With this meager evidence, however, it is possible to observe a significant price premium paid for barndoor skates; 1.5 to 2 times the overall skate prices. Remember that these prices are for extremely low barndoor skate landings, which may trend towards the overall skate price as landings increase.

A possession limit of 500 pounds (500 lb landed weight) represents 19.2 % of the Season 1 wing limit and 12.2 % of the Season 2 wing limit, if the barndoor limit were caught on every trip. If fishermen are allowed to land 500 lb of barndoor skates within the overall skate wing possession limit, the social impacts are expected to be positive relative to No Action.

7.6.2.3 Option 3: Proportional Barndoor Skate Possession Limit

A proportional barndoor skate possession limit of 5 % of the skate wing limit is a more conservative approach. Although it is the lowest positive benefits of the three barndoor possession limit options, it is also the most likely to maintain the price premium for barndoor.

7.6.2.4 Option 4: Mixed Skate Wing Possession Limit

Fishermen would be allowed to possess 2.600 lb (live weight equivalent) in Season 1 and 4,100 lb in Season 2, or 100% of the skate wing possession limit. While providing the greatest positive economic benefits of the three barndoor limit options, it may cause a number of issues in the long-term. Would barndoor prices maintain a premium? Would new markets for the larger barndoor skates result in the elimination of the other skates' fishery, and would that result in fishing vessels using different fishing areas (where barndoor predominate) and/or move to other fishing ports? Any of these effects may have important social impacts.

7.6.2.5 Option 5: Discard Restriction

A discard restriction adds important biological impacts to the socio-economic mix of impacts. Any skate species already winged could not be discarded, in order to land barndoor skate.

At the extreme, with Option 4, barndoor landings may completely displace other skate wing landings, resulting in the unknown concerns as described above. If barndoor skates cannot be caught exclusively, large numbers of other skate wings may be discarded, increasing the impact on those stocks as well as the social (displacement) and economic (price) effects described above. The skates from which the discarded wings came, of course, are all dead.

Table 39 – Social impacts of Options 1 through 5 – barndoor possession limits

	Short run:	**Long run:**
Option:		
1	Neutral	Negative
2	Medium positive	Medium positive
3	Low positive	Low positive
4	High positive	Unknown
5	Neutral	Negative