Northeast Skate Complex Fishery Management Plan

Framework Adjustment 8

Including an Environmental Assessment,

Regulatory Flexibility Analysis, and

Stock Assessment and Fishery Evaluation

Draft for review at September Council Meeting

September 24, 2019

Prepared by the

New England Fishery Management Council

In consultation with the

National Marine Fisheries Service

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FRAMEWORK ADJUSTMENT 8 TO THE NORTHEAST SKATE COMPLEX FISHERY MANAGEMENT PLAN

Proposed Action: Propose specifications for fishing years 2020 and 2021.

Responsible Agencies:

New England Fishery Management Council
50 Water Street, Mill #2
Newburyport, MA 01950

National Marine Fisheries Service
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
Washington, D.C. 20235

For Further Information:

Thomas A. Nies, Executive Director
New England Fishery Management Council
50 Water Street, Mill #2
Newburyport, Massachusetts 01950
Phone: (978) 465-0492
Fax: (978) 465-3116

Abstract: The New England Fishery Management Council, in consultation with NOAA's National Marine Fisheries Service, has prepared Framework Adjustment 8 to the Northeast Skate Complex Fishery Management Plan, which includes a final environmental assessment that presents the range of alternatives to achieve the goals and objectives of the action. The proposed action focuses on adopting specifications for fishing years 2020 and 2021 for skates. The document describes the affected environment and valued ecosystem components and analyzes the impacts of the alternatives on both. It addresses the requirements of the National Environmental Policy Act, the Magnuson Stevens Fishery Conservation and Management Act, the Regulatory Flexibility Act, and other applicable laws.

1.0 EXECUTIVE SUMMARY

In New England, the New England Fishery Management Council (NEFMC) is charged with developing management plans that meet the requirements of the Magnuson-Stevens Act (MSA). 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 acceptable biological catch (ABC) based on survey biomass indices and median exploitation ratios; the ABC is set to equal the annual catch limit (ACL).

This framework adjustment would implement changes to changes to specifications based on updated data and research.

The need for this action is to meet regulatory requirements and adjust management measures that are necessary to prevent overfishing, ensure rebuilding, and help achieve optimum yield in the fishery consistent with the status of stocks and the requirements of MSA of 2006. The primary purpose of FW 8 is to adopt fishing specifications for FY 2020 and FY2021 for skates.

Proposed Action

Under the provisions of the MSA, 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 are in Section 4.0.

The Preferred Alternatives include:

- Updates to Annual Catch Limit
- Revised Annual Catch Limit Specifications.

Impacts of the Proposed Action

The environmental impacts of the alternatives under consideration are detailed in Section 7.0.

Biological Impacts

Essential Fish Habitat (EFH) Impacts

Impacts on Endangered and Other Protected Species

Human Community (Socioeconomic) Impacts

Alternatives to the Proposed Action

Biological Impacts

Essential Fish Habitat (EFH) Impacts

Impacts on Endangered and Other Protected Species

Human Community Impacts

Table 1 [Insert table(s) summarizing impacts by VEC]

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2.4 Acronyms

ABC	Acceptable Biological Catch
ACL	Annual Catch Limit
AIM	An Index Method of Analysis
ALWTRP	Atlantic Large Whale Take Reduction Plan
AM	Accountability Measure
ANPR	Advanced Notice of Proposed Rulemaking
AP	Advisory Panel
APA	Administrative Procedures Act
ASMFC	Atlantic States Marine Fisheries Commission
B_{MSY}	Biomass that would allow for catches equal to Maximum Sustainable Yield when fished at the overfishing threshold (FMSY)
BiOp, BO	Biological Opinion, a result of a review of potential effects of a fishery on Protected Resource species
CAI	Closed Area I
CAII	Closed Area II
CEQ	Council on Environmental Quality
CPUE	Catch per unit of effort
DAM	Dynamic Area Management
DAS	Day(s)-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
EO	Executive Order
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
IFM	Industry-funded monitoring
IFQ	Individual fishing quota
ITQ	Individual transferable quota

IVR	Interactive voice response reporting system
IWC	International Whaling Commission
LOA	Letter of authorization
MA	Mid-Atlantic
MAFAC	Marine Fisheries Advisory Committee
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MRI	Moratorium Right Identifier
MRIP	Marine Recreational Information Program
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSY	Maximum Sustainable Yield
NEAMAP	Northeast Area Monitoring and Assessment Program
NEFMC	New England Fishery Management Council
NEFOP	Northeast Fisheries Observer Program
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NLSA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
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
SAS	Stock Assessment Subcommittee
SAW	Stock Assessment Workshop
SBNMS	Stellwagen Bank National Marine Sanctuary
SIA	Social Impact Assessment
SNE	Southern New England
SNE/MA	Southern New England-Mid-Atlantic
SSB	Spawning stock biomass
SSC	Scientific and Statistical Committee
TAL	Total allowable landings
TED	Turtle excluder device
TEWG	Technical Expert Working Group
TMS	Ten minute square
TRAC	Trans boundary Resources Assessment Committee
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VMS	Vessel monitoring system
VEC	Valued ecosystem component
VPA	Virtual population analysis

VTR	Vessel trip report
WGOM	Western Gulf of Maine
YPR	Yield per recruit

3.0 BACKGROUND AND PURPOSE

3.1 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. This framework to the FMP sets fishery specifications for fishing years (FY) 2020 and 2021. Fishery-specific (skate wing and bait) Total Allowable Landings (TALs) and possession limits are set as part of specifications according to the formula established in Amendment 3 (NEFMC 2010). The New England Fishery Management (Council) sets specifications every 2 years for the skate complex. The Council is also required to set possession limits when setting specifications for the skate wing and bait fisheries. Both fisheries have different seasonal management structures and are subject to effort controls and accountability measures (AMs).

3.2 Purpose and Need

The measures analyzed in this environmental assessment are intended to meet the goals and many of the objectives of the Skate FMP. Periodic frameworks are used to adjust strategies in response to the evaluations that adjust rebuilding plans and overfishing as well as fishery conditions and operations. The need for this action is to meet regulatory requirements and adjust management measures that are necessary to prevent overfishing, ensure rebuilding, and help achieve optimum yield in the fishery consistent with the status of stocks and the requirements of MSA of 2006.

The primary purpose of FW 8 is to adopt fishing specifications for FY 2020 and FY 2021 for skates.

To better demonstrate the link between the purpose and need for this action, Table 1 summarizes the need for the action and corresponding purposes.

Table 2. Purpose and need for Framework 8.

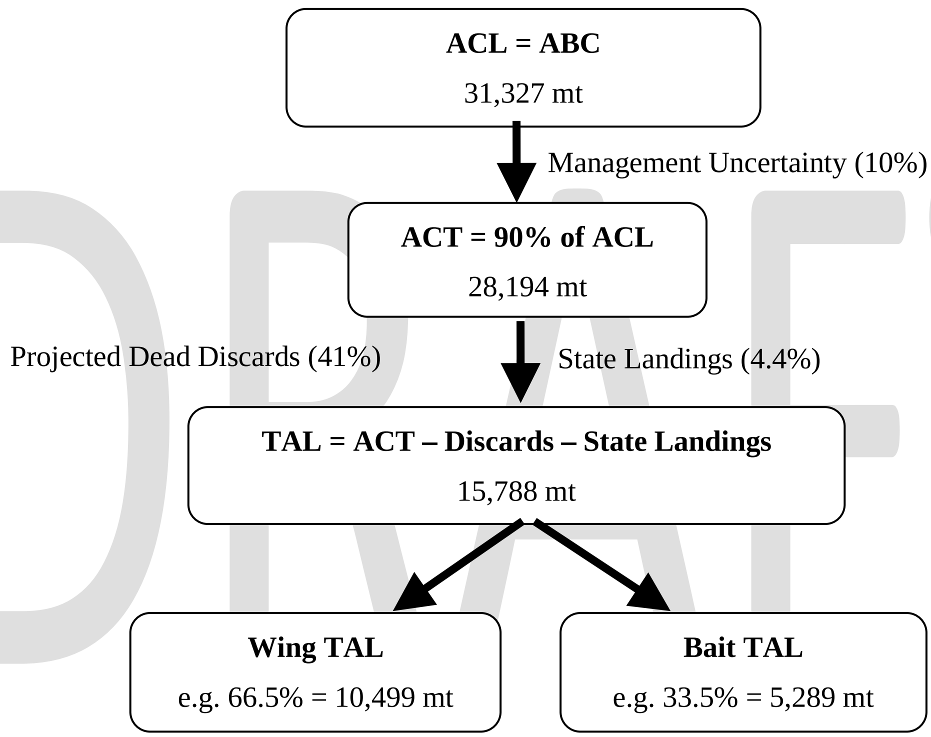
Need for Framework 8	Corresponding Purpose for Framework 8
Ensure that levels of catch for FYs 2020 and 20221 are consistent with best available science and the most recent relevant law	Measures to set ABC and ACL and resultant catch limits

4.0 ALTERNATIVES UNDER CONSIDERATION

4.1 Action 1 - Specifications

4.1.1 Alternative 1 - No Action

Under Alternative 1 (No Action), the ACL parameters and limits would remain unchanged from the final ACL specifications for the 2018-2019 fishing years (see diagram below) in the final regulations for the specifications package and would not incorporate all the updated scientific data and information.

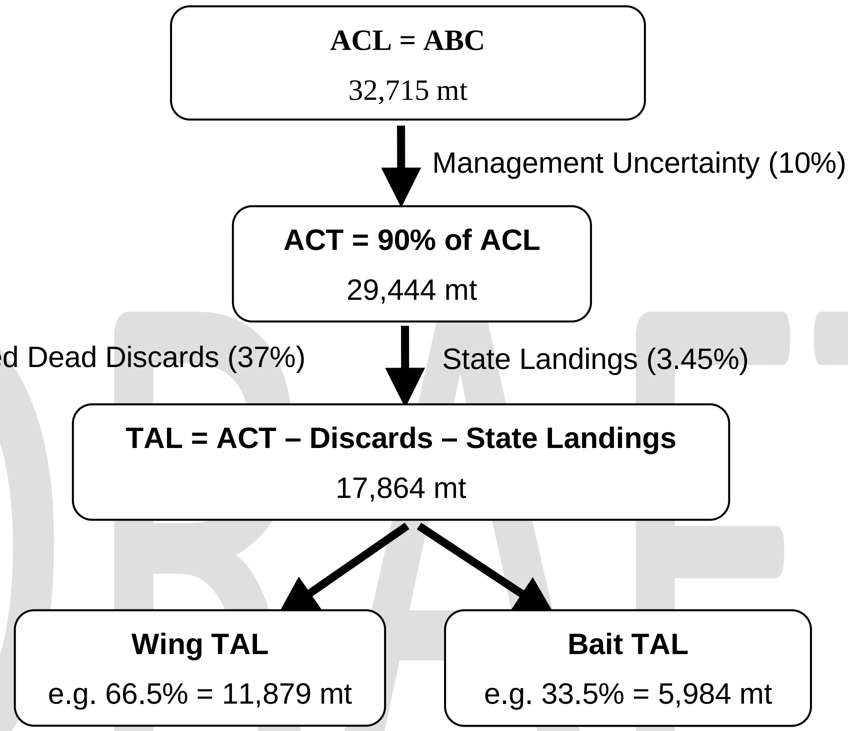


Rationale: The No Action alternative would not incorporate the updated survey biomass indices. The ACL would be maintained at a lower level than the revised data would suggest is appropriate over the time period when specifications are being set. The No Action alternative may result in a slightly higher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

4.1.2 Alternative 2 – Revised Annual Catch Limit Specifications (*Committee preferred alternative*)

Under Alternative 2, ABC and ACL specifications are derived from the median catch/biomass exploitation ratio for time series up to 2019 and the three year average stratified mean biomass for skates, using the 2017-2019 spring survey data for little skate and the 2016-2018 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 (2016-2018); state landings would approximate to 3.45% 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 32,715 mt. The ACL is a limit that would trigger AMs if catches exceed this amount. The ACT would likewise increase to 29,444 mt. After deducting amounts for projected dead discards (calculated from applying the weighted discard mortality rate to the total discards from 2016-2018), the TAL would increase to 17,864 mt. The proportion of dead discards in the catch decreased to 37%, primarily due to a decrease in overall skate discards.



Rationale: Alternative 2 would update the specifications 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 8 is not intended to develop alternative ACL/ACT/TAL calculation methodologies; instead it enacts the existing methodology in the FMP using updated data. 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 Action 2 – Skate Possession Limit Alternatives

4.2.1 Skate Wing Possession Limit Alternatives

4.2.1.1 Alternative 1 – No Action

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

Rationale: In FY2018, the wing fishery achieved 88% of its TAL; maintaining the current trip limits would allow the fishery to maximize its ability to achieve the TAL.

4.2.1.2 Alternative 2 - Increase Season 1 and 2 Wing Possession Limits (*Committee Preferred Alternative*)

Under Alternative 2, the seasonal skate wing possession limit for May 1 to Aug 31 would increase to 3,000 lbs. The seasonal skate wing possession limit for Sep 1 to Apr 30 would increase to 5,000 lbs. This alternative would not alter the 85% trigger for the incidental trip limit. The barndoor possession limit would increase proportionally (by 25%), as established in FW5, from 650 lb in season 1 and 1,025 lb in season 2 to 750 lb in season 1 and 1,250 lb in season 2. Vessels would continue to be able to land up to the revised seasonal possession limits for barndoor skate on a trip. Total pounds of skate wings on board would not be allowed to exceed 3,000 lb in season 1 or 5,000 lb in season 2. Vessels would not be required to land the maximum allowed poundage of barndoor skate.

Rationale: This results in a small increase in possession limits to allow the fishery to achieve its TAL while mitigating the likelihood of the incidental possession limit being implemented. Fishermen and processors have indicated that keeping the fishery open for the entire fishing year creates economic stability, retains important foreign markets, and reduces discards. FW1 possession limit analysis associates these lower limits with a smaller TAL; lower trip limits may unnecessarily restrict the fishery.

4.2.2 Skate Bait Possession Limit Alternatives

4.2.2.1 Alternative 1 – No Action

Alternative 1 (No Action) would maintain the skate bait possession limits and seasons as outlined in Table 2. Vessels that obtain a Skate Bait Letter of Authorization from the NMFS Regional Office would be able to retain up to 25,000 lbs. in seasons 1 and 2 and 12,000 lb in season 3 of whole skates if they comply with related rules and size limits.

Table 3. Bait seasons and associated possession limits when fishing under a Skate Bait Letter of Authorization

Season	Possession Limit	Dates
1	25,000 lb	May 1 – July 31
2	25,000 lb	August 1 – October 31
3	12,000 lb	November 1 – April 30

Rationale: In FY2016, the bait skate fishery was subject to an effective closure when the incidental possession limit was implemented. The maintenance of the lower possession limit in the final trimester of the fishing year would continue to allow the fishery to remain operational longer.

4.2.2.2 Alternative 2 – Increase Season 3 Bait Possession Limit to 25,000 lb (*Committee Preferred Alternative*)

Alternative 2 would set the skate bait possession limit to 25,000 lbs in all three seasons. This alternative would not adjust the seasonal incidental possession limit triggers (90% in seasons 1 and 2; 80% in season 3). It also would not revise the incidental possession limit (8,000 lb) or modify the regulation that the bait fishery is closed once 100% of the TAL is reached. Vessels that obtain a Skate Bait Letter of Authorization from the NMFS Regional Office would be able to retain up to 25,000 lbs. of whole skates in all 3 seasons, if they comply with related rules and size limits.

Rationale: The bait fishery has not achieved its TAL since FW4 implemented the reduced possession limit in season 3. The increased season 3 possession limit is not expected to negatively impact the stock.

4.3 CONSIDERED BUT REJECTED ALTERNATIVES

The Council did not consider any other alternatives besides those described above in Sections 4.1, 4.2, and 4.3.

5.0 AFFECTED ENVIRONMENT

5.1 Introduction

The Affected Environment is described in this action based on valued ecosystem components (VECs), including target species, non-target species, predator species, physical environment and Essential Fish Habitat (EFH), protected resources, and human communities. VECs represent the resources, areas and human communities that may be affected by the alternatives under consideration in this amendment. VECs are the focus, since they are the "place" where the impacts of management actions occur.

5.2 Target Species (Northeast Skate Complex)

5.2.1 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 is caught by the NMFS surveys in shallower water along the Mid-Atlantic coastline but are known to extend into non-surveyed 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.

Skates are unknown to undertake large-scale migrations but 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 is in Section 5.2.4.

5.2.2 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 coefficient of variation (CV) of the survey time series, then fishing mortality is assumed to be greater than FMSY and it is concluded that overfishing is occurring for that species (NEFSC 2007a). The average CVs of the indices are given by species in Table 4. Except for little skates, the abundance and biomass trends are best represented by the fall survey, which has been updated through 2018 (Table 4). Little skate abundance and biomass trends are best represented by the spring survey, which has been updated through 2019 (Table 4). Details about long term trends in abundance and biomass are in the SAW 44 Report (NEFSC 2007a) and in the Amendment 3 FEIS (Section 7.1.2).

Based on survey data updated through fall 2018/spring 2019, only thorny skate remained in an overfished condition (Table 4).

For barndoor skate, the 2016-2018 NEFSC autumn average survey biomass index of 1.81 kg/tow is above the biomass threshold reference point (0.78 kg/tow) and the BMSY proxy (1.57 kg/tow) [Table 4]. The 2016-2018 average index is above the 2015-2017 index by 15.3%. It is recommended that this stock is not overfished, and overfishing is not occurring.

For clearnose skate, the 2016 and 2018 NEFSC autumn average biomass index of 0.61 kg/tow is above the biomass threshold reference point (0.33 kg/tow) but below the BMSY proxy (0.66 kg/tow) [Table 4]. The 2016 and 2018 two-year average index is below the 2014-2016 index by 3.1% 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 2017-2019 NEFSC spring average biomass index of 5.32 kg/tow is above the biomass threshold reference point (3.07 kg/tow) but below the BMSY proxy (6.15 kg/tow) [Table 4]. The 2017-2019 average index is above the 2016-2018 average by 13.4%. It is recommended that this stock is not overfished, and overfishing is not occurring.

For rosette skate, the 2016 and 2018 NEFSC autumn average biomass index of 0.047 kg/tow is above the biomass threshold reference point (0.024 kg/tow) but below the BMSY proxy (0.048 kg/tow) [Table 4]. The 2016 and 2018 two-year average index is above the 2014-2016 index by 0.1%. It is recommended that this stock is not overfished, and overfishing is not occurring.

For smooth skate, the 2016-2018 NEFSC autumn average biomass index of 0.27 kg/tow is above the biomass threshold reference point (0.134 kg/tow) but below the BMSY proxy (0.27 kg/tow) [Table 4]. The 2016-2018 index is above the 2015-2017 index by 0.2. It is recommended that this stock is not overfished, and overfishing is not occurring.

For thorny skate, the 2016-2018 NEFSC autumn average biomass index of 0.16 kg/tow is well below the biomass threshold reference point (2.06 kg/tow) [Table 4]. The 2016-2018 index is higher than the 2015-2017 index by 8.4%. It is recommended that this stock is overfished but overfishing is not occurring.

For winter skate, the 2016-2018 NEFSC autumn average biomass index of 7.22 kg/tow is above the biomass threshold reference point (2.83 kg/tow) and above the BMSY proxy (5.66 kg/tow) [Table 4]. The 2016-2018 average index is above the 2015-2017 index by 1.2%. It is recommended that this stock is not overfished, and overfishing is not occurring.

Table 4. 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**
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	0.34	3.56[b]	0.044	0.27	0.13	6.84
2017	1.54[c]	[c]	6.09	[c]	0.34[c]	0.21[c]	8.40[c]
2018	2.80[e]	0.88	4.41	0.051	0.25[e]	0.14[e]	6.41[e]
2019			5.45				
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	0.23	0.176	6.65
2015-2017 3-year average	1.57[c]	[c]	5.49[b]	[c]	0.27[c]	0.18[c]	7.13[c]
2016-2018 3-year average	1.81[c,e]	0.61[d]	4.69[b]	.047[d]	0.27[c,e]	0.16[c,e]	7.22[c,e]
2017-2019 3-year average			5.32				
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	+13.2	+3.7	+24.2
Percent change 2015-2017 compared to 2014-2016	-0.1.5		-2.6		+16.3	-0.6	+7.3
Percent change 2016-2018 compared to 2015-2017	+15.3	+3.1 [d]	-14.6	+0.1	-0.2	-8.4	+1.2
Percent change 2017-2019 compared to 2016-2018			+13.4				
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

5.2.3 Uncertainty Buffer

Amendment 3 established the annual catch limit framework currently used to set specifications for the NE Skate Complex (NEFMC, 2010). The uncertainty buffer was set at 25% in Amendment 3 but was decreased to 10% in Framework Adjustment 6. Additional sources of uncertainty have not been identified; see Table 5 in Framework 6 (NEFMC 2019) for the full list of the sources of uncertainty, both management and scientific, considered to affect the NE Skate Complex and any improvements made since Amendment 3 was implemented.

5.2.4 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 is 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

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. And a detailed summary of the biological and life history characteristics was in the FEIS for Amendment 3 (NEFMC 2009). Framework 8 (NEFMC, 2019) also contains updated life history information on the seven skate species.

5.2.5 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. Recent research has improved our understanding of discard mortality for several skate species in various gear types (Table 6). 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 setting the Skate ACL, based on this paper.

Table 5. Summary of assumed and estimated discard mortality rates of the seven skate species by gear type.

Gear Type	Barndoor	Clearnose	Little	Rosette	Smooth	Thorny	Winter
Gillnet	50%	50%	50%	50%	50%	50%	14%
Longline	50%	50%	50%	50%	50%	50%	50%
Otter Trawl	50%	50%	22%	50%	60%	23%	9%
Scallop Dredge	50%	50%	48%	50%	50%	50%	34%

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 for otter trawl gear. The SSC approved revising the discard mortality rate estimates for little (22%), smooth (60%), thorny (23%) and winter (9%) skates for otter trawl. 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. The SSC approved revising the discard mortality rate estimates for little (48%) and winter skate (34%) for scallop dredge gear based on this study, as the researchers considered the sample size was insufficient for an accurate estimate for barndoor skate. Sulikowski et al. (in review) estimated the discard mortality of winter skate in commercial sink gillnets. The SSC approved revising the discard mortality rate estimate for winter skate (14%) for sink gillnet gear based on this study.

5.2.6 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 through calendar year 2018 by gear (Table 7). 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 2018 were mt (Table 7). Discards decreased by 11% over the 2017 estimates. The assumed discard rate for 2018 is 37%. Projected dead discards are estimated to be 10,942 mt. Total live and dead discards for the Northeast Skate Complex for all gear types are contrasted in Table 8. The dead discards (Table 8) represent the portion of the live discards that are estimated to be dead. Dead discards are estimated based on the weighted average discard mortality across gear types. Based upon SSC recommendations in 2008, an assumed discard mortality rate of 50% is applied for all gears and species, except when research has provided specific numbers as described in Section 5.2.5.

Table 6. Estimated discards (mt) of skates (all species) by gear type from all areas combined, 1964 – 2018.

	Half 1							Half 2							
Year	Line Trawl	Otter Trawl	Shrimp Trawl	Sink Gill Net	Scallop Dredge	Total Half 1		Line Trawl	Otter Trawl	Shrimp Trawl	Sink Gill Net	Scallop Dredge	Total Half 2		Grand Total
1964	361	53,514	0	12	6,434	60,321		402	37,992	0	7	8,288	46,690		107,011
1965	425	58,644	0	17	5,029	64,115		491	41,212	0	5	8,940	50,647		114,762
1966	311	62,821	0	26	5,543	68,701		625	35,869	0	7	6,524	43,025		111,726
1967	319	56,872	0	22	2,882	60,095		470	35,053	0	8	4,735	40,267		100,362
1968	224	56,209	0	37	3,672	60,142		414	34,010	0	10	4,890	39,324		99,466
1969	296	54,979	0	32	2,294	57,602		669	29,299	0	6	3,017	32,991		90,593
1970	331	43,878	0	22	1,838	46,069		584	26,802	0	7	2,742	30,135		76,204
1971	519	34,509	0	21	1,916	36,965		769	20,097	0	8	2,552	23,426		60,391
1972	525	32,161	0	31	2,000	34,718		711	17,965	0	13	2,559	21,248		55,966
1973	618	34,382	0	31	2,103	37,134		724	19,738	0	15	1,846	22,323		59,457
1974	697	36,349	0	58	1,994	39,099		778	17,754	0	24	2,845	21,401		60,499
1975	727	25,197	283	61	2,615	28,883		744	17,313	36	26	4,757	22,875		51,758
1976	514	22,435	66	99	4,086	27,200		441	19,650	0	37	8,313	28,441		55,641
1977	329	26,817	39	169	7,210	34,564		314	21,679	0	47	10,106	32,146		66,710
1978	829	35,094	0	190	9,048	45,161		661	23,484	0	66	14,452	38,662		83,823
1979	1,019	38,530	26	157	9,186	48,918		971	27,982	0	67	13,540	42,560		91,478
1980	1,056	39,819	23	195	9,900	50,993		354	29,633	0	96	11,104	41,186		92,179
1981	503	43,186	92	264	9,502	53,547		257	26,460	0	93	12,818	39,628		93,175
1982	400	43,461	117	95	7,779	51,853		197	37,880	7	84	12,572	50,740		102,593
1983	471	49,354	116	118	8,655	58,714		226	33,711	22	70	11,965	45,994		104,708
1984	378	48,449	152	126	8,337	57,442		87	31,261	53	94	9,903	41,398		98,840
1985	321	40,153	214	119	6,821	47,628		173	23,506	70	81	9,483	33,314		80,941
1986	406	36,913	256	173	7,821	45,569		171	25,517	83	88	12,080	37,938		83,508
1987	692	36,141	264	143	12,687	49,927		364	21,178	46	86	18,953	40,627		90,554
1988	638	35,353	158	166	13,791	50,106		341	21,180	46	91	19,077	40,734		90,840
1989	542	37,663	73	74	18,206	56,558		264	20,260	17	111	19,452	40,104		96,661
1990	390	49,863	223	347	17,162	67,986		273	39,008	71	73	23,458	62,883		130,869
1991	839	22,882	232	99	19,314	43,366		297	17,478	44	113	18,812	36,744		80,110
1992	2,050	13,819	255	269	13,679	30,072		1,270	19,609	0	107	22,823	43,809		73,881
1993	42	7,886	35	211	11,268	19,442		28	26,825	1	110	12,700	39,663		59,105
1994	33	57,447	11	190	6,484	64,165		28	17,856	1	230	5,621	23,735		87,900
1995	30	21,980	8	443	7,385	29,846		30	11,215	1	350	19,481	31,077		60,922
1996	28	16,222	26	414	8,376	25,066		27	30,622	8	125	11,258	42,039		67,105
1997	30	7,584	34	388	10,130	18,166		30	7,398	4	90	6,059	13,581		31,747
1998	25	6,103	9	218	9,069	15,425		30	10,488	1	252	8,543	19,314		34,739
1999	23	2,655	4	598	8,542	11,823		24	9,857	0	261	6,149	16,291		28,113
2000	14	6,783	6	181	9,024	16,009		26	18,175	0	791	4,959	23,951		39,960
2001	20	20,075	0	404	3,615	24,114		22	8,449	0	207	3,249	11,927		36,040
2002	21	12,168	1	392	6,655	19,237		25	10,067	0	2,718	8,046	20,857		40,094

Table 6 - 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
2017	55	5,505	0	1,000	4,929	11,489		76	7,606	0	684	5,509	13,876		25,365
2018	34	4,124	0	1,316	4,588	10,063		31	6,937	0	564	5,404	12,936		22,999

Table 7. Total live and dead discards (mt) of skates (all species) for all gear types, 1968 – 2018.

Year	Live Discards	Dead Discards
1968	99,466	21,620
1969	90,593	18,453
1970	76,204	15,914
1971	60,391	13,715
1972	55,966	12,101
1973	59,457	12,888
1974	60,499	13,357
1975	51,758	12,224
1976	55,641	14,480
1977	66,710	16,573
1978	83,823	21,348
1979	91,478	22,348
1980	92,179	21,110
1981	93,175	20,538
1982	102,593	21,499
1983	104,708	22,205
1984	98,840	20,832
1985	80,941	16,918
1986	83,508	18,471
1987	90,554	23,581
1988	90,840	22,952
1989	96,661	25,701

1990	130,869	32,887
1991	80,110	24,445
1992	73,881	24,159
1993	59,105	17,622
1994	87,903	21,565
1995	60,924	19,568
1996	67,107	18,593
1997	31,748	10,366
1998	34,740	11,316
1999	28,154	9,608
2000	39,961	12,369
2001	36,041	8,475
2002	40,094	12,132
2003	52,204	14,283
2004	46,823	11,249
2005	46,474	12,866
2006	34,565	10,134
2007	44,920	13,182
2008	35,031	10,160
2009	37,441	10,070
2010	36,766	10,523
2011	38,760	10,508
2012	34,274	10,087
2013	42,674	11,551
2014	42,758	12,673
2015	37,894	10,417
2016	33,271	10,435
2017	25,884	8,544
2018	23,000	7,580

5.2.7 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 2018 (2019 spring survey for little skate) are in Table 4. Currently, overfishing is not occurring on any skate species.

5.3 NON-TARGET SPECIES (BYCATCH)

The skate wing fishery is largely an incidental fishery, with a small portion of the fishery directing on skate wings (Figure 1); 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. Framework 58 to the NE Multispecies FMP and Framework 10 of the Monkfish FMP have full descriptions of the fishing impacts on trips targeting NE multispecies and monkfish (www.nefmc.org). A small number of trips could be described as targeting skates; bycatch on these trips are limited. Monkfish and dogfish comprise most of this bycatch and are described below. Section 6.3 further discusses the relationship of the skate fisheries with the NE multispecies and monkfish fisheries. Table 18 has the amount of skate bait and wings landed on various DAS.

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 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, see Framework 58 to the NE Multispecies FMP.

Monkfish

NMFS implemented the Monkfish FMP in 1999 (NEFMC and MAFMC 1998). The FMP included measures to stop overfishing and rebuild the stocks through several 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 (NEFMC 2017). Additional information on monkfish management is on the NEFMC website (http://www.nefmc.org/monk/index.html).

Dogfish

Based upon the 2018 updated stock assessment by the NEFSC, spiny dogfish stock is presently not 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). Like skates, there is a large degree of overlap between spiny dogfish and NE Multispecies trips where dogfish are landed incidentally to groundfish.

5.4 PROTECTED SPECIES

5.4.1 Species Present in the Area

Numerous protected species inhabit the environment within the Northeast multispecies FMP management unit (Table 9) and have the potential to be affected by the proposed action (i.e., there have been observed/documented interactions in the fishery or with gear type(s) similar to those used in the fishery (bottom trawl or gillnet gear)). 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 8. Species protected under the ESA and/or MMPA that may occur in the affected environment of the Northeast multispecies fishery. Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks.[1]

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.)[3]	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*)	Protected (MMPA)	Yes
Spotted dolphin (*Stenella frontalis*)	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus[4]	***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*)	Threatened	Yes
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic	Threatened	Yes

Ocean DPS		
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	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, 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] 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*.

[4] This includes the following Stocks of Bottlenose Dolphins: Western North Atlantic Offshore, Northern Migratory Coastal (strategic stock), and Southern Migratory Coastal (strategic stock).

Cusk are 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. Thus, this species will not be discussed further in this action; 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 is at: https://www.fisheries.noaa.gov/endangered-species-conservation/candidate-species-under-endangered-species-act.

5.4.2 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 (Table 9). 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 skate fishery (see https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NMFS NEFSC FSB 2018; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html). 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 2014a; NMFS 2015a, b).

5.4.3 Species Potentially Affected by the Proposed Action

Table 8 lists protected species of sea turtle, marine mammal, and fish species present in the affected environment of the skate fishery, and that may also be affected by the operation of this fishery; that is, have the potential to become entangled or bycaught in the fishing gear used to prosecute the fishery. To help identify MMPA protected species potentially affected by the action, the MMPA List of Fisheries and marine mammal stock assessment reports for the Atlantic Region were referenced (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries). To help identify ESA listed species potentially affected by the action, the 2013 Biological Opinion issued by NMFS on the operation of seven commercial fisheries, including the multispecies) FMP, and its impact on ESA listed species was referenced (NMFS 2013). The 2013 Opinion, which considered the best available information on ESA listed species and observed or documented ESA listed species interactions with gear types used to prosecute the 7 FMPs (e.g., gillnet, bottom trawl, and pot/trap), concluded that the seven fisheries may adversely affect, but was not likely to jeopardize the continued existence of any ESA listed species. The Opinion included an incidental take statement (ITS) authorizing the take of specific numbers of ESA listed species of sea turtles, Atlantic salmon, and Atlantic sturgeon[1]. Reasonable and prudent measures and terms and conditions were also issued with the ITS to minimize impacts of any incidental take.

[1] The 2013 Opinion did not authorize take of ESA listed species of whales because (1) an incidental take statement cannot be lawfully issued under the ESA for a marine mammal unless incidental take authorization exists for that marine mammal under the MMPA (see 16 U.S.C. § 1536(b)(4)(C)), and (2) the incidental take of ESA- listed whales by the black seabass fishery has not been authorized under MMAP Section 101(a)(5). However, the 2013

Until recently, the 2013 Opinion remained in effect; however, new information on North Atlantic right whales has been made available that may reveal effects of the fisheries analyzed in the 2013 Opinion that may not have been previously considered (Pettis et al. 2018, Pace et al. 2017). Thus, per an October 17, 2017, ESA 7(a)(2)/7(d) memo issued by NMFS, the 2013 Opinion has been reinitiated. However, the October 17, 2017, memo concludes that allowing these fisheries to continue during the re-initiation period will not increase the likelihood of interactions with ESA listed species above the amount that would otherwise occur if consultation had not been reinitiated, and therefore, the continuation of these fisheries during the re-initiation period would not be likely to jeopardize the continued existence of any ESA listed species. Until replaced, the multispecies FMP is currently covered by the October 17, 2017, memo. As the primary concern for both MMPA protected and ESA listed species is the potential for the fishery to interact (e.g., bycatch, entanglement) with these species 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, to understand the potential risk of an interaction. Information on species occurrence in the affected environment of the multispecies fishery is below, while information on protected species interactions with specific fishery gear is in Section 5.4.4.

5.4.3.1 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 (Table 9). 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, is in several 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).

BiOp assessed interaction risks to these species and concluded that 7 FMPs assessed, may affect but would not jeopardize the continued existence of any ESA listed species of whales (NMFS 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 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).

5.4.3.2 Marine Mammals

5.4.3.2.1 Large Cetaceans

As North Atlantic right, humpback, fin, sei, and minke whales are found throughout the waters of the Northwest Atlantic Ocean (Table 8), these species will occur in the affected environment of the skate fishery. In general, these species follow an annual pattern of migration between low latitude (south of 35ºN) wintering/calving grounds and high latitude spring/summer foraging grounds (primarily north of 41ºN; Hayes et al. 2019; 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 (Hayes et al. 2019 ;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. Thus, 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 refer to: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.

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 in Table 10.

Table 9. Large whale occurrence in the area of operation for the skate fishery.

Species	Prevalence and Month of Occurrence
North Atlantic Right Whale	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year; however, passive acoustic studies demonstrated year-round presence in the GOM and waters off New Jersey and Virginia. • New England waters (GOM and GB regions) = **Foraging Grounds (~January - October)**. Seasonally important foraging grounds include, but not limited to: › Massachusetts and Cape Cod Bays; › Great South Channel; › Basins/banks within the GOM (e.g., Jordan and Wilkinson Basins); and, › northern edge of GB/Georges Basin. • Mid-Atlantic waters: Migratory corridor to/from northern (high latitude) foraging and southern calving grounds. • Location of much of the population unknown in winter; however, increasing evidence of wintering areas (~November – January) in: › Cape Cod Bay; › Jeffreys and Cashes Ledges; › Jordan Basin; and › Massachusetts Bay (e.g., Stellwagen Bank).
Humpback Whale	• 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. (e.g., Mid-Atlantic: waters near Chesapeake and Delaware Bays, peak presence about January through March; Massachusetts Bay: peak presence about March-May and September-December).
Fin	• Distributed throughout all continental shelf waters of the Mid-Atlantic (SNE included), GOM, and GB throughout the year. • Mid-Atlantic waters: › Migratory pathway to/from northern (high latitude) foraging and southern (low latitude) calving grounds; and › Possible offshore calving area (October-January).

Species	Prevalence and Month of Occurrence
	• 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 m 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 within the U.S. EEZ. • Spring to Fall: widespread (acoustic) occurrence on the continental shelf; however, most abundant in New England waters during this time. • September to April: high (acoustic) occurrence in deep-ocean 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; Hayes *et al.* 2017; Hayes *et a*l. 2018; Hayes et al. 2019; 81 FR 4837 (January 27, 2016); NMFS 2015b; Bort et al. 2015.	

5.4.3.2.2 Small Cetaceans

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 (Table 11), these species will occur in the affected environment of the skate fishery (Hayes et al. 2017; Hayes et al. 2018, Hayes et al. 2019). Within this range, however, there are seasonal shifts in species distribution and abundance. To help understand 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 skate fishery is in Table 11. Additional information on the biology, status, and range wide distribution of each species is at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region

Table 10. Small cetacean occurrence in the area of operation of the skate fishery.

Species	Prevalence and Month of Occurrence
Atlantic White Sided Dolphin	• Distributed throughout the continental shelf waters (primarily to 100 m) 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), particularly around Hudson Canyon, low densities found year-round, • Virginia (VA) and North Carolina (NC) waters represent southern extent of species range during winter months.
Short Beaked Common Dolphin	• Regularly found throughout the continental shelf-edge-slope waters (primarily between 100-2,000 m) 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/South Carolina border. • **January-May**: occur from waters off Cape Hatteras, NC, to GB (35° to 42°N). • **Mid-summer-autumn**: Occur in the GOM and on GB; *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, SNE, GB, and GOM. • **July-September**: Concentrated in the northern GOM (<150 m); low numbers can be found on GB. • **October-December**: widely dispersed in waters from New Jersey (NJ) to Maine (ME); seen from the coastline to deep waters (>1,800 m).

Species	Prevalence and Month of Occurrence
	• **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	<u>**Western North Atlantic Offshore Stock**</u> • Distributed primarily along the outer continental shelf and continental slope in the Northwest Atlantic from GB to Florida (FL). • Depths of occurrence: ≥40 meters <u>**Western North Atlantic Northern Migratory Coastal Stock**</u> • Most common in coastal waters <20 m deep. • Warm water months (e.g., July-August): distributed from the coastal waters from the shoreline to about the 20 m depth between the Assateague, VA, to Long Island, NY. • Late summer and fall, and during cold water months (e.g., January-March): stock occupies coastal waters from Cape Lookout, NC, to the NC/VA border. <u>**Western North Atlantic Southern Migratory Coastal Stock**</u> • Most common in coastal waters <20 m deep. • **October-December**: appears stock occupies waters of southern NC (south of Cape Lookout) • **January-March**: appears 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 (as far north as Assateague).
Pilot Whales: *Short- and Long-Finned*	<u>**Short- Finned Pilot Whales**</u> • Except for area of overlap (see below), primarily occur south of 40°N (Mid-Atlantic and SNE waters); although low numbers have been found along the southern flank of GB, but no further than 41°N. • May through December (about): distributed primarily near the continental shelf break of the Mid-Atlantic and SNE; individuals begin shifting to southern waters (i.e., 35°N and south) beginning in the fall. <u>**Long-Finned Pilot Whales**</u> • Except for area of overlap (see below), primarily occur north of 42oN. • Winter to early spring (November - April): primarily distributed along the continental shelf edge-slope of the Mid-Atlantic, SNE, and GB.

Species	Prevalence and Month of Occurrence
	• Late spring through fall (May - October): movements and distribution shift onto/within GB, the Great South Channel, and the GOM. **Area of Species Overlap:** between approximately 38°N and 40°N.
Notes: Information is representative of small cetacean occurrence in the Northwest Atlantic continental shelf waters out to 2,000 m depth ***Sources*:** Hayes *et al*. 2017; Hayes *et al.* 2018; Hayes et al. 2019; Payne and Heinemann 1993; Payne *et al.* 1984; Jefferson *et al*. 2009.	

5.4.3.2.3 Pinnipeds

Harbor, gray, harp, and hooded seals will occur in the affected environment of the skate fishery (Table 12). 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 (35°N) (Waring et al. 2007; Hayes et al. 2019). To help understand how the skate 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 skate fishery is in Table 12. Waring et al. (2007), and Hayes et al. (2019) have additional information on the biology, status, and range wide distribution of each species.

Table 11. Pinniped occurrence in the area of operation of the skate fishery.

Species	Prevalence
Harbor Seal	• Primarily distributed in waters from New Jersey to Maine; however, increasing evidence indicates that their range is extending into waters as far south as Cape Hatteras, NC (35°N). • **Year Round**: Waters of Maine • **September-May**: Waters from MA to NJ.
Gray Seal	• **Year Round**: Waters from Maine to just south of Cape Cod, MA. • **September-May**: Waters from southern MA to NJ. • Stranding records: Southern NJ to Cape Hatteras, NC
Harp Seal	• Winter-Spring (approx. January-May): Waters from New Jersey to Maine.
Hooded Seal	• Winter-Spring (approx. January-May): Waters of New England.
***Sources*:** Waring *et al*. 2007 (for hooded seals); Hayes *et al.* 2019.	

5.4.3.2.4 Atlantic Sturgeon

Table 8 lists the five DPSs of Atlantic sturgeon that occur in the affected environment of the multispecies 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. 2015a,b; ASMFC 2017).

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 m, 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; 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; Wipplehauser 2012; Wipplehauser and Squiers 2015). Although additional studies are still needed to clarify why these 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).

5.4.3.2.5 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; 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). Thus, as the multispecies fishery operates throughout the year, and operates in the GOM, the fishery could overlap in time and space with Atlantic salmon migrating northeasterly between U.S. and Canadian waters.

5.4.4 Interactions Between Gear and Protected Species

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 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 multispecies fishery (i.e., sink gillnet and bottom trawl gear).

5.4.4.1 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 2019 LOF (84 FR 22051 (May 16, 2019)) 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.

5.4.4.1.1 Large Whales

Bottom Trawl Gear

Except for minke whales, there have been no observed interactions with large whales and bottom trawl gear (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; https://www.nefsc.noaa.gov/fsb/take_reports/nefop.html; https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; https://www.nefsc.noaa.gov/publications/crd/). The earliest documented bottom trawl interaction with a minke whale was in 2004, where one minke whale was found fresh dead in trawl gear attributed to the northeast bottom trawl fishery (Waring et al. 2007). In 2008, several minke whales were observed dead in bottom trawl gear attributed to the northeast bottom trawl fishery; estimated annual mortality attributed to this fishery in 2008 was 7.8 minke whales (Waring et al. 2015). Since 2008, serious injury and mortality records for minke whales in U.S. waters have shown zero interactions with bottom trawl (northeast or Mid-Atlantic) gear (Henry et al. 2016; Henry et al. 2017; Hayes et al. 2019; Waring et al. 2015; 84 Federal Register 22051). Based on this information, large whale interactions with bottom trawl gear are expected to rare to nonexistent.

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 (e.g., Johnson et al.

[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.

(2005), Hayes et al. 2019; Henry et al. 2017), 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). Thus, 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 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 11; Henry et al. 2017; Hayes et al. 2019).

Table 13 has 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 2011 to 2015 (Henry et al. 2017). The data are 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 (Table 11) information 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 suggest that entanglements may be occurring more frequently than the observed incidences indicate (NMFS 2014b; Robbins 2009; Knowlton et al. 2012).

Table 12. Summary of confirmed human-caused injury or mortality to fin, minke, humpback, sei, and North Atlantic right whales from 2011-2015 due to entanglement in fishing gear.

Species	Total Confirmed Entanglement: Serious Injury	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	19	35	5	4.55 (0.4/0/4.15)
Humpback Whale	32	61	5	6.45 (1.5/0.3/4.65)
Fin Whale	6	2	4	1.85 (0.2/0.8/0.85)
Sei Whale	0	0	0	0

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.

Minke Whale	20	12	22	7.75 (1.9/3.25/2.6)
Notes: Information is based on confirmed human-caused injury and mortality events along the Gulf of Mexico Coast, U.S. East Coast, and Atlantic Canadian Provinces; it is not specific to U.S. waters only. NMFS defines serious injury as an injury that is more likely than not to result in mortality (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-policies-guidance-and-regulations#distinguishing-serious-from-non-serious-injury-of-marine-mammalsf). ***Source***: Henry *et al.* 2017.				

As in Section 5.4.4.1, 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, especially 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; Humpback whales are also considered strategic stocks as the detected level of U.S. fishery caused mortality and serious injury exceeds the PBR level (Hayes et al. 2019; Table 13). MMPA Section 118(f)(1) 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, aim to help recover 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] Details on the ALWTRP are at: http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/.

[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).

5.4.4.1.2 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 (Read et al. 2006; Lyssikatos 2015; Chavez-Rosales et al. 2017; Hayes et al. 2017; Hayes et al. 2018; Hayes et al. 2019; 84 FR 22051 (May 16, 2019)). Based on the most recent Marine Mammal List of Fisheries (LOF) issued on May 16, 2019 (84 FR 22051), Table 12 provides a list of species that have been observed (incidentally) seriously injured and/or killed by MMPA LOF Category I (frequent interactions) gillnet and/or Category II (occasional interactions) bottom trawl fisheries that operate in the affected environment of the skate fishery. Of the species in Table 12, gray seals, followed by harbor seals, harbor porpoises, short beaked common dolphins, and harps seals are the most frequently bycaught small cetacean and pinnipeds in sink gillnet gear in the Greater Atlantic Region (GAR; Hatch and Orphanides 2014, 2015, 2016, 2019). 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, Risso's dolphins, bottlenose dolphin (offshore), harbor porpoise, harbor seals, and harp seals (Lyssikatos 2015; Chavez-Rosales et al. 2017).

Table 13. Small cetacean and pinniped species observed seriously injured and/or killed by Category I and II sink gillnet or bottom trawl fisheries in the affected environment of the skate 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
		Long-finned pilot whales
		Harbor seal
		Hooded seal
		Gray seal
		Harp seal
Mid-Atlantic Gillnet	I	Bottlenose dolphin (Northern Migratory coastal)
		Bottlenose dolphin (Southern Migratory coastal)
		Bottlenose dolphin (offshore)
		Harbor porpoise
		Short-beaked common dolphin
		Harbor seal
		Harp seal
		Gray 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
		Short-beaked common dolphin
		Risso's dolphin
		Bottlenose dolphin (offshore)
		Gray seal
		Harbor seal
Source: MMPA LOF 84 FR 22051 (May 16, 2019).		

As noted above, numerous species of small cetaceans and pinnipeds interact with Category I and II fisheries in the GAR; however, several species (Table 14) have experienced such great losses to their populations due to interactions with Category I and/or II fisheries that they are now considered strategic stocks under the MMPA (Table 14). These include several stocks of bottlenose dolphins, pilot whales, and until recently, the harbor porpoise[5]. MMPA Section 118(f)(1) requires the preparation and implementation of a TRP for any strategic marine mammal stock that interacts with Category I or II fisheries. Thus, the Harbor Porpoise TRP (HPTRP) and the Bottlenose Dolphin TRP (BDTRP) were developed and implemented for these species.[6] Also, due to the incidental mortality and serious injury of small cetaceans, incidental to bottom and midwater trawl fisheries operating in both the Northeast and Mid- Atlantic regions, the Atlantic Trawl Gear Take Reduction Strategy (ATGTRS) was implemented. Additional information on each TRP or Strategy is at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-take-reduction-plans-and-teams.

[5] In the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Hayes et al. 2018); harbor porpoise is no longer designated as a strategic stock.

[6] Although the most recent U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment (Hayes et al. 2018) no longer designates harbor porpoise as a strategic stock, HPTRP regulations are still in place per the mandates in Section 118(f)(1).

5.4.4.2 Sea Turtles

Bottom Trawl Gear

Sea turtle interactions with trawl gear have been observed in the Gulf of Maine, Georges Bank, and the Mid-Atlantic; however, most of the observed interactions have occurred in the Mid-Atlantic (see Murray 2011; Warden 2011a, b; Murray 2015a, Murray 2015b). As few sea turtle interactions have been observed in the Gulf of Maine and Georges Bank regions of the Northwest Atlantic, there is insufficient data available to conduct a robust model-based analysis on sea turtle interactions with trawl gear in these regions or produce a bycatch estimate for these regions. Thus, the bycatch estimates and discussion below are for trawl gear in the Mid-Atlantic.

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 61 more loggerheads (CV=0.17, 95% CI=41-83) interacting with trawls, but released through a Turtle Excluder Device (TED). The 292 average annual observable loggerhead interactions equates to about 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 about 33 adult equivalents (Murray 2015). Bycatch estimates by 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 (2018) assessed loggerhead, Kemp's ridley, leatherback, and unidentified hard-shell sea turtle interactions in Mid-Atlantic and Georges Bank gillnet gear during 2012-2016. Based on Northeast Fisheries Observer Program, At-Sea Monitoring Program, and Vessel Trip Report data from 2012-2016, total estimated bycatch of sea turtles in commercial sink gillnet gear in the Mid-Atlantic and Georges Bank regions was 705 loggerheads (equivalent to 19 adults), 145 Kemp's ridleys, 27 leatherbacks, and 112 unidentified hard-shelled sea turtles (Murray 2018). Depending on species, sea turtles were observed captured in nets with mesh sizes ranging from 3.25 inches to 12 inches.

5.4.4.3 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 2018). Three documents, covering three time periods, that use data collected by NEFOP 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 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, so Miller and Shepard (2011) is 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 is 1,239 and 1,342 sturgeon in gillnet and bottom otter trawl gear, respectively. 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 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.

5.4.4.4 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 2018). According to the Biological Opinion issued by NMFS Greater Atlantic Regional Fisheries Office (GARFO) on December 16, 2013 and 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 gear (NMFS NEFSC FSB 2018). Based on the above information, specifically the very low number of observed Atlantic salmon interactions in gillnet and trawl gear reported in the Northeast Fisheries Observer Program's database (which includes At-Sea Monitoring data), interactions with Atlantic salmon are likely rare events (Kocik et al. 2014; NMFS NEFSC FSB 2018).

5.5 Physical Environment and Essential Fish Habitat

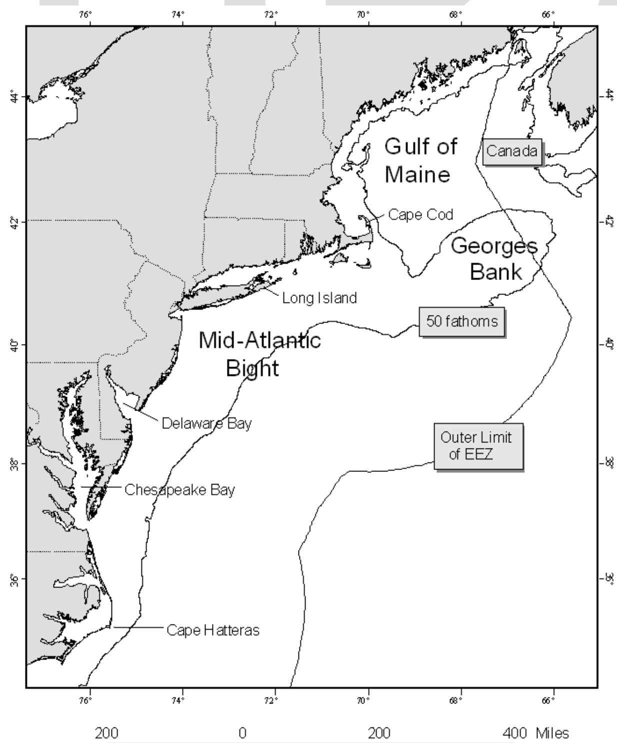
5.5.1 Physical Environment

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 (Map 1, Map 2).

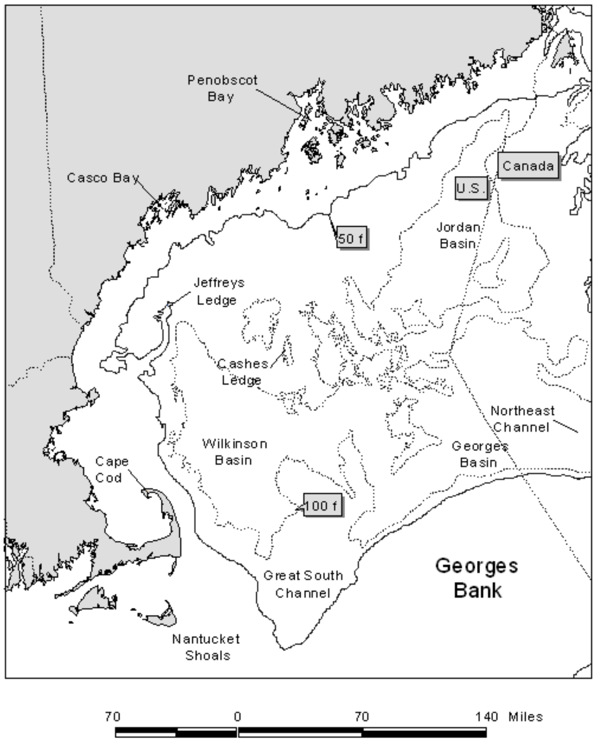
The Gulf of Maine is an enclosed coastal sea, characterized by relatively cold waters and deep basins, with a patchwork of various sediment types. Georges Bank is a relatively shallow coastal plateau that slopes gently from north to south and has steep submarine canyons on its eastern and southeastern 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 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 in this document is from Stevenson et al. (2004).

Map 1. Northeast shelf ecosystem



Map 2. Gulf of Maine



Gulf of Maine

The Gulf of Maine (GOM) is 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 has 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 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 daily by tidal currents, and a low-energy area at depths > 65 m that is affected only by storm currents.

The Great South Channel separates the main part of Georges Bank from Nantucket Shoals. 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 below. 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 and deeper) 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, except for 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.

5.5.2 Essential Fish Habitat

EFH designations for all the managed skate species and for the other species managed by the New England Fishery Management Council were updated in April 2018 as part of the NEFMC's Omnibus EFH Amendment 2 (NEFMC, 2018, see https://www.nefmc.org/library/omnibus-habitat-amendment-2). Skate EFH maps are also available for viewing via the Essential Fish Habitat Mapper: https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper. Within the Greater Atlantic region, any managed species and life stage that occupies a benthic habitat within the geographic range of the skate fishery could potentially be affected by fishing gear used in the fishery that contacts the bottom (i.e., bottom trawls and bottom gillnets).

EFH impacts are related to the amount and location of fishing effort, and the gear type used. A more detailed discussion of habitat types, as well as biological and physical effects of fishing by various gears in the skate fishery is in the 2008 SAFE Report, or Section 7.4.6 of Skate Amendment 3 (NEFMC 2009). This provides a discussion of the biological and physical effects various gear types may have on EFH. An updated analysis of the effects of all gears used in fisheries managed by the NEFMC on marine habitats in the NE region is included in the NEFMC Omnibus EFH Amendment 2 (see Appendix D, Swept Area Seabed Impact Model). This model was updated in 2019 and is now referred to as the Fishing Effects Model (NEFMC 2019, https://www.nefmc.org/library/fishing-effects-model). The gear effects assessment is very similar to the prior work, and Fishing Effects includes updated spatial depictions of habitat disturbance by gear type, through December 2017.

5.6 HUMAN COMMUNITIES – TO BE REVISED

This action evaluates the effect management alternatives may have on the economy, way of life, and traditions of human communities. These social and economic impacts may be driven by changes in fishery flexibility, opportunity, stability, certainty, safety, and/or other factors. While social and economic impacts could be solely experienced by individuals, it is more likely that impacts would be experienced across communities, gear types, and/or vessel size classes. Summarized here are the fisheries and human communities most likely to be impacted by the Alternatives under Consideration. Social, economic and fishery information herein helps describe the response of the fishery to past management actions and predicting how the Framework 8 alternatives may affect human communities. Also, this section establishes a descriptive baseline to compare predicted and actual changes resulting from management. Additional information is contained in Framework 6 (NEFMC 2019).

MSA Section 402(b), 16 U.S.C. 1881a(b) states that no information gathered in compliance with the Act can be disclosed, unless aggregated to a level that obfuscates the identity of individual submitters. The fishery data in this amendment are thus aggregated to at least three reporting units, to preserve confidentiality. Additional standards are applied to reporting the fishing activity of specific states or fishing communities. To report landings activity to a specific geographic location, the landings have been attributed to at least three fishing permit numbers and the landings must be sold to three dealer numbers. However, the dealers do not necessarily have to be in the same specific geographic location.

5.6.1 Commercial Skate Fishery

Skates are harvested in two very different fisheries, one for bait and one for human consumption. As bait, skates are used primarily for the American lobster (*Homarus americanus*) fishery, which prefers small, whole skates and is the more historic and directed skate fishery relative to the fishery for human consumption, which harvests skates for their wings. Since 2003, with the implementation of the original Skate FMP, all vessels landing skate must be on a groundfish Day-at-Sea (DAS).

Bait fishery: Vessels involved in the bait fishery are primarily from Southern New England ports and target little skates (>90%) and, to a much lesser extent, juvenile winter skates (<10%). Juvenile winter skates and little skates are difficult to differentiate due to their nearly identical appearance. Bait skate is primarily landed by trawlers, often as a secondary species while targeting monkfish or groundfish.

The bait fishery, based on FY2010-2018 averages, is largely based out of Rhode Island (primarily Pt. Judith, also Newport, Tiverton and Block Island) with other ports in Massachusetts (Fall River, New Bedford, Bourne and Provincetown), Connecticut (New London, Stonington), New York (Long Island), and New Jersey (Belford, Sea Isle City) also active in the directed bait fishery. 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 about 69°W. The most landings are caught south of Block Island in federal waters. Effort on skates increases in state waters seasonally to supply increased market demand from the lobster fishery in the spring through fall. 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 determine the amount of bait per pot. Within the directed monkfish gillnet fishery, there is also a seasonal gillnet incidental skate fishery, in which mostly winter skates) is sold for lobster bait and as cut wings for processing.

Fishermen have indicated that the market for skates as lobster bait has been relatively consistent. 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 also determine the price paid by the dealer, rather than just supply and demand. The quantity of skates landed in a 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, recorded skate landings in the fishery are known to be less than 100%. 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.

Wing fishery: The other primary market for skates in the region is the wing market. Larger skates, mostly captured by trawl gear, have their pectoral flaps, or wings, cut off and sold into this market. 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 large enough for processing of wings, but due to their overfished status, possession and landing of thorny skates has been prohibited since 2003. Following a rebuilt determination, limited landings of barndoor skate was allowed following FW5 (NEFMC 2018). Winter skate remains the dominant component of the wing fishery, but illegal thorny 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 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 fishing for monkfish 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 recorded 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. Today, Chatham is one of the major ports for skate wings and food skate. Skate wings are also landed significantly in Point Judith and New Bedford. 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).

5.6.1.1 Commercial Skate Permits and Vessels

Both the number of skate permits issued and active permits declined between FY 2009 and 2016 (Table 15). There have been about 400 active permits in recent years, and the percent active has been 20-24% each year since 2009.

Table 14. Number of skate permits, issued and active, 2009-2019.

Year	Permits issued	Active permits	% active
2009	2,574	572	22%
2010	2,503	550	22%
2011	2,326	567	24%
2012	2,265	527	23%
2013	2,202	455	21%
2014	2,148	452	21%
2015	2,084	440	21%
2016	2,074	415	20%
2017	1,919	X	X

5.6.1.2 Catch

The skate fishery caught 77% of the overall ACL in FY 2018 (Table 17); this was a slight decrease from FY 2017 landings (Table 16). No reactive AMs were triggered in FY 2018, as the TALs were not exceeded by over 5%; the wing fishery caught 74.6% of the wing TAL and the bait fishery caught 63.5% of the bait TAL. State landings in FY 2018 were 576 mt (not shown in table), and recreational catch was 1,088 mt (from Table 23). Total live discards in 2018 were 7,580 mt and dead discards were 7,879 mt (Table 8).

Table 15. FY2017 catch and landings of skates compared to management specifications.

Management Specification	Specification Amount (mt)	Catch or Landings (mt)	Percent Caught or Landed
ABC/ACL	31,081	25,294	81.4%
ACT (75% of ABC)	23,311	25,294	104%
Assumed Discards + State Landings	10,721	9,318	n/a
TAL Bait	4,218	3,978	94.3%
TAL Wings	8,372	8,465	101.1%

Table 16. FY2018 catch and landings of skates compared to management specifications.

Management Specification	Specification Amount (mt)	Catch or Landings (mt)*	Percent Caught or Landed
ABC/ACL	31,327	24,128	77%
ACT (75% of ABC)	28,194	24,128	102.7%
Assumed Discards + State Landings	12,406	8,455	n/a
TAL Bait	5,289	3,356	63.5%
TAL Wings	10,499	7,837	74.6%

5.6.1.3 Commercial Landings by Fishery and DAS Declaration

Note that NMFS estimates commercial skate landings from the dealer weigh-out 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 must be considered from a biological and stock assessment perspective, it is important to remember that vessel revenue from 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 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 (a full description of historic landings is in Amendment 3, NEFMC, 2009). Total skate landings have fluctuated between FY 2010 and 2018, largely attributable to the wing fishery as landings in the bait fishery have remained relatively stable (Table 21 & Table 22). It is unclear what is driving the trend in wing landings as quota is likely not limiting the fishery. A potential explanation is the decrease in winter skate survey index that suggests fewer winter skate were available to the fishery. Skate landings by VMS declaration and disposition type in fishing years 2017 and 2018 are in Table 17.

Table 17. Skate landings by VMS declaration and skate fishery disposition type, FYs 2017 & 2018 combined.

VMS Declaration	Bait (live lbs)	Wing (landed lbs)
Mults Sector	7,450,041	9,316,243
Mults Common	2,872,128	191,491
Monkfish	954,352	7,069,242
Scallop	1,000	32,410
Herring	n/a	1,217
Squid, Mackerel, Butterfish	96,945	362,661
Unmatched/No Declaration	7,065,174	2,613,842
DOF	5,588,197	968,218
Total	**24,027,837**	**20,555,324**
Source: NMFS, Fisheries Statistics Office, August 2019		

5.6.1.4 Fishery Revenue

Since FY 2010, skate revenue has been $5.5-$9.3M annually (Table 20), generally under 1% of the total revenue by vessels landing skates. However, dependence by individual vessels may be much higher. The fluctuations in total skate revenue is largely attributable to changes in wing revenue and landings, ranging from $3.2-6.8M annually (Table 19). Revenue from the skate bait fishery has been relatively stable, ranging from $1.1-1.7M annually (Table 20).

Table 18. Skate revenue relative to all revenue from active skate vessels, FY 2010-2018.

FY	Skate revenue	All Revenue	% Skate
2010	$6,318,464	$715,310,895	0.88%
2011	$9,339,118	$762,544,626	1.22%
2012	$7,554,998	$1,108,349,868	0.68%
2013	$7,663,276	$1,196,147,917	0.64%

2014	$9,302,431	$1,163,812,409	0.80%
2015	$6,299,493	$877,965,629	0.72%
2016	$5,518,025	$1,390,180,366	0.40%
2017	$6,422,540	$1,840,542,864	0.35%
2018	$7,552,175	$1,029,229,702	0.73%

Table 19. Skate wing landings and revenue, FY 2010 – 2018.

Fishing Year	Landings		Revenue ($)
	Live lbs.	Landed lbs.	
2010	19,003,883	9,409,707	$3,991,882
2011	24,154,821	11,434,575	$5,822,815
2012	18,060,035	8,250,888	$4,551,783
2013	16,131,031	7,395,103	$4,995,329
2014	21,692,492	10,169,595	$6,816,710
2015	18,157,816	8,314,029	$3,883,042
2016	15,255,193	7,318,913	$3,191,498
2017	17,493,592	8,876,072	$4,132,554
2018	19,486,408	9,620,349	$5,451,020

Table 20. Skate bait landings and revenue, FY 2010-2018.

Fishing Year	Landings		Revenue ($)
	Live lbs.	Landed lbs.	
2010	9,698,695	9,365,792	$1,161,331
2011	10,837,172	10,818,390	$1,711,431
2012	10,766,626	10,754,534	$1,391,065
2013	11,176,451	11,176,413	$1,199,273
2014	9,386,666	9,375,820	$1,161,520
2015	10,513,990	10,508,860	$1,091,415
2016	10,148,571	10,184,091	$1,120,607
2017	12,495,542	12,960,835	$1,653,560
2018	10,625,319	11,033,972	$1,544,838

5.6.2 Recreational Skate Fishery

Skates have little to no recreational value and are not directed on in any recreational fisheries. Between 2010 and 2018, recreational skate catch has fluctuated, with a high of 307,907 lbs (140 mt) in 2015 (Table 23).

Recreational harvest of skates (MRFSS A+B1 data), where skates were retained and/or killed by the angler, vary by species and state. New Jersey, New York, Rhode Island, and Virginia reported the largest recreational skate catches over the time series. Recreational fishermen 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. Refer to the MRIP website for these data: http://www.st.nmfs.noaa.gov/st1/recreational/queries/.

Table 21. Estimated recreational skate harvest (lbs) by species, 2012-2018 (A+B1).

	Winter	Smooth	Clearnose	Little	Total
2012	2,184	0	115,168	0	**117,352**
2013	854	0	88,419	110,771	**200,044**
2014	82	0	35,279	213,091	**248,452**
2015	102,979	0	162,808	42,120	**307,907**
2016	52,233	0	215,191	414	**267,838**
2017	4,248	0	42,008	30,077	**76,333**
2018	1,631	0	246,633	89	**248,353**

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
Note: Species not listed have no reported harvest.

5.6.3 Fishing Communities

Consideration of the economic and social impacts on fishing communities from proposed fishery regulations is required under the National Environmental Policy Act (NEPA) and the Magnuson Stevens Fishery Conservation and Management Act, particularly, National Standard 8 which defines a "fishing community" 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 skate fishery can be difficult. Because skates are widely used as bait for the lobster fishery, it is impractical to identify every community with substantial involvement in the lobster fishery (and consequently some dependence on the skate fishery) for assessment in this document.

Communities dependent on the skate resource were identified and described in Framework 5 and are incorporated herein by reference (NEFMC 2018, Section 6.5.3.1) are categorized into primary and secondary port groups. The skate fishery primary ports are those that are substantially engaged in the fishery, and which are likely to be the most impacted by the alternatives under consideration. The secondary ports are those that may not be as dependent or engaged in the fishery as the primary ports but are involved to a lesser extent. Skate ports meet the following criteria:

Primary ports. At least $1M average annual revenue of skates during 2010-2018 (Table 24).

Secondary ports. At least $100,000 average annual revenue of skates during 2010-2018.

Communities identified. Based on these criteria, there are three primary ports in the Northeast skate fishery: Chatham and New Bedford, Massachusetts and Point Judith, Rhode Island (Table 20). There are 11 secondary ports from Massachusetts to New Jersey. The primary and secondary ports comprised 59.8% and 32.0% of total fishery revenue, respectively, during 2010-2018. There are 107 other ports that have had more minor participation (8.2%) in the fishery recently.

Of the primary ports, Chatham had the highest average revenue between 2010 and 2018, $1.7M, or 15% of total revenue in Chatham for all fisheries (Table 20). There were 59 active skate vessels during that time. Point Judith and New Bedford each had an average over $1.2M. The percent of total revenue was lower, just 0.3% and 2.8%, respectively. However, a much larger number of skate vessels landed in these ports, 167 and 178, respectively. Thus, although these three ports are important for the skate fishery, other fisheries dominate their overall fishing activity. For most of the secondary ports, the percent revenue from skates is also very low, from 0.3-12%, except for Sea Isle City, New Jersey (18%). Montauk, New York and Gloucester, Massachusetts had 106 and 152 active skate vessels during 2010-2018, higher than the other secondary ports, 5-96.

Primary ports are further described in Framework 8. Community profiles are available from the NEFSC Social Sciences Branch website (Clay et al. 2007).

Table 22. Fishing revenue (unadjusted for inflation) and vessels in primary and secondary skate ports, calendar years 2010-2018.

Port	Average revenue, 2010-2018			Total active skate vessels, 2010-2018
	All fisheries	Skates only	% skates	
Primary Ports				
Chatham, MA	$11,724,737	$1,704,647	15%	59
Point Judith, RI	$45,995,459	$1,294,973	2.8%	167
New Bedford, MA	$359,807,372	$1,229,694	0.3%	178
Secondary Ports				
Newport, RI	$8,310,603	$411,274	4.9%	25
Little Compton, RI	$2,345,325	$280,600	12%	30
Long Beach, NJ	$26,247,037	$247,347	0.9%	59
Montauk, NY	$17,262,945	$230,299	1.3%	106
New London, CT	$5,030,350	$226,059	4.5%	30
Pt. Pleasant, NJ	$26,975,369	$175,347	0.7%	96
Sea Isle City, NJ	$879,404	$161,499	18%	5
Gloucester, MA	$47,936,941	$155,971	0.3%	152
Stonington, CT	$7,241,146	$136,587	1.9%	33
Hampton Bay, NY	$5,777,526	$133,139	2.3%	59
Westport, MA	$1,427,621	$101,323	7.1%	10
Source: NMFS Commercial Fisheries Database, accessed September 2019.				

5.6.3.1 Ports by fishery (wing and bait)

Wing fishery: During 2010-2016, skate wings (food) were landed in over 100 ports. Skate wing revenue was highest in Chatham and New Bedford, MA; and Point Judith and Little Compton, RI during that time (Table 25). More recently, 2017-2018, the top ports were Chatham, MA; New Bedford, MA; Point Judith, RI; Montauk, NY; and Point Pleasant, NJ. The average annual skate wing revenue for FY2017-2018 ($5.3M) was lower than the average for FY2010-2016 ($6.1M). The top port for skate wing revenue was Chatham in both periods: FY2010-2016 ($1.48M) and FY2017-2018 ($2.34M average), accounting for about 44% of all wing revenues recently. The second highest port for skate wings is now Point Judith, but the revenue in FY2017-2018 ($512K) was down 37% from the seven-year average ($812K). These declines in wing revenue are likely due to a lower TAL in FY2017 (Table 16).

Both trawlers and gillnets catch food skate. Some trawlers target skate, with others catching skate as bycatch. Most of the gillnet vessels targeting skate 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 bycatch at the height of the fishery.

Bait fishery: During 2010-2018, skate bait was landed in over 35 ports. Skate bait revenue was highest in Point Judith and Newport, RI during FY2010-2016 (Table 25). In FY2016 alone, there were 16 ports where skates were landed for bait, and the total skate bait revenue was very close to the average since 2010 ($1.27M). The top port for skate bait revenue was Point Judith, both in FY2016 ($518K) and since FY2010 ($535K), accounting for about 45% of all bait revenues, though there was a 3% decline in 2017 from average. These revenues are those reported by Federal dealers. Ports such as Montauk, NY have individual vessels which sell skate directly to lobster and other pot fishermen for bait, because there are no major skate bait dealers there.

Table 23. Skate revenue by disposition and port, FY2010-2018.

Port	Average 2010-2016	Average 2017-2018
Wing (food)	**$6,086,777**	**$5,308,735**
Chatham, MA	$1,478,552	$2,339,262
New Bedford, MA	$1,211,848	$478,629
Point Judith, RI	$812,253	$512,053
Little Compton, RI	$303,281	$197,303
Barnegat Light, NJ	$273,719	$200,511
Montauk, NY	$238,807	$237,819
Newport, RI	$193,020	$134,090
Hampton Bays/Shinnecock, NY	$179,107	$143,166
Point Pleasant, NJ	$159,608	$236,797
Gloucester, MA	$158,918	$120,536
Westport, RI	$103,089	$70,619
New London, CT	$88,432	$199,167
Belford, NJ	$36,783	$24,880
Other Ports	*$849,360*	*$413,907*
Bait	**$1,267,597**	**$1,599,199**
Point Judith, RI	$535,311	$664,998
Newport, RI	$244,150	$143,870
Other Ports	*$488,136*	*$790,331*
Grand Total	**$7,354,374**	**$6,907,934**

5.6.3.2 Fishery by states

During FY2017-2018, skates were landed in ten states, with the most landings occurring in Massachusetts and Rhode Island (Table 26), consistent with the pattern since at least FY2012 (Framework 5). The bait fishery is primarily located in Massachusetts, while the wing fishery is primarily located in Rhode Island.

Table 24. Total skate landings and revenue by fishery and state, FY2017-2018.

	Landings (Landed lb)	Landings (Live lb)	Revenue ($)
BAIT	**23,994,807**	**23,120,861**	**$3,198,398**
NH	67,879	67,879	$59,981
MA	1,072,857	636,910	$111,890
RI	12,981,664	12,968,485	$1,618,787
CT	7,912,890	7,483,799	$1,231,513
NY	12,705	16,976	$1,372
NJ	1,932,562	1,932,562	$174,712
MD	14,250	14,250	$143
FOOD	**20,512,346**	**41,221,895**	**$10,617,470**
ME	536	1,216	$253
NH	45,951	58,300	$38,572
MA	11,636,641	23,557,252	$6,303,499
RI	3,746,212	7,757,501	$1,740,091
CT	1,346,890	1,789,462	$527,004
NY	1,573,076	3,406,648	$831,240
NJ	1,741,001	3,901,282	$964,173
MD	151,502	139,083	$88,441
VA	225,189	508,209	$105,176
NC	45,348	102,942	$19,021
Grand Total	**44,507,153**	**64,342,756**	**$13,815,868**

Table 25 - Skate revenue by state, FY2012-2018

State	Average FY2012-2016	Average FY2017-2018
MA	$3,212,265	$3,207,695
RI	$2,086,036	$1,679,439
CT	$404,833	$879,259
NY	$514,695	$416,306
NJ	$614,648	$569,443
Other (n=5)	$95,405	$155,794
Total	**$6,927,882**	**$6,907,934**

6.0 ENVIRONMENTAL IMPACTS OF ALTERNATIVES

The impacts of the alternatives under consideration are evaluated herein relative to the valued ecosystem components (VECs) described in the Affected Environment (Section 6.0) and to each other.

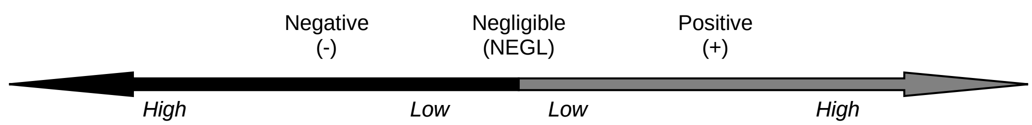
6.1 INTRODUCTION

6.1.1 Evaluation Criteria

This action evaluates the potential impacts using the criteria in Table 25.

Table 26. Terms used to summarize impacts on VECs.

	Direction		
VEC	**Positive (+)**	**Negative (-)**	**Negligible/Neutral**
Allocated target species, other landed species, and protected species	Actions that increase stock/population size for stocks in rebuilding. For stocks that are rebuilt, actions that maintain stock population sizes at rebuilt levels. For protected species, actions that increase the population size, or decrease gear interactions.	Actions that decrease stock/population sizes for overfished stocks. Actions that would cause a rebuilt stock to become overfished. For protected species, actions that decrease the population size, or increase or maintain gear interactions.	Actions that have little or no positive or negative impacts to stocks or populations.
Physical Environment/ Habitat/EFH	Actions that improve the quality or reduce disturbance of habitat	Actions that degrade the quality or increase disturbance of habitat	Actions that have no positive or negative impact on habitat quality
Human Communities	Actions that increase revenue and social well-being of fishermen and/or associated businesses	Actions that decrease revenue and social well-being of fishermen and/or associated businesses	Actions that have no positive or negative impact on revenue and social well-being of fishermen and/or associated businesses
	Impact Qualifiers:		
	All VECs: Mixed	**both positive and negative**	
Low (L, as in low positive or low negative)	To a lesser degree		
High (H; as in high positive or high negative)	To a substantial degree (not significant)		
Likely	Some degree of uncertainty associated with the impact		



6.2 IMPACTS ON TARGET SPECIES (SKATE COMPLEX)

6.2.1 Specifications

6.2.1.1 Alternative 1 – No Action (ACL=ABC of 31,327 mt, ACT of 28,194 mt, TAL of 15,788 mt, Wing TAL=10,499 mt, Bait TAL=5,289 mt)

The No Action alternative would maintain the ACL specifications as those established in Framework 6 (NEFMC, 2019). This would allow a slightly lower than recommended catch than the Preferred Alternative and could reduce the overall long-term yield from the skate resource. Thorny skate is in a rebuilding plan and remains overfished. The survey index three year moving average of the other 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 Alternative 2 this positive effect would not be expected to be significant. Overall, Alternative 1 would be expected to have neutral to low positive impacts compared to Alternative 2.

6.2.1.2 Alternative 2 – Revised Annual Catch Limit Specifications (ACL=ABC of 32,715 mt, ACT of 29,444 mt, TAL of 17,864 mt, Wing TAL=11,879 mt, Bait TAL=5,984 mt)

Alternative 2 would revise the ACL for the skate complex using the most recent survey indices. The revised ACL was calculated using the median catch/biomass exploitation ratios and the most recent three year moving average of the relevant NEFSC trawl survey (Table 29). 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.[7] 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 10% uncertainty buffer. Any overage of the TAL greater than 5% will trigger an accountability measure, resulting in a reduction of the in-season possession limit trigger for the relevant fishery in the next fishing year. If the ACL is exceeded, triggering a different accountability measure, the uncertainty buffer would be increased by 1% for each 1% ACL overage in the second year following the fishing year in which the overage occurred. Recent catches have exceeded the ACT but not the ACL (Table 25). 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).

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

Table 27. ACLs from FYs 2011- 2018 and the percent of ACL achieved.

Fishing Year	ACL	Percent of ACL
2011	50,435	64%
2012	50,435	56%
2013	50,435	55.8%
2014	35,479	81.2%
2015	35,479	79.2%
2016	31,081	79%
2017	31,081	81.4%
2018	32,715	77.6%

Skates are ubiquitous in most fisheries and are caught by most gear types. A small number of trips landed the full wing possession limit, in either season 1 or season 2, indicating a directed fishery (Figure 1); 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, more recently it has fully achieved its TAL (Table 26). The implementation of FW6 late in the 2018 fishing year provided a late influx of TAL in the wing fishery but fishing had been constrained by the lower TAL in place for most of that fishing year. It is difficult to predict future fishing patterns, therefore, fishing patterns observed in recent fishing years are used as the basis for analysis. If the observed fishing pattern from FY2018 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 high levels of skate, e.g. monkfish. The bait fishery achieved the highest level of its TAL in FY 2016 (101%) 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 27).

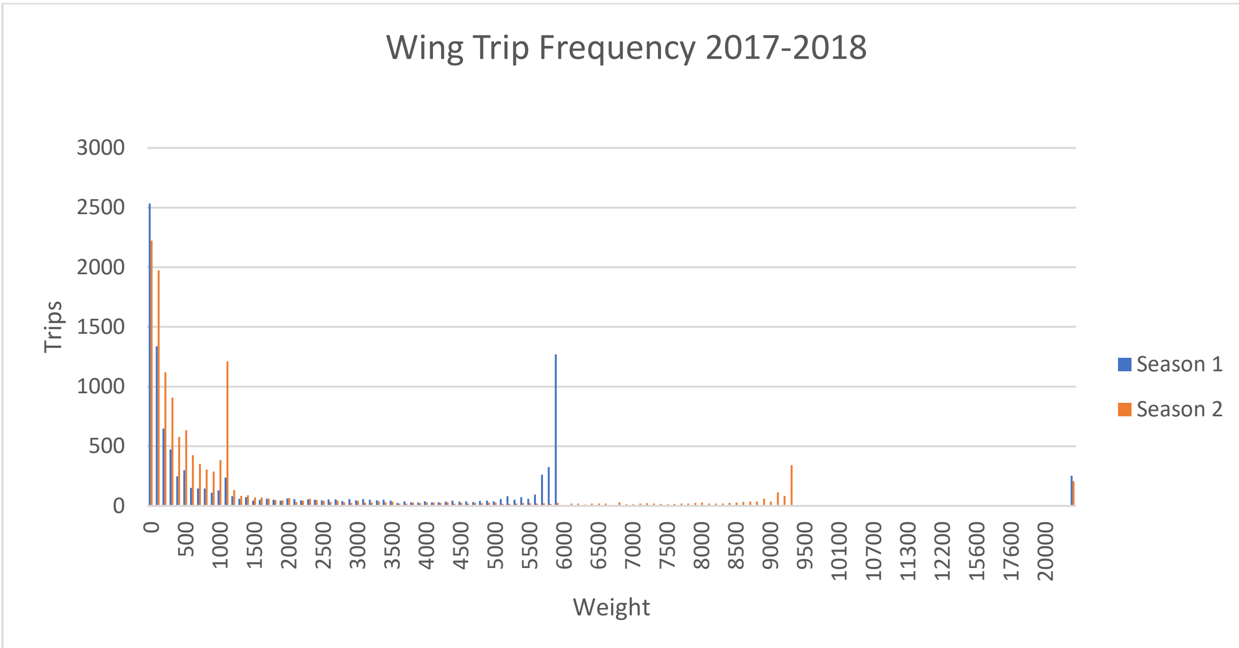

Figure 1 – Frequency of trips (Y-axis) landing wings (disposition food) by weight (X-axis) for FYs 2017 and 2018 for Season 1 (May 1 – August 31) and Season 2 (September 1 – April 30)

Table 28. Landings and percent of TAL achieved in the wing fishery between FY2010 and FY2018.

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	8,372	8,268	98.8%
2017	8,372	8,465	101.1%
2018	10,499	7,837	74.6%

Table 29. Landings and percent of TAL achieved in the bait fishery between FY2010 and FY2018.

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	4,218	4,262	101%
2017	4,218	3,978	94.3%
2018	5,289	3,356	63.5%

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 landings in the wing fishery have been variable (Table 26) and if the wing fishery doesn't land its full TAL this would have low positive impacts on the skate complex. 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 2016-2018). Total and dead skate discards increased in 2013 and 2014 (Table 29) and decreased again despite no large changes occurring in the distribution of pounds of skate landed in recent fishing years (Figure 1).

Table 30. Total and dead skate discards for calendar years 2013 – 2018.

Year	Total Discards (mt)	Dead Discards (mt)
2013	42,673	11,551
2014	42,757	12,673
2015	37,895	10,417
2016	33,270	10,435
2017	25,365	8,544
2018	22,999	7,580

A certain level of barndoor, thorny and smooth skate (in the GOM) discards is expected because landing these species is currently prohibited (although this action is proposing landing barndoor skate). It is important to note that landings and discards have not been generally reported by species and therefore must be estimated using length composition of the survey applied to the length composition of each portion of the catch. This method allows for landings of prohibited species and there is currently no way to change this. 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 as a whole, and slightly more positive impacts when compared to the No Action because effort is not expected to shift from where these species are found.

Table 31. Current and proposed 2020-2021 specifications including 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 FY2018-2019	Proposed 2020-2021 Specifications
	2014-2017 survey; 2014-2016 discards	**2016-2019 survey; 2016-2018 discards**
ACL specifications		
ABC/ACL (mt)	31,327	32,715
ACT (mt)	28,194	29,444
TAL (mt)	16,515	18,502
Assumed state landings	727	638
Federal TAL	15,788	17,742
Wing TAL	10,499	11,798
Bait TAL	5,289	5,944
C/B medians		
Barndoor	2.76	2.76
Clearnose	2.94	2.94
Little	2.14	2.14
Rosette	2.25	2.25
Smooth	2.68	2.68
Thorny	1.44	1.44
Winter	1.87	1.87
Survey biomass (mean kg/tow)	3-year moving average (2014-2016)[a]	3-year moving average (2016-2018)[b]
Barndoor	1.60	1.81
Clearnose	0.59	0.61
Little	5.49	5.32
Rosette	0.047	0.47
Smooth	0.25	0.27
Thorny	0.18	0.16
Winter	6.65	7.22
Discard rate	41%	37%

[a] Spring survey used for little skate, therefore 3-year moving average is 2015 – 2017
[b] Spring survey used for little skate, therefore 3-year moving average is 2017 - 2019

The impacts of the possession limits for barndoor skate are difficult to determine because FW 5 was implemented on September 28, 2018 and have not been in place for an entire fishing year. However, preliminary examination of barndoor skate landings from the CFDERS database indicated that overall landings of barndoor skate in calendar year 2019, to date, have been relatively low (Table 31and would equal less than 2% of the overall wing TAL.

Table 32. Calendar 2019 landings of barndoor skate (NESPP4 codes 3680 & 3681) from CFDERS2019 database

Gear type	Landed Pounds of Barndoor	Live Pounds of Barndoor	Revenue ($)	Price/lb
Longline	139	316	64	0.20
Otter Trawl	787	1,634	571	0.35
5Sink Gillnet	232,738	377,913	93,338	0.25
Other Gillnet	616	616	185	0.30
Other/mixed	40	20,749	5,701	0.27
Grand Total	243,442	401,228	99,859	0.25

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 10%. 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 2016 or 2018 fishing year as compared to Alternative 1. Overall, the specification sin Alternative 2 are based on the most updated survey information and therefore, there should be positive impacts on the skate resource from setting fishery limits with updated data.

6.2.2 Skate Wing Possession Limit Alternatives

6.2.2.1 Alternative 1 – No Action (2,600 lbs. from May 1 to Aug. 31; 4,100 lbs. from Sept. 1 to Apr. 30)

The No Action alternative would keep the current possession limits as set in Framework Adjustment 3. An analysis conducted in FW1 indicated that mortality decreased as possession limits decreased. This alternative therefore is expected to have low positive impacts on the skate complex when compared to Option 2 because this option would maintain a lower possession limit. In 2016, the wing fishery incidental possession limit was in place for approximately 6 weeks of the fishing year. The incidental trip limit, if triggered early in the season, could increase skate discards and could hinder more profitable fishing if a high level of skate is encountered that can't be landed and makes fishing difficult. Therefore, the Alternative 1 would have positive impacts when compared to Alternative 2.

The skate specifications methodology was designed to prevent overfishing of the skate complex. Provided the wing fishery does not exceed its TAL, this alternative would not be expected to negatively impact the skate complex. Approximately 75% of the wing TAL set in FW6 was achieved in FY2018, revised specifications outlined in Section 4.1.2 represent an increase of approximately 4.4% in ABC but approximately a 12% increase in the wing TAL, attributable to the reduction in projected dead discards. The implementation of FW6 late in the 2018 fishing year provided a late influx of TAL in the wing fishery but fishing had been constrained by the lower TAL in place for most of that fishing year. This complicates the comparison of fishery performance in FY2018 to other recent fishing years because behavior may have differed if the additional quota was available for the entire fishing year. Given the recent performance of the fishery, it would be reasonable to expect the wing fishery to achieve the TAL with status quo possession limits. Based on analysis from FW6, the status quo TAL and possession limits would have a low likelihood of the incidental possession limit being implemented. Alternative 1 would be less likely to result in the implementation of the incidental trip limit before the end of the fishing year if more of the TAL is achieved compared to FY2018, when compared to Alternative 2. This would not be expected to increase regulatory discards resulting from implementation of an incidental possession limit and would result in low positive impacts to the skate resource. The lower possession limits would limit the risk of exceeding the ACL. Any overages of the risk-averse ACT will be absorbed by the 10% uncertainty buffer. Any overages of the ACL will trigger accountability measures. Thus, overall, it is highly unlikely that skate catches will exceed the ACL. It is not possible to predict future fishing behavior, which results in a potential range of biological impacts. If a lower amount of the wing TAL was achieved as in some recent fishing years (Table 26), Alternative 1 would have low positive impacts. However, if a higher amount of the wing TAL was achieved as in FY2017, this alternative would have low negative impacts on the complex if regulatory discards were increased from an incidental possession limit being implemented.

6.2.2.2 Alternative 2 – 3,000 lbs. from May 1 to Aug. 31; 5,000 lbs. from Sept. 1 to Apr. 30

Alternative 2 would increase the seasonal skate wing possession limits to 3,000 lb from May 1 to August 31 and to 5,000 lb from September 1 to April 30. The status quo possession limits serve as a constraint to the directed fishery as shown by the number of trips achieving the seasonal possession limits (Figure 1). The wing fishery only achieved 74.6% of its TAL in FY2018 but achieved 101.1% in FY2017 (Table 26). The implementation of FW6 late in the 2018 fishing year provided a late influx of TAL in the wing fishery but fishing had been constrained by the lower TAL in place for most of that fishing year. The observed fishing pattern from FY2018 may not be fully representative of the fishery as they might have fished at a higher level throughout the fishing year and achieved a higher percentage of the TAL. Any increase in possession limits increases the risk of the incidental possession limit being implemented during the fishing year. Based on FY2018 effort, the trigger (when 85% of the wing TAL was achieved) would be expected to be reached in early April or not at all (Table 35). If the fishery was not projected to exceed its TAL then the incidental possession limit would not be implemented, which could increase regulatory discards. The higher possession limits would improve the ability of the fishery to achieve its TAL while also decreasing regulatory discards, which would have low positive biological impacts.

6.2.3 Skate Bait Possession Limit Alternatives

6.2.3.1 Alternative 1 – No Action (25,000 lbs. from May 1 to Oct. 31; 12,000 lbs. from Nov. 1 to Apr. 30)

Alternative 1 would maintain the 25,000 lb possession limit and 90% trigger in Seasons 1 and 2, the Season 3 possession limit at 12, 000 lb, with a 80% trigger, and implement a closure once 100% of the TAL was achieved. This option would also maintain the incidental possession limit at 8,000 lb in all seasons.

Because this alternative has a reduction in the possession limit, from 25,000 lb to 12,000 lb in Season 3, a small reduction in mortality would be expected. This alternative therefore is expected to have low positive impacts on the skate complex when compared to Alternative 2. However, given recent performance of the fishery, it is unlikely that this alternative would allow the fishery to achieve its TAL (Table 28).

6.2.3.2 Alternative 2 – Increase Season 3 bait possession limit to 25,000 lb

Alternative 2 would increase the season 3 bait possession limit to 25,000 lb. The bait fishery has not achieved its TAL since 2016 when the incidental possession limit was implemented (Table 28). Increasing the season 3 possession limit would allow them to more closely achieve their TAL. The incidental possession limit and reduced trigger act more as mechanisms to prolong the fishery and reduce the likelihood of a closure occurring, providing socio-economic benefits. Based on the economic analysis, it is unlikely that the bait fishery will fully achieve its TAL based on recent fishery performance (FY2018). However, if effort increased unexpectedly, resulting in the trigger being reached and the fishery projected to exceed its TAL, the incidental possession limit would reduce directed fishing effort and reducing the risk of overfishing occurring. Additionally, the skate specifications were designed to prevent overfishing of the complex. The buffer between the TAL and the ABC also helps to ensure the ABC is not reached or exceeded. The closure, by making sure the TAL was not exceeded, would provide low positive biological impacts, similar to Options 2 and 3. The resultant closure from fully achieving the TAL, implemented by this option, would provide positive biological impacts.

The majority of trips that occur do not max out the bait possession limits, as no large peaks are observed at the seasonal possession limits (Figure 2).

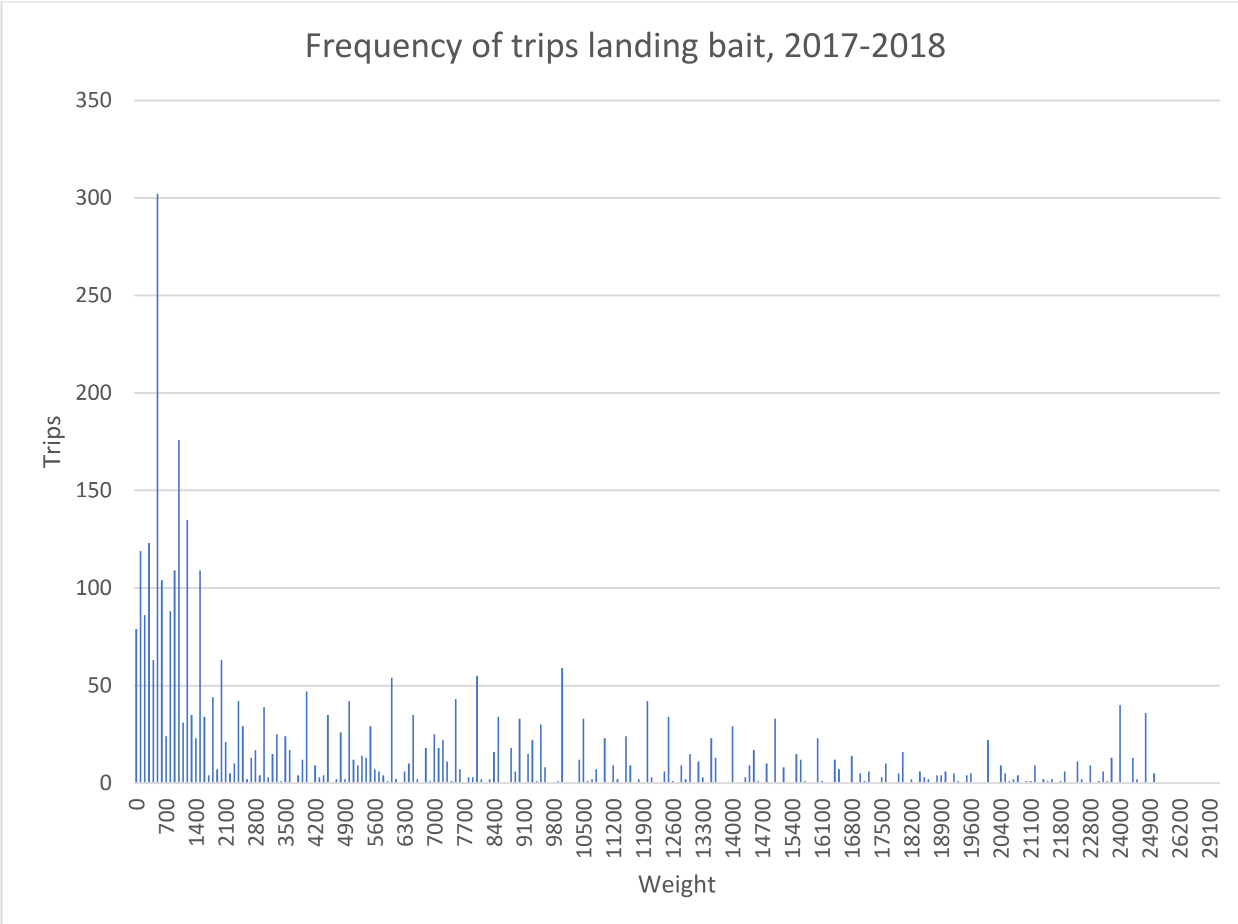

Figure 2 - Frequency of trips (Y-axis) landing bait (disposition bait) by weight (X-axis) for FYs 2017 and 2018

All the measures contained in this option would continue to work together to keep bait skate landings below the TAL, which would have a positive biological impact. Overall, this alternative would have neutral to low positive impacts on the complex because it would prevent the TAL, and therefore the ABC, from being exceeded. Alternative 2 would have similar neutral to low positive impacts compared Alternative 1.

6.3 Impacts on Non-target Species (Bycatch)

6.3.1 Specifications

The skate wing fishery is largely an incidental fishery prosecuted during fishing under other FMPs as described in Section 5.0. 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, refer to the discussion of cumulative effects (Section 6.7). On the small portion of trips where skates are directly targeted, common non-target species include monkfish and spiny dogfish. The increase in the TALs resulting from revised specifications would not be expected to significantly increase catch of non-target species. These alternatives would have a low negative impact on non-target species because they would increase the TAL and therefore potential interactions with other species.

Vessels that target skates in lieu of other fish while on a DAS are likely to catch and possibly discard low amounts of other species. Because these discards are controlled by measures in other fisheries, the impacts to non-skate species from the uncertainty buffer alternatives are negligible above those already analyzed for actions in the other FMPs. The increase in the TAL may allow the skate fisheries to be prosecuted throughout the entire fishing year and therefore would minimize the likelihood of effort shifting from skates to another target species if the incidental possession limit was put into effect, making a trip unprofitable.

Alternative 1 would have low positive impacts on non-target species, because it would not increase fishing opportunities for skates above those analyzed in Framework 6 (NEFMC, 2019). Alternative 2would result in low negative biological impacts on non-target species, because they could allow for more skates to be harvested and therefore create more fishing opportunities.

6.3.2 Skate 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. If fishing effort is similar to FY2018, the higher trip limits would not be likely to trigger the incidental trip limit. However, if the incidental trip limit was implemented it 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.

The Skate FMP requires that all vessels landing whole skates in quantities approaching 25,000 lb (or 12,000 lb in season 3) a Letter of Authorization is required. Analysis of the frequency of trips landing bait by weight for fishing effort in FYs 2017 and 2018 indicated a wide range of landings occurring (Figure 2). The bait fishery is a directed fishery that fishes more on an order by order basis. Because the of the directed nature of this fishery, the bait possession limit alternatives are expected to have negligible impacts to non-skate species above those already analyzed for actions in the other FMPs.

6.4 IMPACTS ON PROTECTED SPECIES

6.4.1 Specifications

6.4.1.1 Alternative 1 – No Action (ACL=ABC of 31,327 mt, ACT of 28,194 mt, TAL of 15,788 mt, Wing TAL=10,499 mt, Bait TAL=5,289 mt)

The No Action alternative would maintain the ACL limits as those revised in Framework 6 (NEFMC, 2018). As a result, fishing behavior would remain like current operating conditions (e.g., no spatial or temporal shifts in effort; no changes in gear type, quantity, or relative soak/tow time). The skate fisheries can fish year-round for skate wings and bait, restrictions on fishing throughout the fishing year result from either fishery being projected to exceed its seasonal or annual TAL resulting in the incidental possession limit being implemented. It is difficult to predict when an incidental possession limit will be implemented and its effect on fishing behavior, but previous implementation periods have been for relatively short time periods, e.g. 6 weeks in FY2016. Once the incidental possession limit was removed, normal fishing behavior resumed, therefore no expected changes in effort relative to current operating conditions would be expected, as was seen in FY2016 when fishing resumed after the effective closure at a pace that achieved both TALs. Once 100% of the bait annual TAL is achieved, the bait fishery is closed. The wing fishery remains open once 100% of the wing TAL is achieved, but may only land the incidental amount of 500 lb.

Significant changes in effort (e.g., gear quantity, soak/tow time, area fished), even if a closure occurs, are not expected under Alternative 1. As a result, fishing behavior is expected to remain similar to current operating conditions. Understanding expected fishing behavior/effort in a fishery informs potential interaction risks with protected species. Specifically, interaction risks with protected species are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., soak or tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. Taking into consideration the latter, as well as fishing behavior/effort under the No Action (Alternative 1), impacts of the No Action to protected species are provided below:

MMPA (Non-ESA listed) Protected Species Impacts

Impacts of the No Action on non-ESA listed marine mammals (i.e., species of cetaceans and pinnipeds) are somewhat uncertain as a quantitative analysis has not been performed. However, we have considered, to the best of our ability, the most recent (2012-2016) information on non-ESA listed marine mammal interactions with commercial fisheries, of which, the skate fishery is a component (Hayes et al. 2019). Aside from several stocks of bottlenose dolphin, there has been no indication that takes of non-ESA listed species of marine mammals in commercial fisheries has gone above and beyond levels which would result in the inability of each species population to sustain itself (Hayes et al. 2019). Specifically, aside from several stocks of bottlenose dolphin, the potential biological removal (PBR) level has not been exceeded for any of the non-ESA listed marine mammal species identified in section 6.4 (Hayes et al. 2019). Although several stocks of bottlenose dolphin have experienced levels of take that have resulted in the exceedance of each species PBR level, take reduction strategies and/or plans have been implemented to reduce bycatch in the fisheries affecting these species (Atlantic Trawl Gear Take Reduction Strategy, Bottlenose Dolphin Take Reduction Plan (BDTRP), effective April 26, 2006 (71 FR 24776)). These efforts are still in place and are continuing help decrease bycatch levels for these species. Although the most recent five years of information presented in Hayes et al. (2019) is a collective representation of commercial fisheries interactions with non-ESA listed species of marine mammals, and does not address the effects of the skate fishery specifically, the information does demonstrate that thus far, operation of the skate fishery, or any other fishery, has not resulted in a collective level of take that threatens the continued existence of non-ESA listed marine mammal populations.

Based on the above information, and the fact that the skate fishery must comply with specific take reduction plans (i.e., ALWTRP; HPTRP, BDTRP); 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 Strategy), but occasional fishery interactions still occur, the No Action is expected to have low negative impacts on non-ESA listed species of marine mammal.

ESA Listed Species

The skate fishery is prosecuted with sink gillnet and bottom trawl gear. As provided in Section 5.4, based on observed and/or documented gear interactions with listed species, gillnet gear poses an interaction risk to ESA listed species of whales, sea turtles, Atlantic sturgeon, and Atlantic salmon, while trawl gear poses an interaction risk to sea turtles, Atlantic sturgeon, and Atlantic salmon . Based on this, the skate fishery is likely to result in negligible to some level of negative impacts to ESA listed species. Taking into consideration fishing behavior/effort under the No Action alternative, as well as the fact that interaction risks with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species (with vulnerability of an interaction increasing with increases in of any or all of these factors), we determined the level of negative impacts to ESA listed species to be low. Below, we provide support for this determination.

As provided above, the No Action alternative will maintain the existing specifications including the total allowable landings for both fisheries. As a result, fishing behavior and effort in the skate fishery is expected to remain like what has been observed in the fishery over the last 7 or more years. Specifically, the number of bottom trawls or sink gillnets, tow or soak times, and area fished are not expected change significantly from current operating conditions. As noted above, interactions risk with protected species are strongly associated with the amount of gear in the water, gear soak or tow time, as well as the area of overlap, either in space or time, of the gear and a protected species. Continuation of "status quo" fishing behavior/effort is not expected to change any of these operating conditions and therefore, the impacts of the No Action alternative on ESA listed species is expected to be low negative. However, as provided above, should incidental possession limits be implemented for either fishery, as they have in the past under similar operating conditions as the No Action, some benefit to listed species may be experienced. As any resultant implementation in the fishery will result in reduced fishing in the wing fishery, we can conclude that there will be some reduction in the amount of gear being present in the water for a specific period of time. Once 100% of the bait annual TAL is achieved, the bait fishery is closed. Based on this information, any implementation of the incidental possession has the potential to reduce interaction risks with listed species, thereby providing some benefit to listed species. However, the magnitude of this reduction in interactions is dependent on the period of time the incidental possession limit is in place.

Based on the above information, and the fact that the skate fishery must comply with specific take reduction plans affecting listed species (i.e., ALWTRP) the No Action is expected to have negligible to low negative impacts on ESA listed species, with negligible impacts reflecting the fact that there have never been documented/observed interactions with bottom trawl gear and ESA listed species of large whales.

Overall Impacts to Protected Species

Based on the above protected species (ESA listed and/or MMPA protected species) impact analysis, overall impacts of Alternative 1 on protected species are expected to be negligible to low negative. Relative to Alternative 2, Alternative 1 is expected to have negligible impacts to protected species as effort, and therefore interaction risks, are not expected to differ greatly between either Alternative; see Alternative 2 for additional information supporting this rationale.

6.4.1.2 Alternative 2 – Revised Annual Catch Limit Specifications (ACL=ABC of 32,715 mt, ACT of 29,444 mt, TAL of 17,846 mt, Wing TAL=11,879 mt, Bait TAL=5,984 mt)

Alternative 2 would revise the ACL for the skate complex; specifically, annual catch limit specifications will be slightly increased from the 2018-2019 fishing years. The increase in the ACL may result in more directed fishing effort; however, this is unlikely for the following reasons. 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. Since the possession of skates mostly requires vessels to be fishing on a NE Multispecies, Scallop, or Monkfish DAS, fishing effort on skates is 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. Given this information, the small increase in TAL is 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 differ than those under Alternative 1 (Section 6.4.1.1). The small increase in total allowable landings may allow for discards to be converted to landings, while potentially not increasing overall effort. 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. Given this and the information provided above, Alternative 2 is expected to have similar impacts to protected species as Alternative 1 (i.e., negligible to low negative impacts). Relative to Alternative 1, Alternative 2 is expected have negligible impacts on protected species as effort, and therefore interaction risks, are not expected to differ greatly between either Alternative.

6.4.2 Skate Wing Possession Limit Alternatives

6.4.2.1 Alternative 1 – No Action (2,600 lbs. from May 1 to Aug. 31; 4,100 lbs. from Sept. 1 to Apr. 30)

The No Action alternative would maintain the seasonal wing possession limits as established in FW1. 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 6.4.1.1 (i.e., low negative to neutral).

6.4.2.2 Alternative 2 – Increase Possession Limit (3,000 lbs. from May 1 to Aug. 31; 5,000 lbs. from Sept. 1 to Apr. 30)

Alternative 2 increases the possession limit from 2,600 lbs. to 3,000 lbs. during season 1 (May 1st to August 31st) and increases the possession limit from 4,100 lbs. to 5,000 lbs. during season 2 (September 1st to April 30th). The increase in possession limits is expected to result in a small increase in gear in the water from an expected increase in fishing effort. As provided above, interaction risks with protected species are strongly associated with the amount of gear in the water, the time the gear is in the water (e.g., soak or tow time), and the presence of listed species in the same area and time as the gear, with risk of an interaction increasing with increases in of any of these factors. As Alternative 2 may result in an increase in gear (quantity or soak/time time?) and because both gillnet and bottom trawl are used to target skate wings, impacts to protected species are expected to be negligible to low negative, with negligible reflecting the fact that listed large whales haven't been observed or documented in trawl gear. Relative to Alternative 1, Alternative 2 is expected to result in negative impacts to protected species.

6.4.3 Skate Bait Possession Limit Alternatives

6.4.3.1 Alternative 1 – No Action (25,000 lbs. from May 1 to Oct. 31; 12,000 lbs. from Nov. 1 to Apr. 30)

Alternative 1 would maintain the provision of a Letter of Authorization with a 25,000 lb possession limit and 90% trigger in Seasons 1 and 2, the Season 3 possession limit of 12, 000 lb and the 80% trigger in Season 3, close the bait fishery once 100% of the TAL was achieved. This option would also maintain the incidental possession limit at 8,000 lb in all seasons. The fishery is allowed to fish year-round for bait skate, restrictions on fishing throughout the fishing year result from the fishery being projected to exceed its seasonal or annual TAL resulting in the incidental possession limit being implemented. As a result, fishing effort and 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). Based on this information, impacts on protected species (ESA listed and MMPA species) are expected to be similar to those described in Section 6.4.1.1 (i.e., low negative to neutral).

6.4.3.2 Alternative 2 – Increase Season 3 Bait Possession Limit to 25,000 lb

Alternative 2 would increase the season 3 possession limit to 25,000 lb while fishing under a Letter of Authorization. It would also not change any of the triggers or incidental possession limits outlined in Alternative 1.

The fishery is allowed to fish year-round for bait skate, restrictions on fishing throughout the fishing year result from the fishery being projected to exceed its seasonal or annual TAL resulting in the incidental possession limit being implemented or the backstop being implemented. Further, since the possession of skates mostly requires vessels to be fishing on a NE Multispecies, and a Scallop or Monkfish DAS, fishing effort on skates are largely constrained by other FMPs. As a result, fishing effort would not only be restricted by the specifications, but also by the above nature of the fishery and the associated AMs that account for any overage of ACLs. However, as only a small number of trips land the full bait trip limit in a fishing year, the likelihood that any changes in possession limit, as proposed by Alternative 2, would result in changes in fishing behavior that differ from status quo conditions is unlikely.

Based on this information, impacts to protected species are not expected to be significantly greater than those under status quo conditions. Specifically, fishing effort is likely to remain similar to status quo conditions as there is no incentive to significantly increase fishing effort or shift where effort is occurring. However, the increase in possession limits may equate to less fishing time or fewer trips, and therefore, gear being present in the water for a shorter 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 decrease in either of these factors will reduce the potential for protected species interactions with gear and therefore, reduce the potential for serious injury or mortality to these species. Given this information and given that both gillnet and bottom trawl are used to land bait, impacts of Alternative 2 are expected to be negligible to low negative, with negligible reflecting the fact that listed large whales haven't been observed or documented in trawl gear. Relative to Alternative 1, Alternative 2, given the potential for a reduction in fishing time or fewer trips, is expected to result in negligible to low positive impacts to protected species.

6.5 Impacts on Physical Environment and Essential Fish Habitat

6.5.1 Specifications

6.5.1.1 Alternative 1 – No Action (ACL=ABC of 31,327 mt, ACT of 28,194 mt, TAL of 15,788 mt, Wing TAL=10,499 mt, Bait TAL=5,289 mt)

Alternative 1 would maintain current specification levels from FYs 2018 and 2019 for FYs 2020 and 2021.

- The aggregate skate ABC/ACL would stay at 31,327 mt.
- The ACT would stay at 28,194 mt.
- The Federal TAL would stay at 15,788 mt.

The TAL is allocated amongst the bait and wing fisheries. Each fishery has its own possession limit. By regulation, the wing fishery cannot land thorny skates since they are prohibited from possession and still in a rebuilding plan. Winter skates constitute the bulk of the catch in the wing fishery. The bait fishery is also prohibited from possessing or landing thorny and smooth skates, and generally prefers to take smaller animals, i.e. little skates and juvenile winter skates. The wing fishery fully achieved its TAL in FY2017 (Table 27). In FYs 2015 and 2016, the bait fishery fully achieved its TAL (Table 28). 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[8]). 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

[8] 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 at: www.nefmc.org/library/omnibus-habitat-amendment-2.

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, NEFMC 2019). 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, with a small directed component, measures that affect fishing effort in fisheries such as NE multispecies and monkfish may influence EFH impacts that should not be attributed entirely to the skate fishery. Measures approved in the Omnibus Habitat Amendment 2 will continue to minimize adverse impacts of trawl gear in all NEFMC fisheries.

Alternative 1 would produce minor negative impacts to the EFH resource because no significant change in fishing effort or interactions with EFH would be expected. Alternative 1 may have similar low negative impacts on EFH compared to Alternative 2 as catch limits are lower under Alternative 1. Given that the wing and bait TALs have been achieved during some recent years, it is reasonable to expect that the magnitude of fishing effort may change slightly in response to TAL changes, such that there could be slight differences in effort under Alternative 1 as compared to Alternative 2 (see next section for further discussion).

6.5.1.2 Alternative 2 – Revised Annual Catch Limit Specifications (ACL=ABC of 32,715 mt, ACT of 29,444 mt, TAL of 17,864 mt, Wing TAL=11,879 mt, Bait TAL=5,984 mt)

Alternative 2 would adjust skate specifications for fishing years 2020-2021 as follows:

- The aggregate skate ABC/ACL would increase from 31,327 to 32,715 mt.
- The ACT would likewise increase from 28,194 to 29,444 mt.
- The Federal TAL would increase from 15,788 to 17,864 mt. (11,879 mt wing, 5,984 mt bait)

The revised specifications would increase the TALs by a relatively small amount compared to the TAL established in Framework 6 (NEFMC 2019). The increase in TAL would not be considered large enough to incentivize increased fishing effort on skate in the wing or bait fisheries. Thus, under Alternative 2, catch and effort in the wing and bait fisheries are expected to remain at a similar level to recently observed landings, perhaps slightly higher. The implementation of FW6 late in the 2018 fishing year provided a late influx of TAL in the wing fishery but fishing had been constrained by the lower TAL in place for most of that fishing year. This complicates the comparison of fishery performance in FY2018 to other recent fishing years because behavior may have differed if the additional quota was available for the entire fishing year. Given the recent performance of the fishery, it would be reasonable to expect the wing fishery to achieve the TAL with status quo possession limits. Based on analysis from FW6, the status quo TAL and possession limits would have a low likelihood of the incidental possession limit being implemented.

Impacts on EFH would be low negative for Alternative 2 because interactions with EFH would not be reduced relative to Alternative 1/No Action. Because of the slight increase in specifications relative to Alternative 1, overall effort and interactions with EFH would not be expected to significantly increase under Alternative 2. Therefore, the impacts on EFH from Alternative 2 are similar to the impacts associated with Alternative 1. Measures approved in the Omnibus Habitat Amendment 2 will continue to minimize adverse impacts of trawl gear in all NEFMC fisheries.

6.5.2 Skate Wing Possession Limit Alternatives

6.5.2.1 Alternative 1 – No Action (2,600 lbs. from May 1 to Aug. 31; 4,100 lbs. from Sept. 1 to Apr. 30)

Alternative 1 would maintain the FW1 skate wing possession limits of 2,600 lbs. from May 1 to Aug. 31 and 4,100 lbs. from Sep. 1 to Apr. 30, or until the 85% TAL trigger has been met and it appears that without adjustment the fishery may potentially exceed the annual TAL. Reaching the 85% trigger may lead to an incidental limit of 500 lbs., if such a limit is deemed necessary by the Regional Administrator to prevent overage of the TAL. This alternative does not alter the 85% trigger. The analysis of the revised uncertainty buffer in Framework 6 concluded that it was unlikely that the wing fishery would trigger its incidental possession limits under the revised TAL with status quo possession limits. In FY2018 the wing fishery achieved approximately 75% of its TAL.

Effort and therefore impacts are capped by the overall TAL and effort controls, and total impact on EFH is controlled by fishing effort in the multispecies and monkfish fisheries, where the vast majority of skate landings are derived. Given the recent performance of the fishery and the gear types used to execute the fishery, under Alternative 1 the wing fishery would be expected to have low negative impacts on EFH.

6.5.2.2 Alternative 2 – Increase Possession Limit (3,000 lbs. from May 1 to Aug. 31; 5,000 lbs. from Sept. 1 to Apr. 30)

Alternative 2 would increase the possession limits from 2,600 lbs. to 3,000 lbs. during season 1 (May 1st to August 31st) and from 4,100 lbs. to 5,000 lbs. during season 2 (September 1st to April 30th). Under Alternative 2, fishing effort is not expected to increase significantly, thus, the amount of fishing gear in the water is not expected to increase meaningfully. With these proposed increases in possession limits during both seasons, the wing fishery is expected to have a low negative impact on the physical environment and essential fish habitat. The impact of increased possession limits on essential fish habitat is not expected to differ significantly from Alternative 1 because effort would not be expected to drastically increase.

6.5.3 Skate Bait Possession Limit Alternatives

6.5.3.1 Alternative 1 – No Action (25,000 lbs. from May 1 to Oct. 31; 12,000 lbs. from Nov. 1 to Apr. 30)

The No Action alternative would maintain the skate bait possession limit at 25,000 lbs. during seasons 1 and 2 and 12,000 lbs. during season 3 with a Skate Bait Letter of Authorization, as set in FW4. The lower possession limit could lead to a reduction in the usage of trawl gear, which is used to catch skate bait, in season 3. This would reduce interactions with habitat during season 3. However, if orders for skate bait are high, this could result in an increased number of trips to achieve the TAL. The bait fishery has not achieved its TAL since bait possession limits were last established in Framework 4 (NEFMC 2017). Impacts on EFH from the bait fishery would be expected to be low negative as trawl gear is a mobile bottom tending gear and overall fishing effort would not be expected to significantly change from recent fishing years. Alternative 1 would have low negative impacts on EFH but this would not be significantly different to those for Alternative 2 as fishing effort would not be expected to drastically change between alternatives.

6.5.3.2 Alternative 2 – Increase Season 3 Bait Possession Limit to 25,000 lb

This alternative would increase the skate bait possession limit from 12,000 lbs. to 25,000 lbs in season 3. The higher bait limit could increase efficiency in the bait fishery, which may result in fewer overall trips being taken during season 3. However, it is difficult to predict this as the bait fishery doesn't appear to be too constrained by the existing seasonal possession limits (Figure 2). Because trawl gear is used to catch skate bait, under Alternative 2 the bait fishery is expected to have low negative impacts on EFH. These impacts would not be expected to differ significantly from Alternative 1 because effort would not be expected to drastically increase.

6.6 IMPACTS ON HUMAN COMMUNITIES

When examining potential economic and social impacts of management measures, it is important to consider impacts on the following: the fishing fleet (vessels grouped by fishery, primary gear type, and/or size); vessel owners and employees (captains and crew); skate dealers and processors; final users of skate; community cooperatives; fishing industry associations; cultural components of the community; and fishing families. While some management measures may have a short-term negative impact on some communities, this should be weighed against potential long-term benefits to all communities which can be derived from a sustainable skate fishery.

Economic impacts. In general, the economic effects of regulations can be categorized into regulations that change costs (including transactions costs such as search, information, bargaining, and enforcement costs) or revenues (by changing market prices or by changing the quantities supplied). These economic effects may be felt by the directly regulated entities. They may also be felt by related industries. For the skate fishery, this would include participants in the lobster fishery and purchasers of skate for food.

Social impacts. The social impact factors outlined below help describe the skate fishery, its sociocultural and community context and its participants. These factors or variables are considered relative to the management alternatives and used as a basis for comparison between alternatives. Use of these kinds of factors in social impact assessment is based on NMFS guidance (NMFS 2007) and other texts (e.g., Burdge 1998). Longitudinal data describing these social factors region-wide and in comparable terms is limited. While this analysis does not quantify the impacts of the management alternatives relative to the social impact factors, qualitative discussion of the potential changes to the factors characterizes the likely direction and magnitude of the impacts. The factors fit into five categories:

1. *Size and Demographic Characteristics* of the fishery-related workforce residing in the area; these determine demographic, income, and employment effects in relation to the workforce as a whole, by community and region.

2. The *Attitudes, Beliefs, and Values* of fishermen, fishery-related workers, other stakeholders and their communities; these are central to understanding the behavior of fishermen on the fishing grounds and in their communities.

3. The effects of the proposed action on *Social Structure and Organization*; that is, changes in the fishery's ability to provide necessary social support and services to families and communities.

4. The *Non-Economic Social Aspects* of the proposed action; these include lifestyle, health, and safety issues, and the non-consumptive and recreational uses of living marine resources and their habitats.

5. The *Historical Dependence on and Participation* in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution, and rights (NMFS 2007).

General impacts of skate fishery specifications on human communities

Human communities are impacted by skate fishery specifications as they set harvest levels for the fishery. Lowering the skate ABC (and associated catch limits) could result in short-term revenue reductions, which may, in turn, have negative impacts on employment and the size of the skate fishery within fishing communities, with ripple effects on the communities involved in the fisheries that use skate for bait (e.g., lobster). Likewise, increasing allowable harvests would likely have positive short-term impacts on fishing communities. In the long term, ensuring continued, sustainable harvest of the resource benefits all fisheries.

The specific communities that may be impacted by this action are identified in Section 6.5. This includes three primary ports (e.g., Chatham, New Bedford, Point Judith; Table 25) and 11 secondary ports for the skate fishery. The communities more involved in the skate fishery are likely to experience more direct impacts of this action, though indirect impacts may be experienced across all the key communities. As these specifications largely affect stock-wide harvest levels, impacts would likely occur across the communities that participate in the skate fishery, proportional to their degree of participation.

6.6.1 Specifications

6.6.1.1 Alternative 1 – No Action (ACL=ABC of 31,327 mt, ACT of 28,194 mt, TAL of 15,788 mt, Wing TAL=10,499 mt, Bait TAL=5,289 mt)

Under No Action, the TAL specified for 2018 and 2019 (15,788 mt; via Framework 6) would remain unchanged for 2020 and 2021. An in-season adjustment to possession limits, subject to the discretion of the Regional Administrator, is triggered when:

1. Catch of skate wings reaches 85% of the seasonal or annual wing TAL (mt), or
2. Catch of skate bait reaches 90% (mt) in seasons 1 and 2 or 80% in season 3.

The economic impacts of Alternative 1 are likely negative, because the fishery could not land the higher TAL that the updated survey indices indicate is allowable (Alternative 2). Continuing the current specifications, as set in Framework 6, would likely have negative economic impacts in the short term. The status quo ACL would continue a risk of closing the directed skate fishery before the end of the fishing year. During both FY 2016 and 2017, the wing fishery was impacted by the 500 lb. incidental possession limit, resulting in a *de facto* closure in Season 2 and a subsequent increase in the incidental possession limit to restart that fishery. The bait fishery also had a *de facto* closure in FY 2016 when the incidental possession limit was in place for about the last three months of the fishing year. Incidental possession limits, in either fishery, were not triggered in 2018 or 2019 (to date).

Total skate revenue in FY 2017 and 2018 was $6.4M and $7.4M, respectively (Table 20, p. 55). If the price of skate wings remains within the recent range (about $0.53/lb), the total revenue from skate wings under Alternative 1 would likely experience little change. Alternative 1 is expected to have overall negative economic impacts, because the TAL would be set too low, forgoing potential economic gains within a sustainable TAL.

Alternative 1 is expected to have positive long-term stock benefits, with future increases in biomass and potential catch (Section 6.2). If this leads to less restrictive regulations, and if optimum yield is realized, there may be low positive economic impacts in the long term.

The social impacts of Alternative 1 are likely negative because, given the SSC determination that the resource can sustain an increase in the ABC, Alternative 1 might cause distrust in management among the industry. The industry could not realize the benefits of additional yield that is supported by the best available science. If fishermen perceive that managers are not making use of the best available science in a timely manner, their attitudes, beliefs, and values towards management could be negatively impacted. Reduced income for fishermen, due to continuing the potential to exceed TALs and trigger AMs, may translate into negative social impacts in the short term on the size and demographic characteristics of the fishery-related workforce. There may be reduced business opportunities for shoreside service providers, impacting employment in the wider fishing community. Additionally, declines in fishing earnings may decrease job satisfaction among fishermen (e.g., Pollnac & Poggie 2008; Pollnac et al. 2014), which may reduce the well-being of fishermen, their families, and their communities (e.g., Pollnac et al. 2014; Smith & Clay 2010). Alternative 1 would constrain operations and limit income potential, which would contribute to these feelings of frustration. However, if Alternative 1 ultimately facilitates the long-term sustainability of the resource, there could be low positive social impacts in the long term on the historical dependence on and participation in the skate fishery.

Alternative 1 is expected to have more negative economic and social impacts than Alternative 2 in the short and long term. Alternative 1 has a higher possibility of allowing landings to exceed the TAL relative to Alternative 2, so triggering the AM is more likely under Alternative 1. Additionally, the best scientific information indicates that the higher TAL under Alternative 2 is sustainable, so Alternative 1 would keep lower TALs that would not allow optimum yield to be achieved. Alternative 1 may result in foregone yield and may cause more negative attitudes, beliefs, and values towards management.

6.6.1.2 Alternative 2 – Revised Annual Catch Limit Specifications (ACL=ABC of 32,715 mt, ACT of 29,444 mt, TAL of 17,864 mt, Wing TAL=11,879 mt, Bait TAL=5,984 mt)

Under Alternative 2, the federal TAL would increase from 15,788 mt to 17,864 mt. As with Alternative 1, an in-season adjustment to possession limits, subject to the discretion of the Regional Administrator, is triggered when:

1. Catch of skate wings reaches 85% of the seasonal or annual wing TAL (mt), or
2. Catch of skate bait reaches 90% (mt) in seasons 1 and 2 and 80% in season 3.

The economic impacts of Alternative 2 are likely low positive in the short term relative to Alternative 1, because the TAL would be higher than under Alternative 1. The federal TAL (17,864 mt) would still be above the FY2017 and FY2018 total catch of wing and bait by federal vessels, 12,443 mt and 11,193 mt, respectively (Table 14, Table 15). With the higher TAL, Alternative 2 has less probability of triggering AMs, if fishing behavior does not change. However, the impact of Alternative 2 would depend on future fishing behavior, which is difficult to predict. If fishing effort does not increase, Alternative 2 is likely to have low positive long-term economic impacts, because landings would likely be like recent fishing years. If the incidental possession limit is triggered midyear, Alternative 2 could have low negative short-term impacts, because this would reduce revenue per trip or constrain fishing for other more economically valuable species. 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 be affected by reduced trip possession limits, and the lower probability of triggering AMs under Alternative 2 compared to the status quo.

To help determine potential economic impacts, the impact of Alternative 2 on the FY 2018 fishery was simulated. Increasing the TAL does not result in a gain in landings and revenues because, faced with the same possession limits, the fleet is expected to land the same amounts as before. With new, higher possession limits as described below, however, there would be increased landings and revenues (Table 31). Under 2018 conditions in the wing fishery, there would be a medium revenue gain of 4.65%, and only 86.5% of the new TAL would be achieved because the TAL is 13.1% higher than FY2018. Again under 2018 conditions, the bait fishery would have a revenue gain of 6.6%, but only 71.2% of the new TAL would be achieved.

Table 33. Landings and revenues with revised ACL specifications (FY2017-FY2018 conditions).

	Actual Landings & TAL			Alternative 2: Revised ACL & Possession Limit Specifications			
	Landings (1,000 live lbs.)	Revenue ($1,000)	TAL (1,000 lbs.)	Option 2 = new TAL (1,000 lbs.)	Landings gain (1,000 lbs.)	Revenue gain ($1,000)	% of new TAL achieved
2018 Wings	9,860	$5,655	10,197	11,537	439	$250	86.5%
2018 Bait	8,710	$1,081	11,660	13,193	689	72	71.2%
Source: SAFIS/CFDBS *Note:* includes all wing (landed wing weight) and bait landings (live weight) from federal permit-holders							

Alternative 2 would have overall positive economic impacts, although minor in the wing fishery because the incidental limit, 500 pounds, is simulated to be implemented on April 12. The loss during those 18 days negates half of the gain from the higher, seasonal possession limits. If the Regional Administrator (RA) does not close the fishery), however, then expected landings would be 10,252,607 pounds of wings, or 77.7% of the new TAL and a 3.9% revenue gain. This depends on whether 2018 conditions persist over the long term. However, either effect is more positive than Alternative 1.

The social impacts of Alternative 2 are likely low positive relative to Alternative 1. Given the SSC determination that the resource can sustain an increase in the ABC, the industry could realize the benefits of additional yield that is supported by the best available science. Alternative 2 might cause more trust in management among the industry if fishermen perceive that managers are making use of the best available science in a timely manner; their attitudes, beliefs, and values towards management will be positively impacted. There could be some negative short-term impacts from exceeding TALs and triggering AMs, but that potential is reduced relative to Alternative 1. Alternative 2 would be less likely to constrain operations and limit income potential, which may improve job satisfaction for fishermen (e.g., Pollnac & Poggie 2008; Pollnac et al. 2014), which may increase the well-being of fishermen, their families, and their communities (e.g., Pollnac et al. 2014; Smith & Clay 2010).

6.6.2 Skate Wing Possession Limit Alternatives

6.6.2.1 Alternative 1 – No Action (2,600 lbs. from May 1 to Aug. 31; 4,100 lbs. from Sept. 1 to Apr. 30)

The short-term economic impacts of Alternative 1 would not be affected beyond those analyzed in FW1, which set seasonal skate wing possession limits. The No Action alternative would maintain the skate wing possession limit at 2,600 lbs. during Season 1 and 4,100 lbs. during Season 2. For the wing fishery, 101.1% and 74.6% of the TAL was achieved in FY2017 and FY2018 (Table 14, Table 15), respectively, under status quo possession limits. In the long term, negative economic impacts would occur only if the long-term health of the stock was to decline, as would be expected if an ACL is set at an amount higher than that determined by the most recent survey data and if possession limits were set too high. On the other hand, long-term, negative economic impacts would also occur if the ACL is not achieved on a consistent basis; the fishery would not reach its optimum yield.

The social impacts of Alternative 1 are likely low positive. The wing fishery would continue to fish under the current possession limits but could not realize the benefits of additional yield that may occur under Alternative 2. Reduced income for fishermen may translate into negative social impacts in the short term on the size and demographic characteristics of the fishery-related workforce. There may be reduced business opportunities for shoreside service providers, impacting employment in the wider fishing community. Additionally, declines in fishing earnings may decrease job satisfaction among fishermen (e.g., Pollnac & Poggie 2008; Pollnac et al. 2014), which may reduce the well-being of fishermen, their families, and their communities (e.g., Pollnac et al. 2014; Smith & Clay 2010). However, the risk of triggering the in-season adjustment to possession limits would be lower than under Alternative 2.

Alternative 2 – Increase Season 1 (to 3,000 lbs) and 2 (to 5,000 lbs) Wing Possession Limits

Alternative 2 would increase the seasonal skate wing possession limits to 3,000 lb from May 1 to August 31 and to 5,000 lb from September 1 to April 30.

To help determine potential economic impacts, the impact of Alternative 2 on the FY 2018 fishery was simulated. There are instances in the landings data in which landed pounds is less than live pounds, which is unlikely to be the case. Also, there are instances where Season 1 landings exceeded the 2,600 lb possession limit. For the purpose of this simulation, the following adjustments were made to the landings data:

1. If live weight was less than landed weight, then the live weight was used rather than the landed weight.
2. If landed weight was ≥ 2,600 lbs. and < 3,000 lbs., then landed weight was simulated to be 3,000.
3. If landed weight was >3,000, then it was not changed.

The results of this simulation are in Table 35. Under this scenario, the FY2018 landings would have increased by 438,647 lbs. and associated revenue by $250,329. The incidental possession limit (500 lbs) would not have been triggered.

Table 34. Simulation of FY2018 wing fishery under Alternative 2.

FY2018 actual	Total lbs landed	9,340,824
	Total revenue	$5,371,538
FY2018 simulated	Increase in total lbs landed	438,647
	Increase in total revenue	$250,329
	Total landings	**9,779,471**
	Total revenue	**$ 5,621,867**
Trigger	85% of wing weight TAL	9,806,441
Note: data based on CFDERS_ALL_YEARS on 9/4/2019.		

The economic impacts of Alternative 2 would likely be medium positive relative to No Action.

The social impacts of Alternative 2 would likely be low positive relative to No Action. The bait fishery would be able to fish under higher possession limits, realizing the benefits of additional yield that may occur. Increased income for fishermen may translate into positive social impacts in the short term on the size and demographic characteristics of the fishery-related workforce. There may be increased business opportunities for shoreside service providers, impacting employment in the wider fishing community. Additionally, increases in fishing earnings may increase job satisfaction among fishermen (e.g., Pollnac & Poggie 2008; Pollnac et al. 2014), which may increase the well-being of fishermen, their families, and their communities (e.g., Pollnac et al. 2014; Smith & Clay 2010). However, the risk of triggering the in-season adjustment to possession limits would be higher than under Alternative 1.

6.6.3 Skate Bait Possession Limit Alternatives

6.6.3.1 Alternative 1 – No Action (25,000 lbs. from May 1 to Oct. 31; 12,000 lbs. from Nov. 1 to Apr. 30)

The No Action alternative would maintain the skate bait possession limit at 25,000 lbs. during Seasons 1 and 2 and 12,000 lbs. during Season 3. For the bait fishery, 94% and 64% of the TAL was achieved in FY2017 and FY2018 (Table 14, Table 15), respectively, under status quo possession limits. Total federally-reported skate bait landings in FY2017 and FY2018 were 3,978 mt and 3,356 mt, respectively. While skate bait landings were lower in FY2017, this amount would not exceed the proposed TAL of 5,984 mt and the trigger amount (90% of the TAL in seasons 1 and 2; 80% in season 3).

The social impacts of Alternative 1 are likely low positive. The bait fishery would continue to fish under the current possession limits but could not realize the benefits of additional yield that may occur under Alternative 2. Reduced income for fishermen may translate into negative social impacts in the short term on the size and demographic characteristics of the fishery-related workforce. There may be reduced business opportunities for shoreside service providers, impacting employment in the wider fishing community. Additionally, declines in fishing earnings may decrease job satisfaction among fishermen (e.g., Pollnac & Poggie 2008; Pollnac et al. 2014), which may reduce the well-being of fishermen, their families, and their communities (e.g., Pollnac et al. 2014; Smith & Clay 2010). However, the risk of triggering the in-season adjustment to possession limits would be lower than under Alternative 2.

6.6.3.2 Alternative 2 – Increase Season 3 Bait Possession Limit to 25,000 lb

Alternative 2 would increase the seasonal skate bait possession limit to 25,000 lb from November 1 to April 30.

To help determine potential economic impacts, the impact of Alternative 2 on the FY 2018 fishery was simulated. The results of this simulation are in Table 36. Under this scenario, the FY2018 landings would have increased by 689,000 lbs. and revenue by $72,020. The incidental possession limit (500 lbs) would not be triggered during any season.

Table 35. Simulation of FY2018 wing fishery under Alternative 2

FY2018 actual	Total lbs landed	8,709,742
	Total revenue	$1,083,959
FY2018 simulated	Increase in total lbs landed	689,000
	Increase in total revenue	$72,020
	Total landings	**9,398,742**
	Total revenue	**$ 1,155,979**
Trigger	80% of bait (live wt.) TAL	10,554,072
Note: data based on CFDERS_ALL_YEARS on 9/4/2019.		

The economic impacts of Alternative 2 would likely be medium positive relative to No Action.

The social impacts of Alternative 2 would likely be low positive relative to No Action. The bait fishery would be able to fish under higher possession limits, realizing the benefits of additional yield that may occur. Increased income for fishermen may translate into positive social impacts in the short term on the size and demographic characteristics of the fishery-related workforce. There may be increased business opportunities for shoreside service providers, impacting employment in the wider fishing community. Additionally, increases in fishing earnings may increase job satisfaction among fishermen (e.g., Pollnac & Poggie 2008; Pollnac et al. 2014), which may increase the well-being of fishermen, their families, and their communities (e.g., Pollnac et al. 2014; Smith & Clay 2010). However, the risk of triggering the in-season adjustment to possession limits would be higher than under Alternative 1, though this did not occur in the simulation of FY2018.