Draft Amendment 22 to the Northeast Multispecies FMP (Small-mesh Multispecies) With an Environmental Impact Statement

DRAFT

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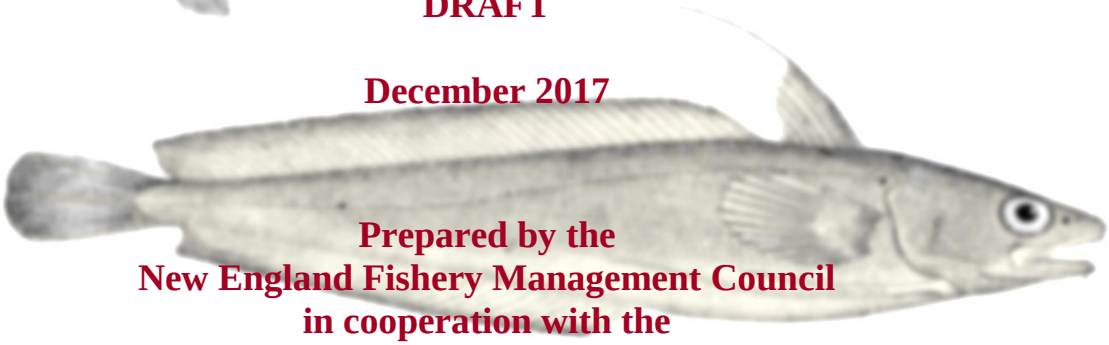

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1.0 EXECUTIVE SUMMARY (draft)

This executive summary will give an overview of the document, the alternatives, identify which are preferred alternatives and include a decision matrix. It will also provide a summary of the expected impacts.

As such, it is more appropriately written when the draft environmental impact statement is finalized and the impact analyses have been completed.

This document is currently under development and is currently incomplete, but contains a complete description of and rationale for the alternatives, an analysis of limited access qualification based on fleet history, and an analysis of direct and indirect impacts of all alternatives on target species (red, silver, and offshore hakes), non-target species (finfish bycatch), and economic and community effects. The Council could identify preferred alternatives using the results of the analyses in this document, since the effects on protected species and EFH are not likely to differ very much between the alternatives.

1.1 Document organization

This amendment to the NE Multispecies Fishery Management Plan includes alternatives to implement a small-mesh multispecies fishery limited access scheme and adjust possession limits. These alternatives and their rationale are described in Section 4.0.

In Section 4.0, there is a No Action alternative, alternatives for adjusting mesh-size dependent whiting possession limits, and three major Actions with several sub-alternatives. The No Action alternative is described in Section 4.1 and would be chosen if the Council decides not to implement a limited access program. In this case, the Council may select one of the alternatives in Section 4.2 to adjust the whiting possession limits for vessels using trawls with cod-end mesh 3.0 inches and larger. These alternatives would either raise the southern management area whiting possession limit in the winter and spring, lower it during the summer and fall, or keep it the same. Any combination of these three alternatives could be chosen.

Three actions follow in Sections 4.3.1 to 4.3.3 that would establish a small-mesh multispecies limited access fishery. Action 1 describes alternatives for qualifying vessels based on their fishing history. Action 2 establishes whiting possession limits for vessels that apply and qualify for a Category I or II permit, plus whiting and red hake possession limits for vessels that do not qualify and hold in Incidental Permit. Action 3 would establish limited access and incidental permit characteristics, defining how qualification would be applied and how the vessels may fish with the respective permits.

Action 1 (Section 4.1) describes five limited access qualification alternatives that would set landings thresholds to qualify for either a Category I (high level) or a Category II (low level) limited access permit. The alternatives also incorporate three qualification periods including 1996 to the 2012 control date that favors vessels that fished in earlier periods, 2008 to the 2012 control date which favors more recent participants that fished before the control date, 2008-2016 which uses a recent period and favors current fishery participants (including vessels that began fishing for small-mesh multispecies after the control date), and 2000-2016 that would qualify both historic and more recent participants.

Alternatives in Action 2 (Section 4.3.2) would establish whiting and red hake possession limits for vessels holding the new limited access permit categories. One set of alternatives (described in Section 4.3.2.1)

would apply to Category I qualifiers, either raising the southern management area whiting possession limit in the winter and spring, lower it during the summer and fall, or keep it the same. These alternatives could be chosen in any combination. A second set of possession limits would apply to Category II qualifiers (described in Section 4.3.2.2), either retaining the current possession limits or reducing the southern management area whiting possession limit to 15,000 lbs.

Finally, a third set of alternatives in Action 2 would apply to non-qualifying vessels holding an incidental permit (described in Section 4.3.2.3). The status quo alternative would continue the current whiting and red hake possession limits, even if a limited access program became effective. The Council could then lower the possession limit for the incidental permit, when it is needed to manage the target stocks and fishery. A second alternative would establish an incidental possession limit for whiting (2,000 lbs.) and red hake (400 lbs.).

Action 3 (Section 4.3.3) includes a variety of alternatives that would set conditions on the Category I, Category II, and Incidental permits. For Category I and II, there is a 'default' alternative with permit conditions that apply to large-mesh groundfish limited access permits, followed by several alternatives that come from other related limited access fisheries (i.e. herring or squid/mackerel/butterfish). These alternatives address issues such as upgrade restrictions and accumulation limits. Action 3 also includes several alternatives that would apply to vessels that are on a Multispecies DAS using large-mesh gears or are fishing on a herring or squid trip using small-mesh trawls. Two alternatives would exempt vessels using small-mesh trawls to target Atlantic herring, squids, Atlantic mackerel, and butterfish from the Incidental Permit whiting and red hake possession limits. An additional alternative would also exempt vessels from the Incidental Permit whiting and red hake possession limits while targeting small-mesh multispecies in certain exemption areas. These specific areas are open to small-mesh multispecies fishing using a raised footrope trawl, which is more selective and catches fewer benthic fish, such as flounders, monkfish, and skates.

Section 3.0 provides background and setting for the proposed alternatives in this document. It includes an important description of the Purpose and Need for the proposed action (Section 3.1), a brief description of the history of the fishery (Section 3.2), and a management background summary (Section 3.3) including the plan goals and objectives, overfishing definitions, current and future specifications, and management history.

Section 4.4.3 has three sections that descript the environment that would be affected by the proposed action, including the biological environment (life history and stock status of the target species, plus trends in landings and non-target bycatch by the fishery, and protected species), the physical environment (focusing on essential fish habitat (EFH) and fishery impacts on it), and human communities (including economic trends and economic impacts on fishing communities).

Section 6.0 analyzes the direct and indirect effects of the proposed action on target species (Section 6.2), non-target species (Section 6.3), protected species (Section 6.4), the physical environment and EFH (Section 6.4), and on human communities (including economic and social effects; Section 6.6). Section 6.1 describes how limited access qualification was evaluated and analyzed in the analysis of impacts that follow in Section 6.0. Most of the analytical work to date has been focused on the biological impacts to target and non-target species, as well as economic effects on the fishery and communities. Additional work is needed on the impacts on protected resources and EFH, which will be completed before the Council approves the draft amendment for public hearing.

Section 6.7 includes an analysis of the probable cumulative effects of past, present, and reasonably foreseeable future actions (this section will be developed for the final amendment). Section **Error! Reference source not found.** will be written for the final amendment and will describe how the

amendment complies with applicable laws and executive orders. A glossary, references cited, and an index to the document is included in Sections 7.0 to **Error! Reference source not found.**, respectively. Section 2.5 includes a list of acronyms that are frequently used in this document. Section 11.0 is an appendix that summarizes our analysis of bycatch in the small-mesh multispecies fishery, on trips using small-mesh trawls and landing more than 2000 lbs. of whiting or 400 lbs. of red hake.

1.2 Decision matrix

In addition to No Action, Draft Amendment 22 offers alternatives to 1) adjust whiting possession limits and 2) implement a limited access program for the small-mesh multispecies fishery. If No Action (Section 4.1) is chosen, the Council may choose one of the alternatives (Section 4.2) to adjust the whiting possession limits. If one of the alternatives to qualify vessels for limited access (Action 1; Section 4.3.1) is chosen, the Council would choose one of the Action 2 alternatives (Section 4.3.2) to establish whiting and red hake possession limits by permit category (Category I, Category II, and Incidental) and a set of alternatives in Action 3 (Section 4.3.3) to establish permit allowances and conditions that would define how the three types of proposed permits could be used. For limited access, Draft Amendment 22 proposes to establish two levels of limited access permits, which would be called Category I and Category II. For each of the five qualification alternatives, Category I has a higher threshold to qualify than for Category II qualification. There are four sets of fishing history periods that are proposed, qualifying either historic or more recent fishery participants. In these alternatives, there is an inherent trade-off between equity (number of qualifiers) and latent effort (qualifiers that are not active in the fishery).

The Council has designated No Action as the preferred alternative in Draft Amendment 22. During public hearings it is important for the public to comment on all alternatives.

Table 1. Matrix of Amendment 22 alternatives and expected impacts.

Alternative	Measures	Target species	Non-target species	Protected Resources	Physical Environment and EFH	Economy and Fishery-dependent Communities
No Action (preferred) (Section 4.1)	**Retains open access fishery**	**Low negative**	**Negative**	**Low negative**	**Low negative**	**Positive**
Action alternatives						
Whiting possession limits (Section 4.2)		**Adjustments to whiting possession limits in the southern management area**				
Alternative 1	Status quo	Low negative	Low negative	Low negative	Low negative	Positive
Alternative 2	Raise to 50,000 lbs.	Low negative	Low negative	Neutral to low negative	Neutral to low positive	Low positive
Alternative 3	Lower to 30,000 lbs.	Low positive	Low positive	Neutral to low positive	Neutral to low negative	Low negative
Action 1: Limited access alternatives (Section ???)						
Action 1: Qualification (Section 4.3.1)	Five alternatives to qualify vessels for Category I or Category II permits	Low positive	Low positive	Low positive	Low positive	Low positive for qualifying vessels Negative for non-qualifying vessels
Action 2: Possession limits (Section 4.3.2)	Whiting and red hake possession limits for Category I, Category II, and Incidental permits	Low positive	Low positive	Low positive	Low positive	Low positive for qualifying vessels Negative for non-qualifying vessels
Action 2: Whiting possession limits for Category I (Section 4.2)						
Alternative 1	Status quo	Low negative	Low negative	Low negative	Low negative	Positive
Alternative 2	Raise to 50,000 lbs.	Low negative	Low negative	Neutral to low negative	Neutral to low positive	Low positive
Alternative 3	Lower to 30,000 lbs.	Low positive	Low positive	Neutral to low positive	Neutral to low negative	Low negative
Action 2: Whiting possession limits for Category II (Section 4.2)						
Alternative 1	Status quo	Low negative	Low negative	Low negative	Low negative	Positive
Alternative 2	Lower to 15,000 lbs. whiting	Low positive	Low positive	Neutral to low negative	Neutral to low positive	Low negative
Action 2: Whiting possession limits for Incidental permits (Section 4.2)						
Alternative 1	Status quo	Low negative	Low negative	Low negative	Low negative	Positive
Alternative 2	2000 lbs. whiting and 400 lbs. red hake	Positive	Positive	Neutral to low positive	Neutral to low positive	Low negative

Alternative	Measures	Target species	Non-target species	Protected Resources	Physical Environment and EFH	Economy and Fishery-dependent Communities
Action 3: Permit allowances (Section 4.3.3)						
Limited access permits						
Alternative 1	Groundfish permit conditions	Depends on choice of Action 1 alternative	Same as impacts associated with the selected Action 1 alternative	Low positive	Low positive	Neutral
Alternative 2	No accumulation limit	Neutral or no meaningful impact	Neutral	Neutral	Neutral	Low positive
Alternative 3	Construction eligibility	Positive	Low positive	Low positive	Low positive	Low negative
Alternative 4	Qualification restriction	Positive	Low positive	Low positive	Low positive	Low positive
Alternative 5	Upgrading vessels	Neutral to low negative	Low negative	Neutral	Neutral	Low negative
Incidental permits						
Alternative 1	Fishing in exemption areas only by qualifiers	Low positive	Low positive	Low positive	Low positive	Low negative
Alternative 2a	May exceed incidental possession limit on a Multispecies DAS using large-mesh	Positive	Positive	Neutral	Neutral	Low positive
Alternative 2b	May not exceed incidental possession limit on a Multispecies DAS using large-mesh	Negative	Potentially negative	Neutral	Neutral	Low negative
Alternative 3	May exceed incidental possession limit when fishing for squids or herring	Positive	Positive	Neutral	Neutral	Low positive
Alternative 4	Allow vessels with an incidental permit to fish in exemption areas requiring a raised footrope trawl	Neutral to low negative	Low positive on flatfish and low negative on roundfish	Low negative	Low negative	Positive

1.3 Preferred alternatives

No Action was chosen as the "preferred alternative" because the small-mesh multispecies fishery is catching a small fraction of the current and future ACLs. A limited access program would impede the ability of new and existing vessels to increase catches of whiting, possibly more costly than other means of limiting and potentially reducing non-target catches of "choke species". Measures that could reduce bycatch include requiring more selective gears (although no gear has yet been identified to separate red hake and whiting catch), closed seasons (e.g. when the bycatch rate relative to the target species is highest), and closed areas (e.g. where the bycatch rate relative to the target species is highest).

Although the Council chose No Action (and thus no limited access program) for the preferred alternative, in case a limited access program is chosen as the final alternative, the Council also designated preferred alternatives for Action 2 (Section 4.3.2; Possession Limits by Permit Type) and Action 3 (Section 4.3.3; Permit Allowances).

The Action 2 alternatives would apply to vessels that qualify for a Category I or II limited access permit, or hold an Incidental Permit (by vessels that do not qualify or apply for a limited access permit). Furthermore, in case the public favors and the Council chooses a final alternative from the Action 1 qualification alternatives, the Council has designated a set of Action 2 alternatives as "preferred". These preferred alternatives include Alternative 1 for Category I vessels that would retain current whiting and red hake possession limits.

In Action 3, the Council designated Alternatives 1 and 4 as preferred for small-mesh multispecies limited access permits. Alternative 1 would create limited access permits that had the same characteristics as those associated with a large-mesh NE Multispecies permit. Alternative 4 however would allow only one vessel to qualify based on a single history, or conversely no two vessels could qualify based on a single permit history (This was allowed for NE Multispecies qualification because of ambiguities in fishing history ownership before a limited access program existed).

Also in Action 3, the Council chose Alternative 3 as a preferred alternative. This alternative would allow a vessel using small-mesh trawls to target Atlantic herring, squid, mackerel, or butterfish to exceed the incidental whiting and red hake possession limits. In this case, the vessels would be able to retain whiting and red hake up to the amounts specified for qualified vessels, consistent with the mesh size in use. An additional alternative in Action 3 would allow any vessel to exceed the incidental whiting and red hake possession limits while fishing with small-mesh trawls in exemption areas that require a raised footrope configuration. Such vessel could land whiting and red hake up to the limits specified for the mesh in use (see Table 5).

1.4 EIS Conclusions

The small-mesh multispecies fishery is highly regulated by seasonal, area, gear, and possession limit restrictions, compared to other fisheries. The fishery has at times exceeded the annual catch limits for red hake and yellowtail flounder, but so far these problems have been managed by possession limit adjustments, gear restrictions, or accountability measures.

Despite the regulatory and marketing constraints for targeting small-mesh multispecies, increases in fishing effort can and have occurred. In the 1980s and early 1990s, fishing effort was much higher than it

is now and recent, but modest increases in fishing effort in the northern management area have occurred. Rapid increases in the number of vessels and frequency of small-mesh multispecies trips could open up a run-away and difficult to control situation. Additional vessels entering the small-mesh multispecies fishery could make this task to regulate red hake catches and bycatch more difficult and/or compliance could become very costly to existing participants in the fishery, if measures to manage catch become considerably more restrictive to compensate for the added fishing effort.

The Council proposed alternatives that would limit the number of vessels in the small-mesh multispecies fishery because catches of non-target species could exceed limits when new vessels enter the fishery. Although participation in the fishery has declined since the early 1990s, there have been recent increases in the number of vessels and trips to target small-mesh multispecies in the northern management area. At the same time, biomass of whiting and red hake in the southern management area has been declining and the existing catches are near the thresholds that would trigger in-season accountability measures, particularly for southern red hake which is considered overfished. The Council will also need to consider additional measures in a future amendment to rebuild southern red hake, because it has become overfished. Future measures to restrict catch and rebuild southern red hake will need to be more conservative with an open access fishery than they would be with a finite pool of vessels that have a history of targeting small-mesh multispecies.

Under existing conditions with stable fishing effort, when catches have approached or exceeded the annual catch limits modest adjustments have been effective, with relatively minor biological, ecological, or economic and social effects. Thus, in this document, No Action is evaluated as having a small negative effect on target species, non-target species, protected species, and habitat while conversely having a small positive effect on the economy and communities. Because the proposed alternatives are intended to "freeze the footprint" of the fishery and not reduce effort and catch, the alternatives conversely are generally evaluated as having a small positive effect on target species, non-target species, protected species, and habitat while conversely having a small negative effect on the economy and communities.

At the same time, the potential for large increases in fishing effort caused by increasing prices for whiting or red hake or increasingly restrictive regulations and lack of catch in alternative fisheries must be considered. In this case, the negative effects on target species, non-target species, protected species, and habitat would become highly negative with a positive short-term impact on the economy and communities. The long-term impacts on the economy and communities could be negative if under No Action the measures to manage catch make compliance more costly to participants, enforcement more costly to government, and fishery participation potentially unprofitable. When this potential risk of increasing effort is considered, the relative positive effects on target species, non-target species, protected species, and habitat with small negative effects on the economy and communities would be magnified. Over the long term, reducing the risk of overcapitiliztion of the fishery through limited access is expected to have a positive effect on all VECs (target species, non-target species, protected species, habitat, and on the economy and fishery-dependent communities. On the other hand, if more selective gear technology, methods of fishing, or access specification can reduce bycatch then the costs associated with managing an open access fishery (i.e. No Action in Amendment 22) might be offset or exceeded by profits created by more full utilization of the target species.

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2.5 List of Acronyms

ABC	Acceptable biological catch
ACL	Annual Catch Limit
AIM	An Index Method of Analysis (the assessment model used to determine red and silver hake status)
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 (F_{MSY})
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
ESA	Endangered Species Act
F	Fishing mortality rate
FEIS	Final Environmental Impact Statement
FMP	Fishery management plan
FW	Framework
FY	Fishing year
GARM	Groundfish Assessment Review Meeting
GB	Georges Bank
GIS	Geographic Information System
GOM	Gulf of Maine
GRT	Gross registered tons/tonnage
HAPC	Habitat area of particular concern
HPTRP	Harbor Porpoise Take Reduction Plan
IFQ	Individual fishing quota
ITQ	Individual transferable quota
IVR	Interactive voice response reporting system
IWC	International Whaling Commission
LOA	Letter of authorization
MA	Mid-Atlantic
MAFAC	Marine Fisheries Advisory Committee
MAFMC	Mid-Atlantic Fishery Management Council
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MRFSS	Marine Recreational Fishery Statistics Survey
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSMC	Multispecies Monitoring Committee
MSY	Maximum sustainable yield
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office
NLSA	Nantucket Lightship closed area
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
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
RMA	Regulated Mesh Area
RPA	Reasonable and Prudent Alternatives
SA	Statistical Area
SAFE	Stock Assessment and Fishery Evaluation
SAP	Special Access Program
SARC	Stock Assessment Review Committee
SAW	Stock Assessment Workshop
SBNMS	Stellwagen Bank National Marine Sanctuary
SEIS	Supplemental Environmental Impact Statement
SFA	Sustainable Fisheries Act
SIA	Social Impact Assessment
SNE	Southern New England
SNE/MA	Southern New England-Mid-Atlantic
SSB	Spawning stock biomass
SSC	Social Science Committee
TAL	Total allowable landings
TED	Turtle excluder device
TEWG	Turtle 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
VPA	Virtual population analysis
VTR	Vessel trip report
WGOM	Western Gulf of Maine
YPR	Yield per recruit

3.0 INTRODUCTION AND BACKGROUND

3.1 Purpose and Need for the Action

The purpose of this action is to implement measures through limited access that would prevent unrestrained increases in fishing effort by new entrants to the fishery. Limited access would establish a maximum number of vessels in the small-mesh multispecies fishery, improving the effectiveness of regulations that reduce or cap catches of species with sub-ACL or choke species (i.e. species with catches that equal or exceed their annual catch limits).

Although small-mesh multispecies fishing effort has remained historically low and the fishery has taken a fraction of the northern whiting, southern whiting, and southern red hake Annual Catch Limits (ACL) since 2012, the directed fishery is completely open to new entrants. New entrants could cause catches to increase, which is or could be problematic for northern red hake, Georges Bank yellowtail flounder, and other large-mesh groundfish. Northern red hake and Georges Bank yellowtail flounder catches have exceeded their ACLs in past years and triggered Accountability Measures (AM).

Increasing catches of other groundfish have become more problematic, and the Council is considering establishing additional sub-ACLs for groundfish stocks caught in non-groundfish fisheries. The Council could take other actions such as reducing possession limits or requiring more selective gear (provided that such gear has been developed and tested), but these technical measures are less effective if directed fishing effort increases. Increases in fishing effort are likely if the availability of whiting and red hake increase, whiting and red hake prices increase, and/or regulations on alternative trawl fisheries become more restrictive. If the ACLs are exceeded, the AMs could have a harmful effect on existing fishery participants and/or increase discarding if non-target species landings are prohibited.

From another perspective, whiting and red hake ACLs could decline if stock biomass decreases and catch specifications are lowered. In the 2015 Annual Monitoring Report, presented to the Council in September 2016, the Plan Development Team warned that unless the survey biomass indexes increase in 2016-2017, the ACLs for southern whiting and southern red hake could be much lower, and could be close to current catch levels.

The need for the amendment is to reduce the potential for a rapid escalation of the small-mesh multispecies fishery, possibly causing overfishing and having a negative effect on red hake and whiting markets, both outcomes having negative effects on fishery participants. The amendment will help ensure that catches of the small-mesh multispecies and other non-target species will be at or below specifications, reducing the potential for triggering accountability measures, resulting closure of the directed fishery.

3.2 History of the Fishery

The commercial silver hake fishery in the United States may have begun as early as the mid-1800s (Anderson et al, 1980). Prior to the early 1920s, landings of silver hake (commonly known as ‘whiting’) totaled less than seven million pounds annually, and most fishermen considered whiting a nuisance fish, because its soft flesh tended to spoil quickly without refrigeration. Technological advances in handling, freezing, processing, and transportation aided in expanding this market as well as creating new opportunities to capitalize on whiting. Until this time, the fishery operated primarily inshore using pound nets. As the demand for whiting increased, operations began to extend offshore, and vessels started using otter trawls to catch more whiting. By 1950, U.S. commercial silver hake landings had increased to more

than 45,000 metric tons. Floating traps, gillnets, purse seines, and longline trawls were also employed. Today, almost all of the U.S. commercial silver hake catch is taken with otter trawls.

Prior to 1960, the commercial exploitation of silver hake in the Northwest Atlantic was exclusively by U.S. fleets. Distant water fleets had already reached the banks of the Scotian Shelf by the late 1950s, and by 1961, scouting/research vessels from the USSR were fishing on Georges Bank. By 1962, factory freezer fleets (ranging from 500 to 1,000 GRT) intensively exploited the whiting and red hake stocks on the Scotian Shelf and on Georges Bank. Led by the USSR, the distant water fleet landed an increasingly larger share of the silver hake catch from the Gulf of Maine, Georges Bank, and northern Mid-Atlantic waters. In 1962, the distant water fleet landed 41,900 tons of silver hake (43% of the total silver hake landings), but that number had increased to 299,200 tons (85% of the total silver hake landings) in 1965. That year marked the year of the highest total commercial silver hake landings, 351,000 tons. Recreational landings of silver hake in the southern New England and Mid-Atlantic areas were also at record levels between 1955 and 1965, about 1,360 tons annually. Unable to sustain such high rates of fishing, the abundance of silver hake off the U.S. Atlantic coast began to decline. As a result, total commercial catches decreased significantly after 1965 and reached a 20-year low of 55,000 tons in 1970. U.S. recreational landings also dropped after 1965 to about half the levels of previous years.

After 1970, catches of silver hake by the distant water fleet in U.S. waters increased again, especially in southern New England and the Mid-Atlantic. Between 1971 and 1977, distant water fleet landings from the southern stock averaged 75,000 tons annually and accounted for 90% of the total harvest from the southern stock. The size and efficiency of distant water fleet factory ships also increased, many ranging between 1,000 and 3,000 GRT. In 1973, the International Commission for the Northwest Atlantic Fisheries established temporal and spatial restrictions that reduced the distant water fleet to small "windows" of opportunity to fish for U.S. silver hake - to the continental slope of Georges Bank and the Mid-Atlantic. As effort control regulations increased, foreign fleets gradually left most areas of Georges Bank.

Although foreign fishing had ceased on Georges Bank by about 1980 and in the Mid-Atlantic by about 1986, the U.S. groundfish fleet's technologies and fishing practices were advancing, and between 1976 and 1986, fishing effort (number of days) increased by nearly 100% in the Gulf of Maine, 57% on Georges Bank, and 82% in southern New England (Anthony, 1990). Such increases in effort, although directed primarily towards principal groundfish species (cod, haddock, yellowtail flounder), were accompanied by a 72% decline in silver hake biomass. In turn, U.S. East Coast landings of silver hake began to decline, dropping to 16,100 tons in 1981. Since that time, landings have remained relatively stable, but at much lower levels in comparison to earlier years. U.S. East Coast silver hake catches are taken almost exclusively by otter trawls, either as bycatch in other fisheries or through directed fisheries targeting a variety of sizes of silver hake.

3.3 Management Background

The small-mesh multispecies fishery consists of three species: Silver hake (*Merluccius bilinearis*), red hake (*Urophycis chuss*), and offshore hake (*Merluccius albidus*). There are two stocks of silver hake (northern and southern), two stocks of red hake (northern and southern), and one stock of offshore hake, which primarily co-occurs with the southern stock of silver hake. There is little to no separation of silver and offshore species in the market, and both are generally sold under the name "whiting." Throughout the document, "whiting" is used to refer to silver hake, and offshore and silver hake combined catches.

3.3.1 Goals and Objectives of FMP

The Council's objective is to manage fisheries catching red, silver, and offshore hake that maintain stock size at levels capable of sustaining Maximum Sustainable Yield (MSY) on a continuing basis. In addition to existing restrictions on fishing through exemption areas and seasons to minimize groundfish bycatch, other measures are intended to optimize size selectivity and keep landings from temporarily flooding limited market demand. These measures include red and silver hake possession limits. The silver hake possession limits are higher when a vessel uses large mesh, providing an incentive to avoid catching juvenile or small silver hake. Amendment 19 established and specified catch and landings limits which are deemed to be sustainable, including accountability measures which either reduce the risk that catches will exceed the ACL or to account for those overages in later seasons if they do occur.

3.3.2 Overfishing Definitions

The following overfishing definitions were chosen by the Council in Amendment 12 (https://www.nefmc.org/library/amendment-12-2) and re-evaluated in the 2010 benchmark assessment (NEFSC 2011) and subsequently approved by the Council's SSC for determining stock status.

3.3.2.1 Silver hake

Silver hake is overfished when the three-year moving average of the fall survey weight per tow (i.e. the biomass threshold) is less than one half the B_{MSY} proxy, where the B_{MSY} proxy is defined as the average observed from 1973-1982. The most recent estimates of the biomass thresholds are 3.21 kg/tow for the northern stock, and 0.83 kg/tow for the southern stock.

Overfishing occurs when the ratio between the catch and the arithmetic fall survey biomass index from the most recent three years exceeds the overfishing threshold. The most recent estimates of the overfishing threshold are 2.78 kt/kg for the northern stock and 34.19 kt/kg for the southern stock of silver hake.

Overfishing threshold estimates are based on annual exploitation ratios (catch divided by arithmetic fall survey biomass) averaged from 1973-1982.

Table 2. Silver hake overfishing definition reference points.

Stock	Threshold	Target
Northern Silver Hake	½ B_{MSY} Proxy (3.21 kg/tow) F_{MSY} Proxy (2.78 kt/kg)	B_{MSY} Proxy (6.42 kg/tow) F_{MSY} Proxy (n/a)
Southern Silver Hake	½ B_{MSY} Proxy (0.83 kg/tow) F_{MSY} Proxy (34.19 kt/kg)	B_{MSY} Proxy (1.65 kg/tow) F_{MSY} Proxy (n/a)

3.3.2.2 Red hake

Red hake is overfished when the three-year moving arithmetic average of the spring survey weight per tow (i.e., the biomass threshold) is less than one half of the B_{MSY} proxy, where the B_{MSY} proxy is defined as the average observed from 1980 – 2010. The current estimates of $B_{THRESHOLD}$ for the northern and southern stocks are 1.27 kg/tow and 0.51 kg/tow, respectively.

Overfishing occurs when the ratio between catch and spring survey biomass for the northern and the southern stocks exceeds 0.163 kt/kg and 3.038 kt/kg, respectively, derived from AIM analyses from 1980-2009.

Table 3. Red hake overfishing definition reference points.

Stock	Threshold	Target
Northern Red Hake	½ B_{MSY} Proxy (1.27kg/tow) F_{MSY} Proxy (0.163 kt/kg)	B_{MSY} Proxy (n/a) F_{MSY} Proxy (n/a)
Southern Red Hake	½ B_{MSY} Proxy (0.51 kg/tow) F_{MSY} Proxy (3.038 kt/kg)	B_{MSY} Proxy (n/a) F_{MSY} Proxy (n/a)

3.3.2.3 Offshore hake

The 2010 benchmark assessment concluded that information was not available to determine stock status for offshore hake because fishery data were insufficient and the survey data are not considered to reflect stock trends. It was not possible to recommend a reference points for offshore hake and the overfished and overfishing status of offshore hake is therefore unknown.

3.3.3 Stock Status, Biological Reference Points and Specifications

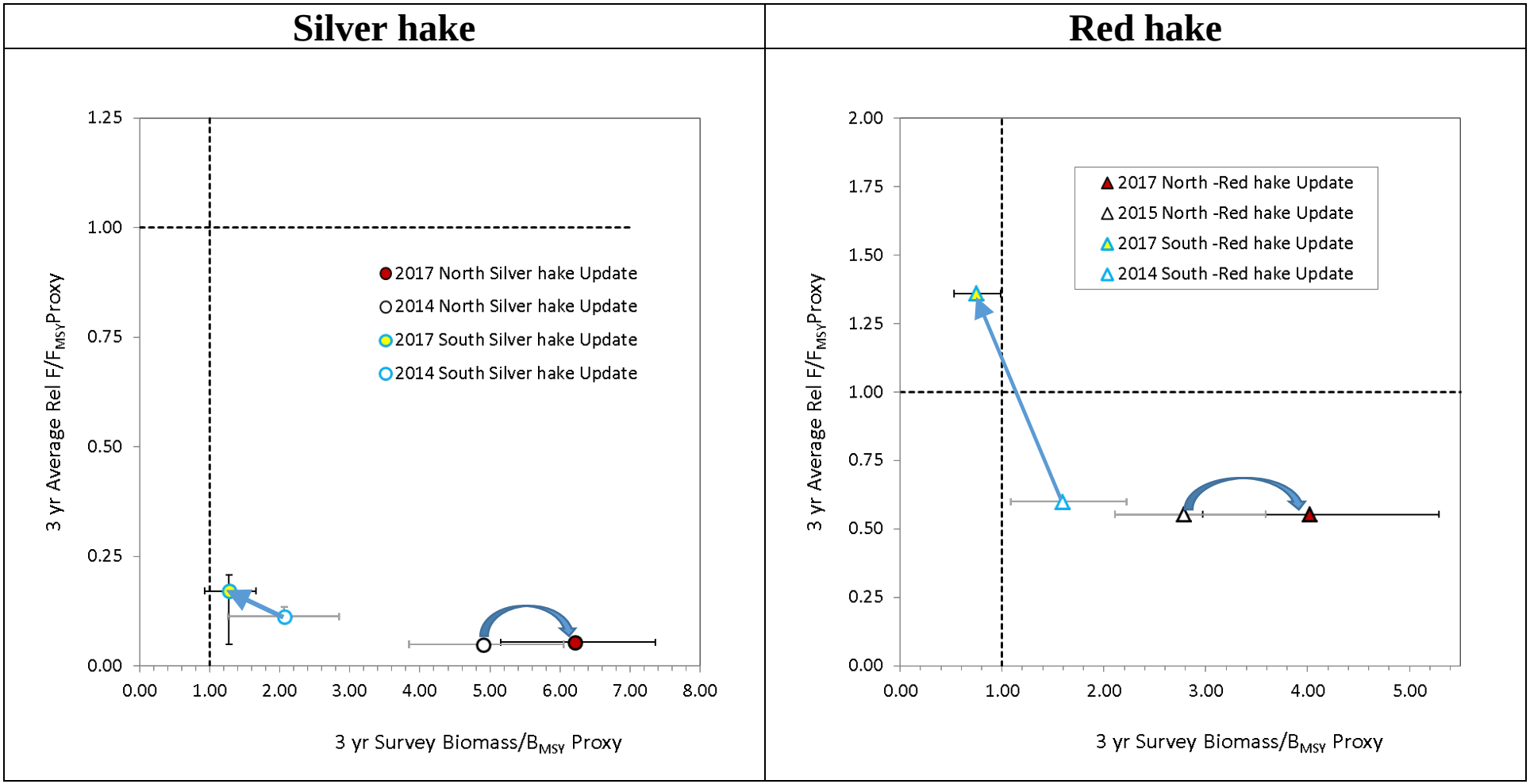
3.3.3.1 Stock Status

According to the 2016 assessment update conducted by the NEFSC and included in the Stock Assessment and Fishery Performance Report for Fishing Year 2016 (NEFMC 2017), southern red hake has become overfished and overfishing is occurring. For all other stocks in the fishery, overfishing is not occurring (see Figure 1).

The stock biomass index for northern silver hake is well above the 6.42 kg/tow target, the highest level since 1963, and exploitation remains low (below the 2.77 kt/kg target. Stock biomass for southern silver hake has declined from recent levels and is now below the MSY proxy value (1.65 kg/tow), although exploitation remains low (below the 34.17 kt/kg threshold). Biomass is above the 0.825 kg/tow threshold, thus the stock is not overfished.

The stock biomass index for northern red hake is well above the 2.53 kg/tow target, the highest level in the time series. Since being overfished in 2013, exploitation has declined below the 0.163 kt/kg threshold. Southern red hake biomass has declined from a peak in 2010 and is now below the minimum biomass threshold of 0.51 kg/tow. Recent catch has remained relatively stable despite a reduction in the specifications in 2016. Coupled with a reduction in stock biomass, the stable catches caused exploitation to increase above the 3.04 kt/kg threshold. Overfishing is therefore occurring.

Figure 1. Stock status relative to MSY proxy values for exploitation (y-axis) and biomass (x-axis). Dashed lines (value=1) indicate targets. Biomass and fishing stock status plots for specification years 2016-2018 in the north (labeled as 2015), 2015-2017 in the south (labeled as 2014) and 2018-2020 (labeled as 2017) and associated 95% confidence intervals. The triangle symbols are points estimates derived from the ratio of the most recent 3yr average index to proxy reference points while the 95% CI were calculated from the 5th and 95th percentile of the cumulative distribution of the recent 3-year index of biomass and Relative F.



3.3.3.2 Maximum Sustainable Yield (MSY)

National Standard 1 requires that FMPs achieve "on a continuing basis, the optimum yield from each fishery for the United States fishing industry." The term "optimum," with respect to yield from a fishery, is defined as the amount of fish which:

(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
(B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and
(C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Optimum yield (OY) for silver hake, offshore hake, and red hake will therefore be the amount of fish that results from fishing under the set of rules designed to achieve the plan objectives. It is the amount of fish caught by the fishery when fishing at target fishing mortality rates (Ftarget) at current biomass levels (Bt), or when fishing in a manner intended to maintain or achieve biomass levels capable of producing maximum sustainable yield (MSY) on a continuing basis. Accounting for scientific uncertainty in the estimate of MSY, Ftarget is defined as the mortality that would produce the ACL at existing stock biomass and size selectivity. Expressed as an equation:

$$OY = Ftarget \times (Bt)$$

For a rebuilt stock, Bt is always greater than BMSY (stock biomass capable of sustaining MSY over time). Ftarget is the target level of fishing mortality and is set safely below FMSY (the fishing mortality rate capable of producing MSY over time) to prevent overfishing and ensure that OY can be achieved on a continuing basis. For an overfished stock, Bt is the current stock biomass level estimated or projected from the most recent assessment, and Ftarget is the fishing mortality rate objective that will achieve the desired rebuilding. If the current F, Ftarget, or Bt is unknown, proxy control rules are applied and the long-term potential yield may be a satisfactory proxy for OY.

The target fishing mortality rate (Ftarget) is the rate that will achieve the plan objectives with an acceptable degree of safety or precaution. Factors to be considered in setting Ftarget will be calculated through periodic stock assessments and include the stock size relative to BMSY, the current age structure of the population and recruitment, as well as projected growth and recruitment characteristics of the stock. The Council may also consider social and economic characteristics in setting Ftarget provided the stock rebuilding projections are within the Council's range of precaution.

For an overfished stock (no stock is currently overfished), for example, the Council would set a target rate to rebuild the stock within a maximum time, usually not to exceed ten years. On a rebuilt stock, the Council should set Ftarget safely below the threshold level that will produce MSY. In setting target fishing mortality rates, the Council must balance maximizing short-term economic yield and providing for sustained participation of communities in the fishery against the risk or cost of allowing the biomass to decline to levels below BMSY. Thus, the Council will consider social, economic, and ecological factors in setting the Ftarget in addition to considering the risk of not achieving stock recovery in an acceptable time period, or the risk of the rebuilt stock becoming overfished at any given time.

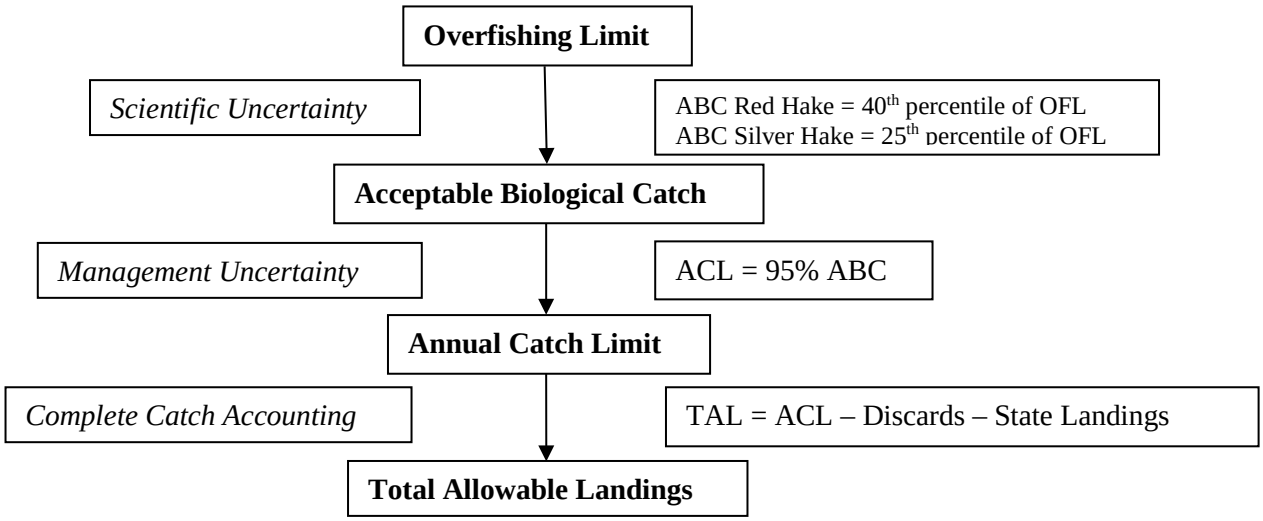
OY, therefore, is not a fixed amount but varies with the status of the stocks in the fishery, but it cannot be above a level that would exceed FMSY. It is a quantity that represents the yield resulting from fishing at

target levels on a rebuilt stock or stock complex, or the yield resulting from fishing at target levels designed to rebuild the stock in a specified time frame.

3.3.3.3 Acceptable Biological Catch (ABC)

The process and formulae for developing specifications for red, silver, and offshore hake (target species for the small-mesh multispecies fishery) are described in §648.90(b). The regulations provide for an annual review and three-year specification process where the Council sets specifications for at least a three-year period, using best available science. The specifications for each stock include an overfishing limit (OFL), which is associated with maximum sustainable yield (MSY); an Acceptable Biological Catch (ABC), which accounts for scientific uncertainty; an Annual Catch Limit (ACL), which accounts for management uncertainty; and a Total Allowable Landings (TAL) limit that accounts for discards and catch by state-only permitted vessels.

This ACL framework, including the OFLs and ABCs, is illustrated below:



The OFL is derived from the average exploitation rate during a period that is considered to represent conditions that generated MSY. Adopted in the last benchmark assessment (SAW 51, NEFSC 2011), these baseline reference periods were 1980-2009 for red hake and 1973-1982 for silver hake. These average exploitation rates derived from the assessments were applied to the most recent three-year moving average biomass estimates gives the OFL (in mt) that is consistent with current stock conditions.

Precision (or conversely, scientific uncertainty) is estimated and a level of precaution was selected in Amendment 19 to account for scientific uncertainty. For red hake, the 40th percentile of the distribution of scientific uncertainty estimates was chosen as an appropriate level of precaution. For silver hake, a more conservative 25th percentile was chosen. This buffer between the OFL and ABC will vary with the degree of scientific uncertainty (getting smaller with greater amounts of precision in the estimates). In Amendment 19, the Council also chose a 5% buffer to account for management uncertainty to set the ACL. A three-year average discard rate (discards/catch) is applied for each stock to set the TAL, after deducting an assumed 3% catch for state-only permitted vessels.

Details about the estimation procedures and values derived from the latest stock assessment are given in the SAFE Report for the 2013 fishing year (NEFMC 2014).

3.3.3.4 Specifications (Allowable Biological Catch and Annual Catch Limits)

New Specifications for 2018-2020 (2017) are being developed by the Council, based on an assessment update for 2016 prepared by the Northeast Fisheries Science Center (NEFSC). The new specifications are presented in Table 4, but have not yet been reviewed or approved by the Council's Scientific and Statistical Committee (SSC). The SSC meeting is tentatively scheduled for early October 2017 and the Council expects to approve a specification package in December 2017, so that new regulations become effective on May 1, 2018.

An update assessment was performed by the Northeast Fisheries Science Center (NEFSC) and presented to the Whiting PDT in July. This assessment followed the same procedures that were applied in the benchmark assessment using new survey data and catch estimates. Also, scientific uncertainty in these estimates were estimated and the full range of potential ABC values as well as probability of overfishing (ABC>OFL) will be presented to the Scientific and Statistical Committee (SSC). These estimates included the ABC at the 25th percentile for silver hake and the 40th percentile for red hake, separately for the northern and southern management areas.

During the last update assessment and development of three-year specifications, two advisors raised concerns about red hake stock structure and survey availability due to interference with fixed gear. More data and analyses were presented to the SSC, who felt that the concerns were valid but also deemed the assessment was consistent with currently available information. The SSC did however recommend that these issues should be more thoroughly examined at the next benchmark assessment. In addition, it has been six years since the last benchmark assessment and will be nine years old by the next specification cycle. Changes in distribution and an apparent shift in relative productivity of northern and southern stocks may make the existing reference point benchmarks (1973-1982 for silver hake and 1980-2009 for red hake) less suitable for future management targets and thresholds. Further advancements could be made if red hake aging data can be used in the assessment. An alternative assessment could also be performed using survey data ONLY from the RV Bigelow time series, coupled with compatible state survey data (including the ME/NH and NEMAP trawl surveys). The 2011 benchmark assessment adjusted the RV Albatross survey series to RV Bigelow units based on calibration data (which has some level of uncertainty) that the NEFSC collected during the transition.

After reviewing the PDT advice, the SSC felt that the buffers the Council chose for scientific uncertainty were appropriate and had worked as intended during the 2012-2014 specification period. The SSC therefore approved using the 25th percentile for silver hake and a less conservative 40th percentile for red hake. The proposed 2018-2020 specifications are shown in the table below.

Table 4. Proposed 2018-2020 specifications.

Stock	OFL (mt)	ABC (mt)	ACL (mt)	Change from 2016-2017	TAL (mt)
Northern silver hake	58,350	31,030	29,475	+33%	26,604
Northern red hake	840	721	685	+2.6%	274
Southern whiting	31,180	19,395	18,425	-37%	14,465
Southern red hake	1,150	1,060	1,007	-2.4%	305

3.3.4 Management History

The small-mesh multispecies fishery consists of three species: Silver hake (*Merluccius bilinearis*), red hake (*Urophycis chuss*), and offshore hake (*Merluccius albidus*). There are two stocks of silver hake (northern and southern), two stocks of red hake (northern and southern), and one stock of offshore hake, which primarily co-occurs with the southern stock of silver hake. There is little to no separation of silver and offshore species in the market, and both are generally sold under the name "whiting." Throughout the document, "whiting" is used to refer to silver hake and offshore and silver hake combined catches.

Collectively, the small-mesh multispecies fishery is managed under a series of exemptions from the Northeast Multispecies Fishery Management Plan. The Northeast Multispecies FMP requires that a fishery can routinely catch less than 5% of regulated multispecies to be exempted from the minimum mesh size. In the Gulf of Maine and Georges Bank Regulated Mesh Areas (Map 1), there are six exemption areas, which are open seasonally (Table 5).

Table 5. Northern area exemption program seasons

	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Cultivator			June 15 – October 31									
GOM* Grate			July 1 – November 30									
Small I			July 15 – November 30									
Small II	– June 30								January 1 –			
Cape Cod RFT†					Sept 1 – Nov 20							
					September 1 – December 31							

* GOM = Gulf of Maine

† RFT = Raised Footrope Trawl

The Gulf of Maine Grate Raised Footrope area is open from July 1 through November 30 of each year and requires the use of an excluder grate on a raised footrope trawl with a minimum mesh size of 2.5 inches. Small Mesh Areas I and II are open from July 15 through November 15, and January 1 through June 30, respectively. A raised footrope trawl is required in Small Mesh Areas I and II, and the trip limits are mesh size dependent. Cultivator Shoal Exemption Area is open from June 15 – October 31, and requires a minimum mesh size of 3 inches. The Raised Footrope Trawl Exemption Areas are open from September 1 through November 20, with the eastern portion remaining open until December 31. A raised footrope trawl, with a minimum mesh size of 2.5-inch square or diamond mesh, is required. The Southern New England and Mid-Atlantic Regulated Mesh Areas are open year-round and have mesh size dependent possession limits for the small-mesh multispecies.

The mesh size dependent possession limits for all the areas with that requirement are shown below.

Table 6. Mesh size dependent possession limits

Codend Mesh Size	Silver and offshore hake, combined, possession limit	Red Hake South	Red Hake North
Smaller than 2.5”	3,500 lbs.	5,000 lbs.	3,000 lbs.
Larger than 2.5”, but smaller than 3.0”	7,500 lbs.	5,000 lbs.	3,000 lbs.
Equal to or greater than 3.0”	30,000 lbs. (40,000 lbs. in Southern Area)	5,000 lbs.	3,000 lbs.
Accountability measure, in-season trigger	2,000 lbs. 90% of TAL	400 lbs. 90% of TAL	400 lbs. 37.9% of TAL

The exemption areas were implemented as part of several different amendments and framework adjustments to the Northeast Multispecies FMP (Map 1). In 1991, Amendment 4 incorporated silver and red hake and established an experimental fishery on Cultivator Shoal. Framework Adjustment 6 (1994) was intended to reduce the catch of juvenile whiting by changing the minimum mesh size from 2.5 inches to 3 inches. Small Mesh Areas I and II, off the coast of New Hampshire, were established in Framework Adjustment 9 (1995). The New England Fishery Management Council (Council) established essential fish habitat (EFH) designations and added offshore hake to the plan in Amendment 12 (2000). Also in Amendment 12, the Council proposed to establish limited entry into the small-mesh fishery. However, that measure was disapproved by the Secretary of Commerce because it did not comply with National Standard 4[1] as a result of measures that benefited participants in the Cultivator Shoal experimental fishery and because of the “sunset” provision that would have ended the limited entry program at some date. The Raised Footrope Trawl Area off of Cape Cod was established in Framework Adjustment 35 (2000). A modification to Framework Adjustment 35 in 2002 adjusted the boundary along the eastern side of Cape Cod and extended the season to December 31 in the new area. Framework Adjustment 37 modified and streamlined some of the varying management measures to increase consistency across the exemption areas. In 2003, Framework Adjustment 38 established the Grate Raised Footrope Exemption Area in the inshore Gulf of Maine area.

The Northeast Multispecies FMP was implemented primarily to manage the commercial cod and haddock fisheries in the Gulf of Maine and Georges Bank[2]. The FMP is complicated and has been changed numerous times since 1985 (almost 20 Council amendments and over 50 framework adjustments; not including dozens of emergencies, interim, and Secretarial amendments implemented outside of the Council process.) A few of those amendments and several framework adjustments have addressed the small-mesh fishery specifically and are described below.

Amendment 1 (1987) reduced the spatial footprint of the winter inshore whiting fishery in order to protect struggling large mesh species like redfish, gray sole, and dabs; focused the small-mesh target species to

[1] National Standard 4 states that measures “shall not discriminate between residents of different States,” and that fishing privileges must be “fair and equitable to all such fishermen.”

[2] The large-mesh species (cod, haddock, pollock, flounders, etc.) were commonly referred to as the “regulated” species because they were the focus of management originally. That term is confusing as almost all of the commercially viable stocks are now “regulated.” This document refers to the management of those species as the “groundfish fishery” or the “large-mesh multispecies fishery.”

large-mesh species ratio on a selected set of species; and reduced the size of the Georges Bank whiting fishery area to protect yellowtail flounder.

Amendment 2 (1989) made some additional, minor changes to the exempted fishery program for whiting and other small-mesh stocks.

Amendment 4 (1991) established the Cultivator Shoals Exemption Area and formally incorporated silver hake and red hake into the FMP. This amendment also established a minimum mesh size for the directed small-mesh fishery as well. This was intended to control mortality of whiting and red hake in this fishery.

Amendment 5 (1994) established an overfishing definition for red hake, and implemented some other minor modifications to small-mesh management, including a standardized bycatch amount of 500 lb of large-mesh groundfish.

Framework Adjustment 3 (1994) modified the 500-lb bycatch limit to reduce the incentive for vessels to target groundfish with small mesh. This action changed the limit to "10-percent of the total weight of fish on board, or 500 lb, whichever is less." This preserved the Council's original intent of minimizing mortality on juvenile groundfish, while allowing the legitimate small-mesh fishery to continue.

Framework Adjustment 6 (1994) was intended, in part, to reduce juvenile whiting mortality in the Cultivator Shoals whiting fishery and modified the requirements of that program.

Framework Adjustment 9 (1995) established Small Mesh Areas I and II in the Gulf of Maine and implemented the requirements for fishing in those areas.

An Adjustment to Amendment 7 (1996) made some minor modifications to non-groundfish bycatch limits in the Cultivator Shoals fishery.

Amendment 12 (1999/2000) addressed many small-mesh issues. This amendment officially incorporated offshore hake into the FMP; established essential fish habitat designations for all three small-mesh species; standardized the mesh-size based possession limits (see below); required a Letter of Authorization for several small-mesh exemption areas; and established a provision to allow the transfer of up to 500 lb of small-mesh multispecies at sea. Amendment 12 also proposed a limited access permit program for this fishery. However, that program was not implemented because NMFS determined that it did not comply with the requirement to treat residents of different states equally (National Standard 4.)

Framework Adjustment 35 (2000) established the Raised Footrope Trawl Exemption Area off Cape Cod. A Modification to Framework 35 (2002) modified the boundaries and seasons of the Cape Cod exemption areas.

Framework Adjustment 37 (2003) eliminated some of the now unnecessary provisions from Amendment 12, clarified the transfer-at-sea provisions, and reinstated the full season (back to an October 31 end date) for the Cultivator Shoal Exempted Fishery. This framework also standardized the types and amounts of incidental species that could be retained in the small-mesh exemption areas between Small Mesh Areas I and II and the Cape Cod Exemption Area.

A new Control Date (2003) was formally established with the intentions of developing a limited access permit program.

Framework Adjustment 38 (2003) established the Inshore Gulf of Maine Grate Raised Footrope Trawl Exemption Area along the coast of Maine.

A Secretarial Amendment (2012) brought this portion of the FMP into compliance with the Magnuson-Stevens Act requirements to have (1) annual catch limits and (2) measures to ensure accountability for each Council managed fishery. A Secretarial Amendment was necessary because the development of Amendment 19, the mechanism through which the Council was intending to adopt the new requirements, was delayed.

The Control Date for the small-mesh multispecies was modified to November 28, 2012.

Amendment 19 (2013) allowed the Council to incorporate updated stock assessment information and adopt the annual catch limit structure implemented in the 2012 Secretarial Amendment. Amendment 19 modified the accountability measures, adopted new biological reference points, and established a trip limit for red hake.

Framework Adjustment 50 (2013) established a separate, sub-annual catch limit of Georges Bank yellowtail flounder for the small-mesh fishery (whiting and squid fisheries.)

Framework Adjustment 51 (2014) implemented accountability measures for that sub-annual catch limit.

Post-season Accountability Measure (2015) reduced the TAL trigger for northern red hake from 90% of the TAL to 62.5% of the TAL.

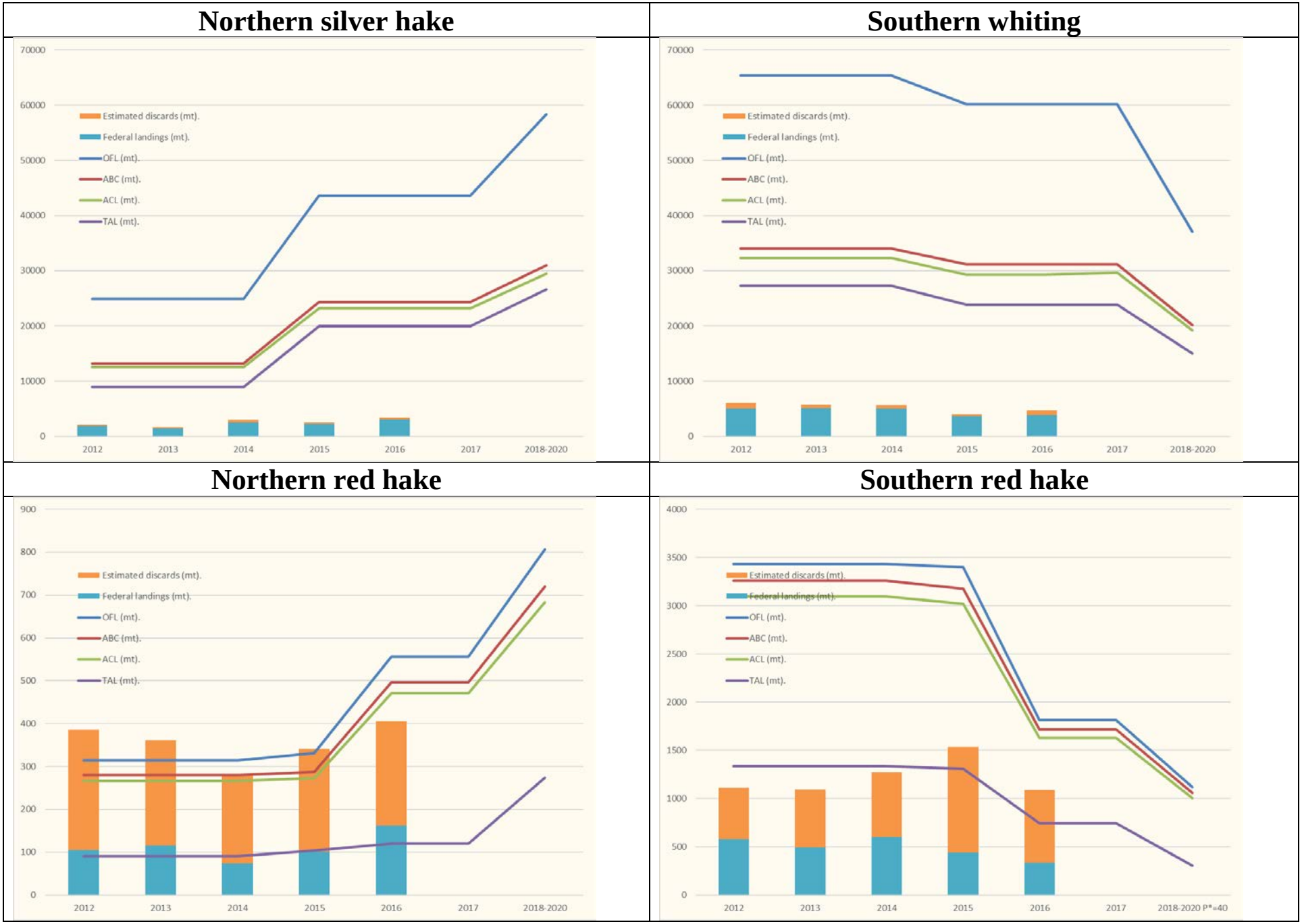
Specifications for 2015-2017 (2016) adjusted the OFL, ABC. ACL, and TALs to account for changes in stock biomass. The specification document also changed the northern red hake possession limit to 3,000 lbs. at the beginning of the fishing year, which would automatically drop to 1,500 lbs. when landings reach 62.5% of the TAL. Due to prior overages, the TAL trigger was reduced to 45% of the TAL.

Post-season Accountability Measure (2016) reduced the northern red hake TAL trigger from 45% of the TAL to 37.9%.

New Specifications for 2018-2020 (2017) are being developed by the Council, based on an assessment update for 2016 prepared by the Northeast Fisheries Science Center (NEFSC). The new specifications are presented in Section 3.3.3.4, but have not yet been reviewed or approved by the Council's Scientific and Statistical Committee (SSC). The SSC meeting is tentatively scheduled for early October 2017 and the Council expects to approve a specification package in December 2017, so that new regulations become effective on May 1, 2018.

The following figure summarizes the past, current, and proposed specifications by stock.

Figure 2. Annual specifications and catch estimates for small-mesh multispecies by stock



Vessels participating in any of the exemption areas must have a Northeast Multispecies limited access or open access category K permit and must have a letter of authorization from the Regional Administrator to fish in Cultivator Shoal and the Cape Cod Raised Footrope areas. Most of the areas (Small Mesh Areas I and II, the Cape Cod Raised Footrope areas, Southern New England Exemption Area, and the Mid-Atlantic Exemption Area) have mesh size dependent possession limits for silver and offshore hake, combined (Table 6). The Gulf of Maine Grate Raised Footrope Area has a possession limit of 7,500 lb, with a 2.5-inch minimum mesh size, and Cultivator Shoal has a possession limit of 30,000 lb, with a 3-inch minimum mesh size.

The red hake possession limit is 5,000 lb, regardless of area fished. Amendment 19 also implemented a 40,000 lb possession limit for vessels fishing in the southern stock area.

Map 1. Location of small-mesh fishing during 2002-2013 and exemption areas. Vessels that belong to a groundfish sector may fish for small-mesh multispecies in the two shaded exemption areas off NY, CT, and southern MA. The northern stock area is shaded grey, while the southern stock area is not shaded. The locations of groundfish closed areas shaded beige are shown for reference.

3.3.4.1 Magnuson-Stevens Fishery Conservation and Management Act

In 2006, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) was passed, which updated the original Magnuson-Stevens Act (MSA) and the Sustainable Fisheries Act of 1996. The MSFCMA introduced requirements for fishery management, including:

- A firm deadline to end overfishing in America by 2011. For stocks that are currently experiencing overfishing, the deadline for ending that overfishing is 2010
- Use of Annual Catch Levels (ACLs) to prevent overfishing, set at a level to ensure that overfishing does not occur in the particular fishery. The ACL is required to be set at or below the Acceptable Biological Catch (ABC) of the fishery. Councils were directed to follow the recommendations of their Scientific and Statistical Committee (SSC); the ACL cannot exceed the SSC's ABC recommendation.
- Use of Accountability Measures (AMs), actions to be taken in the event of an ACL overage.

3.3.4.2 Essential Fish Habitat (EFH)

See Section 5.3.2 for a summary of EFH management actions.

This amendment proposes no changes to small-mesh multispecies (hake) EFH descriptions or designations.

4.0 ALTERNATIVES

4.1 No Action (Preferred)

No Action would retain the current permit system and permit conditions. Vessels fishing for small-mesh multispecies in an exemption program must possess either an open access (Category K) or limited access (Categories A-F) NE multispecies permit. If the vessel has a limited access NE multispecies permit, fishing for small-mesh multispecies may be conducted while the vessel is not fishing under a day-at-sea (DAS) and while declared out of the fishery (DOF), if the vessel is required to operate a Vessel Monitoring System (VMS).

Rationale: This alternative retains the existing regulation pertaining to open access (Category K) permits in case the final preferred alternative is the status quo, i.e. rejects limited access to manage the small-mesh multispecies fishery. The fishery would continue to be self-regulating due to market forces and regulation. Possession limits and other measures could be adjusted as needed to keep the fishery within catch limits for whiting, red hake, and other groundfish species.

No Action was chosen as the "preferred alternative" because the small-mesh multispecies fishery is catching a small fraction of the current and future ACLs. A limited access program would impede the ability of new and existing vessels to increase catches of whiting, possibly more costly than other means of limiting and potentially reducing non-target catches. Measures that could reduce non-target catches include requiring more selective gears (although no gear has yet been identified to separate red hake and whiting catch), closed seasons (e.g. when the bycatch rate relative to the target species is highest), and closed areas (e.g. where the bycatch rate relative to the target species is highest).

In 2016, the fishery caught 15 percent of the northern silver hake ACL and 13% of the southern whiting ACL. The fishery however caught 86% of the northern red hake ACL and 67% of the southern red hake ACL, while the 2016 assessment update indicated that overfishing of southern red hake was occurring. If catches remain constant, relative to the 2018-2020 specifications, the fishery would catch 12% of the northern red hake ACL, 24% of the southern whiting ACL, 59% of the northern red hake ACL, and 108% of the southern red hake ACL. Red hake are a secondary target species for the small-mesh multispecies fishery.

4.2 Whiting[3] Possession Limit for Vessels Using 3-inch and larger Cod-End Mesh Trawls

4.2.1 Alternative 1 (Preferred; No Action) – Existing small-mesh multispecies possession limits apply

[3] Whiting includes silver and offshore hakes.

This alternative would apply the existing possession limits to all vessels using 3-inch mesh to target whiting, red hake, or other species. Under existing specifications, any vessel in a small-mesh exemption program in the Northern Fishery Management Area (i.e. the Gulf of Maine Grate Raised Footrope, Small-Mesh Areas I and II, the Cape Cod Raised Footrope Areas, and the Cultivator Shoals Area) may retain and land up to 30,000 lbs. of whiting and 3,000 lbs. of red hake. When fishing in the Southern New England and Mid-Atlantic exemption areas (Map 1), vessels may possess and land up to 40,000 lbs. of whiting and 5,000 lbs. of red hake. As they do now, lower whiting possession limits would apply if the vessel uses trawls with less than 3-inch mesh (see Table 6).

Rationale: Amendment 19 raised the whiting possession limit in the Southern New England and Mid-Atlantic exemption areas from 30,000 lbs. to 40,000 lbs. "to give vessels a better opportunity to harvest optimum yield and counter rising fuel prices." Although fuel prices have abated since that time, the fishery caught only 13.7% of the Annual Catch Limit (ACL) in fishing year 2015 (NEFMC 2016). If specifications are not substantially reduced, retaining the current possession limits would continue allowing the vessels to profitably target whiting. In the northern area, the fishery caught 23.9% of the whiting ACL, but exceeded the red hake ACL by 24.6%. Thus, increasing the whiting possession limit in the northern area is not justified because it could increase fishing effort and exceed the northern red hake ACL by an even greater amount despite the more restrictive accountability measure that takes effect in 2017.

4.2.2 Alternative 2 – Raise the Whiting possession limit from 40,000 to 50,000 lbs., January 1 to June 14 in the Southern New England and Mid-Atlantic exemption areas

Unless the possession limit is reduced to an incidental level by an in-season accountability measure [see §648(d)(4)], vessels would be able to possess and land up to 50,000 lbs. of whiting in the Southern New England and Mid-Atlantic exemption areas from January 1 to June 14, inclusive. The whiting possession limit from June 15 to December 31 would remain at 40,000 lbs. As they do now, the 30,000 lbs. whiting possession limit in the northern area and lower whiting possession limits for vessels using trawls with less than 3-inch mesh [see §648(d)(1)] would continue to apply.

Rationale: Increasing the whiting possession limit would be justified to allow the fleet to land more whiting on a trip and improve their ability to catch optimum yield. The higher possession limit would be restricted to a season to avoid negatively affecting price when the northern small-mesh exemption areas are open.

4.2.3 Alternative 3 – Lower the Whiting possession limit from 40,000 to 30,000 lbs., June 15 to December 31 in the Southern New England and Mid-Atlantic exemption areas

Unless the possession limit is reduced to an incidental level by an in-season accountability measure (see §648(d)(4), vessels fishing in the Southern New England and Mid-Atlantic exemption areas would be able to possess and land 30,000 lbs. of whiting from June 15 to December 31, and 40,000 lbs. from January 1 to June 14. Whiting possession limits in the northern exemption areas would not be changed. As they do now, the 30,000 lbs. whiting possession limit in the northern area and lower whiting possession limits for vessels using trawls with less than 3-inch mesh [see §648(d)(1)] would continue to apply.

Rationale: A lower possession limit is needed because the proposed 2018-2020 southern whiting ACL is 35 percent lower than the 2017 ACL. Lower specifications were predicted by the Plan Development

Team in the 2015 Annual Monitoring Report, because the 2014 and 2015 survey biomass indices were much lower than before[4]. Reducing the possession limit during June 15 to December 31 would also reduce the negative effect on prices when the northern exemption areas are open, yet leave the possession limit at 40,000 lbs. in the Southern New England and Mid-Atlantic exemption areas during the important winter season.

4.3 Limited Access Alternatives

4.3.1 Action 1 – Qualification Criteria

This action proposes a range of qualification criteria for vessels to continue targeting whiting and red hake with small-mesh trawls. Limited access would establish a maximum number of vessels in the small-mesh multispecies fishery, improving the effectiveness of regulations that reduce or cap catches of species with sub-ACL or choke species (i.e. species with catches that equal or exceed their annual catch limits).

Although the fishery history and the number of potentially qualifying vessels differs in the Northern Fishery Management Area from the Southern Fishery Management Area, a single set of qualification criteria would be simpler and less costly to administer. Regional differences in the small-mesh multispecies fisheries could be accommodated by adjusting the applicable possession limits for each limited access permit category (see Action 2).

No alternatives in Action 1 are designated as a "preferred alternative", because the alternatives reduce opportunities for new participants in the fishery when a small fraction of the whiting ACL is being caught. In 2016, the fishery caught 15 percent of the northern silver hake ACL and 13% of the southern whiting ACL. The fishery however caught 86% of the northern red hake ACL and 67% of the southern red hake ACL, while the 2016 assessment update indicated that overfishing of southern red hake was occurring. Red hake are a secondary target species for the small-mesh multispecies fishery.

4.3.1.1 Alternative 1 – Category I landings of 500,000 lbs. and Category II landings of 100,000 lbs. during 2008-2012

Vessels with documented landings at least 500,000 lbs. of whiting and/or red hake from January 1, 2008 to November 28, 2012 (control date) would qualify for a Category I permit. Vessels that landed at least 100,000 lbs. of whiting and/or red hake between these inclusive dates would qualify for a Category II permit. Vessel history would apply to the applicable permit history accounting for vessel transfers, bills of sale, or written agreements; including Moratorium Right ID history for vessels with an existing limited access permit in another Northeast Region (NER) fishery.

Rationale: This alternative would qualify more vessels at the Category I level than would Alternative 2, but fewer vessels at the Category II level. Analysis will show which alternative is a better fit to match the existing fishery footprint and be more effective at limiting effort increases.

Based on preliminary analyses using dealer, vessel trip report and dealer matching imputation system data, this alternative would qualify 48 vessels for a Category I limited access permit and 88 vessels for a Category II limited access permit. Thirty-one (31) Category I qualifiers and 40 Category II qualifiers

[4] Whiting specifications are set for a three-year period using a three-year moving average for the survey biomass index. Thus in 2018-2020 (the next specifications cycle), the ACL will be set using the 2014-2016 fall survey data in a separate Specifications Package.

were using small-mesh trawls and landing whiting and/or red hake during 2014-2016. Seventeen (17) of Category I qualifiers and 48 of Category II qualifiers were not active in the recent fishery. Sixty-nine (69) vessels fishing with small-mesh trawls and landing more than 2,000 lbs. of whiting in 2014-2016 would not qualify for a limited access permit. Of these 69 vessels, 26 had no whiting fishery history during the qualification period.

4.3.1.2 Alternative 2 – Category I landings of 1,000,000 lbs. and Category II landings of 20,000 lbs. during 2008-2012

Vessels with documentation that show landings at least 1,000,000 lbs. of whiting and/or red hake from January 1, 2008 to November 28, 2012 (control date) would qualify for a Category I permit. Vessels that landed at least 20,000 lbs. of whiting and/or red hake between these inclusive dates would qualify for a Category II permit. Vessel history would apply to the applicable permit history accounting for vessel transfers, bills of sale, or written agreements; including Moratorium Right ID history for vessels with an existing limited access permit in another Northeast Region (NER) fishery.

Rationale: This alternative would qualify fewer vessels at the Category I level than would Alternative 1, but more vessels at the Category II level. Analysis will show which alternative is a better fit to match the existing fishery footprint and be more effective at limiting effort increases.

Based on preliminary analyses using dealer, vessel trip report and dealer matching imputation system data, this alternative would qualify 25 vessels for a Category I limited access permit and 237 vessels for a Category II limited access permit. Nineteen (19) Category I qualifiers and 77 Category II qualifiers were using small-mesh trawls and landing whiting and/or red hake during 2014-2016. Six (6) of Category I qualifiers and 160 of Category II qualifiers were not active in the recent fishery. Thirty-nine (39) vessels fishing with small-mesh trawls and landing more than 2,000 lbs. of whiting in 2014-2016 would not qualify for a limited access permit. Of these 39 vessels, 23 had no whiting fishery history during the qualification period.

4.3.1.3 Alternative 3 – Category I landings of 500,000 lbs. and Category II landings of 100,000 lbs. during 2008-2016

Vessels with documentation with landings at least 500,000 lbs. of whiting and/or red hake from January 1, 2008 to December 31, 2016 would qualify for a Category I permit. Vessels that landed at least 100,000 lbs. of whiting and/or red hake between these inclusive dates would qualify for a Category II permit. Vessel history would apply to the applicable permit history accounting for vessel transfers, bills of sale, or written agreements; including Moratorium Right ID history for vessels with an existing limited access permit in another Northeast Region (NER) fishery.

Rationale: These qualification criteria are the same as those in Alternative 1 (Section 4.3.1.1), but history from the control date to the end of 2016 would also be considered for the purposes of qualification. Some vessels have recently entered the small-mesh multispecies fishery in response to more restrictive NE Multispecies regulations and lower quotas. Some of these vessels participated in the whiting fishery before 1996, particularly in the Ipswich Bay area when whiting were as abundant as they are now.

Based on preliminary analyses using dealer, vessel trip report and dealer matching imputation system data, this alternative would qualify 58 vessels for a Category I limited access permit and 113 vessels for a Category II limited access permit. Forty (40) Category I qualifiers and 49 Category II qualifiers were using small-mesh trawls and landing whiting and/or red hake during 2014-2016. Eighteen (18) of Category I qualifiers and 66 of Category II qualifiers were not active in the recent fishery. Sixty-four (64)

vessels fishing with small-mesh trawls and landing more than 2,000 lbs. of whiting in 2014-2016 would not qualify for a limited access permit. Of these 64 vessels, three had no trips in the qualification period that exceeded 2,000 lbs. of whiting landings.

4.3.1.4 Alternative 4 – Category I landings of 500,000 lbs. and Category II landings of 100,000 lbs. during 2000-2016

Vessels with documentation with landings at least 500,000 lbs. of whiting and/or red hake from January 1, 2008 to December 31, 2016 would qualify for a Category I permit. Vessels that landed at least 100,000 lbs. of whiting and/or red hake between these inclusive dates would qualify for a Category II permit. Vessel history would apply to the applicable permit history accounting for vessel transfers, bills of sale, or written agreements; including Moratorium Right ID history for vessels with an existing limited access permit in another Northeast Region (NER) fishery.

Rationale: These qualification criteria are the same as those in Alternative 1 (Section 4.3.1.1), but history from the control date to the end of 2016 would also be considered for the purposes of qualification, as in Alternative 4 above. This alternative also would allow more time for a vessel to meet the qualification criteria, to compensate for changes in the official policy that associated fleet history to an MRI. As a result, some vessels did not retain prior fleet history before this policy went into effect.

Based on preliminary analyses using dealer, vessel trip report and dealer matching imputation system data, this alternative would qualify 115 vessels for a Category I limited access permit and 201 vessels for a Category II limited access permit. Forty-three (43) Category I qualifiers and 44 Category II qualifiers were using small-mesh trawls and landing whiting and/or red hake during 2014-2016. Seventy-two (72) of Category I qualifiers and 157 of Category II qualifiers were not active in the recent fishery. Sixty-two (62) vessels fishing with small-mesh trawls and landing more than 2,000 lbs. of whiting in 2014-2016 would not qualify for a limited access permit.

4.3.1.5 Alternative 5 – Category I landings of 1,000,000 lbs. and Category II landings of 200,000 lbs. during 1996-2012

Vessels with documentation that show landings at least 1,000,000 lbs. of whiting and/or red hake from January 1, 1996 to November 28, 2012 (control date) would qualify for a Category I permit. Vessels that landed at least 200,000 lbs. of whiting and/or red hake between these inclusive dates would qualify for a Category II permit. Vessel history would apply to the applicable permit history accounting for vessel transfers, bills of sale, or written agreements; including Moratorium Right ID history for vessels with an existing limited access permit in another Northeast Region (NER) fishery.

Rationale: Participating vessels in the small-mesh multispecies fishery before 2008 would qualify for a limited access permit. Some of these vessels were previously active in the fishery, but have not targeting whiting and red hake more recently because of regulations for other fisheries in which they participate, due to limited availability of whiting in the exemption programs, due to low prices for whiting and red hake, or all three. Some fishermen with these vessels have expressed an interest in remaining in the fishery and resuming fishing for whiting and red hake when conditions change. This alternative is likely to qualify more vessels than either Alternative 1 or 2 above, but more vessels are currently not active in the fishery which could enter the fishery when regulatory or market conditions change, providing flexibility for more fishermen.

Based on preliminary analyses using dealer, vessel trip report and dealer matching imputation system data, this alternative would qualify 97 vessels for a Category I limited access permit and 180 vessels for a Category II limited access permit. Twenty-seven (27) Category I qualifiers and 36 Category II qualifiers were using small-mesh trawls and landing whiting and/or red hake during 2014-2016. Seventy (70) of Category I qualifiers and 144 of Category II qualifiers were not active in the recent fishery. Seventy-two (72) vessels fishing with small-mesh trawls and landing more than 2,000 lbs. of whiting in 2014-2016 would not qualify for a limited access permit.

4.3.2 Action 2 – Possession Limits by Permit Type

Although the Council chose No Action (and thus no limited access program) for the preferred alternative, the Action 2 alternatives would apply to vessels that qualify for a Category I or II limited access permit, or hold an Incidental Permit (by vessels that do not qualify or apply for a limited access permit). Furthermore, in case the public favors and the Council chooses a final alternative from the Action 1 qualification alternatives, the Council has designated a set of Action 2 alternatives as "preferred". These preferred alternatives include Alternative 1 for Category I vessels that would retain current whiting and red hake possession limits, plus Alternative 3 for Category II vessels and Alternative 3 for vessels holding an Incidental Permit that would retain current whiting and red hake possession limits, but would automatically trigger a possession limit reduction if certain criteria are met.

This action would retain or adjust the whiting possession limit for vessels that qualify for a limited access permit. No adjustments to the 5,000 lbs. southern red hake or the 3,000/1,500 lbs. northern red hake possession limits are proposed. When required, whiting possession limits may be reduced to an incidental limit (currently 2,000 lbs. or whiting and 400 lbs. of red hake) as an in-season accountability measure when landings reach a specified fraction of the Total Allowable Landings [see §648.86(d)(4)]. These accountability measures would continue under any of the Action 2 alternatives, as adjusted by future changes in specifications.

4.3.2.1 Whiting[5] Possession Limit for Vessels with a Category I Limited Access Small-Mesh Multispecies Permit

4.3.2.1.1 Alternative 1 (Preferred; Status quo) – Existing small-mesh multispecies possession limits apply

This alternative would apply the existing possession limits to all vessels with a Category I limited access permit. Under existing specifications, any vessel in a small-mesh exemption program in the Northern Fishery Management Area (i.e. the Gulf of Maine Grate Raised Footrope, Small-Mesh Areas I and II, the Cape Cod Raised Footrope Areas, and the Cultivator Shoals Area) may retain and land up to 30,000 lbs. of whiting. When fishing in the Southern New England and Mid-Atlantic exemption areas (Map 1), vessels may possess and land up to 40,000 lbs. of whiting. As they do now, lower whiting possession limits would apply if the vessel uses trawls with less than 3-inch mesh.

Rationale: Amendment 19 raised the whiting possession limit in the Southern New England and Mid-Atlantic exemption areas from 30,000 lbs. to 40,000 lbs. "to give vessels a better opportunity to harvest optimum yield and counter rising fuel prices." Although fuel prices have abated since that time, the fishery caught only 13.7% of the Annual Catch Limit (ACL) in fishing year 2015 (NEFMC 2016). If specifications are not substantially reduced, retaining the current possession limits would continue allowing the vessels to profitably target whiting. In the northern area, the fishery caught 23.9% of the

[5] Whiting includes silver and offshore hakes.

whiting ACL, but exceeded the red hake ACL by 24.6%. Thus, increasing the whiting possession limit in the northern area is not justified because it could increase fishing effort and exceed the northern red hake ACL by an even greater amount despite the more restrictive accountability measure that takes effect in 2017.

4.3.2.1.2 Alternative 2 – Raise the Whiting possession limit from 40,000 to 50,000 lbs., January 1 to June 14 in the Southern New England and Mid-Atlantic exemption areas

Unless the possession limit is reduced to an incidental level by an in-season accountability measure [see §648(d)(4)], vessels would be able to possess and land up to 50,000 lbs. of whiting in the Southern New England and Mid-Atlantic exemption areas from January 1 to June 14, inclusive. The whiting possession limit from June 15 to December 31 would remain at 40,000 lbs. As they do now, the 30,000 lbs. whiting possession limit in the northern area and lower whiting possession limits for vessels using trawls with less than 3-inch mesh [see §648(d)(1)] would continue to apply.

Rationale: Increasing the whiting possession limit would be justified to allow limited access vessels to land more whiting on a trip and improve their ability to catch optimum yield. With limited access in place, the higher possession limit would not attract more vessels into the fishery, but inactive vessels with a limited access permit may be more likely to fish for whiting with a higher possession limit. The higher possession limit would be restricted to a season to avoid negatively affecting price when the northern small-mesh exemption areas are open.

4.3.2.1.3 Alternative 3 – Lower the Whiting possession limit from 40,000 to 30,000 lbs., June 15 to December 31 in the Southern New England and Mid-Atlantic exemption areas

Unless the possession limit is reduced to an incidental level by an in-season accountability measure (see §648(d)(4), vessels fishing in the Southern New England and Mid-Atlantic exemption areas would be able to possess and land 30,000 lbs. of whiting from June 15 to December 31, and 40,000 lbs. from January 1 to June 14. Whiting possession limits in the northern exemption areas would not be changed. As they do now, the 30,000 lbs. whiting possession limit in the northern area and lower whiting possession limits for vessels using trawls with less than 3-inch mesh [see §648(d)(1)] would continue to apply.

Rationale: A lower possession limit is needed because the proposed 2018-2020 southern whiting ACL is 35 percent lower than the 2017 ACL. Lower specifications were predicted by the Plan Development Team in the 2015 Annual Monitoring Report, because the 2014 and 2015 survey biomass indices were much lower than before[6]. Reducing the possession limit during June 15 to December 31 would also reduce the negative effect on prices when the northern exemption areas are open, yet leave the possession limit at 40,000 lbs. in the Southern New England and Mid-Atlantic exemption areas during the important winter season.

4.3.2.2 Whiting Possession Limit for Vessels with a Category II Limited Access Small-Mesh Multispecies Permit

4.3.2.2.1 Alternative 1 (Status quo) – Existing small-mesh multispecies possession limits apply

[6] Whiting specifications are set for a three-year period using a three-year moving average for the survey biomass index. Thus in 2018-2020 (the next specifications cycle), the ACL will be set using the 2014-2016 fall survey data in a separate Specifications Package.

Vessels would be able to possess and land the same amount as allowed for vessels that qualify for a Category I vessel. The limits that currently apply to vessels in small-mesh exemption programs is 30,000 lbs. in northern exemption areas and 40,000 lbs. in the Southern New England and Mid-Atlantic exemption areas. As they do now, lower whiting possession limits would apply if the vessel uses trawls with less than 3-inch mesh [see §648.86(d)(1)].

Rationale: This alternative would give vessels that qualify for any limited access permit the same opportunity to catch optimum yield. It would be justified if the fishery catches a fraction of the ACLs and the specifications are not reduced. Although the initial analysis shows that many of the vessels that would qualify for Category II limited access permits land smaller amounts per trip than the (typically larger) vessels that would qualify for a Category I permit, the alternative would allow the Category II vessels to take longer trips and catch optimum yield.

4.3.2.2.2 Alternative 2 – Whiting possession limit of 30,000 lbs. in the northern exemption areas and 15,000 lbs. in the Southern New England and Mid-Atlantic exemption areas

Vessels that qualify for a Category II limited access permit would be able to possess and land 30,000 lbs. of whiting when fishing in the northern exemption areas (Gulf of Maine Grate Raised Footrope, Small-Mesh Areas I and II, the Cape Cod Raised Footrope Areas, and the Cultivator Shoals Area). This is the same as the limit for vessels that would qualify for a Category I limited access permit. As they do now, lower whiting possession limits would apply if the vessel uses trawls with less than 3-inch mesh [see §648.86(d)(1)].

Vessels that qualify for a Category II limited access permit would be able to possess and land 15,000 lbs. of whiting when fishing in the Southern New England and Mid-Atlantic exemption areas. Vessels that fish any part of the trip in the Southern New England and Mid-Atlantic exemption areas would be subject to the 15,000 lbs. limit unless transiting the area with gear properly stowed in a manner unavailable for fishing. As they do now, lower whiting possession limits would apply if the vessel uses trawls with less than 3-inch mesh.

Rationale: Fewer vessels that fish in the northern exemption areas are expected to qualify for a limited access permit and the fishery has caught a small fraction of the whiting ACL. On the other hand, many more vessels that fish in the southern area would qualify for a Category II limited access permit under any qualification alternative and typically land smaller amounts of whiting. A lower possession limit would reduce the incentive for Category II vessels to increase fishing effort, particularly if as anticipated the southern area specifications are lowered.

4.3.2.3 Incidental Possession Limit for Vessels Without a Limited Access Small-Mesh Multispecies Permit

Possession for this set of alternatives would apply to vessels that do not qualify under Action 1 (Section 4.1) for a Category I or II limited access permit.

4.3.2.3.1 Alternative 1 (Status quo) – Existing small-mesh multispecies possession limits apply

Any vessel, including non-qualifying vessels, would be able to possess and land the existing amounts of whiting (30,000 lbs. of whiting in the northern exemption areas and 40,000 lbs. of whiting in the Southern New England and Mid-Atlantic exemption areas; 3,000 lbs. of red hake in the northern management area or 5,000 lbs. of red hake in the southern management area). As they do now, lower whiting possession

limits for exemption areas would apply if the vessel uses trawls with less than 3-inch mesh [see §648.86(d)(1)]. Lower whiting and red hake limits also may apply in the northern or southern management area if and when in-season accountability measures are triggered [see §648.86(d)(4)].

Rationale: This alternative would retain the current possession limits for vessels in the small-mesh exemption area programs, while allowing for a limited access program to be established. That is, the Council could establish a limited access framework and qualify vessels, but change possession limits by category in the future as needed. If reductions in possession limits are needed, the incidental limit for non-qualifying vessels could then be reduced if the fishery exceeds the ACLs for whiting, red hake, or other species. This alternative would allow greater participation in the fishery to harvest optimum yield relative to Alternative 3, as long as the ACLs are not exceeded and overfishing is not occurring.

4.3.2.3.2 Alternative 2 – 2,000 lbs. whiting and 400 lbs. red hake possession limit for non-qualifying vessels

Vessels that do not qualify for a Category I or II limited access permit would be able to obtain an incidental permit. Unless otherwise specified (see alternatives in Section 4.3.2.3), these vessels would be able to possess and land up to the incidental possession limit specified in §648.86(d)(4) when fishing in any area, currently 2,000 lbs. of whiting and 400 lbs. of red hake.

Rationale: These limits are consistent with the possession limits associated with accountability measures which are intended to discourage vessels from targeting whiting and red hake. Very few vessels using large-mesh trawls or target other species land more than 2,000 lbs. of whiting or 400 lbs. of red hake.

4.3.3 Action 3 – Permit Allowances

If a limited access program for the small-mesh multispecies fishery is formed through this amendment, this Action considers the characteristics and conditions of the permit, and how similar they would be to other limited access permits commonly fished in conjunction with small-mesh multispecies permits. Alternative 1 would replicate many of the characteristics of other limited access permits used in conjunction, while Alternatives 2-5 consider specific differences that would be applicable to just the newly-formed small-mesh limited access permits.

Limited access permits issued under CFR §648.4 for Northeast region fisheries have a suite of characteristics and conditions that pertain to issuance, vessel replacement, and history assignment, etc. It is important that the characteristics and conditions for a limited access small-mesh multispecies fishery permit be consistent with other limited access programs if possible, particularly for fisheries that frequently intersect. The fisheries and limited access permits that most commonly intersect with vessels currently issued an open access small-mesh multispecies permit (Category K) are NE Multispecies DAS, Atlantic herring All Areas and Areas 2/3, and MAFMC squid, mackerel, and butter fish permits (see Table 7). Many of these permit characteristics and conditions are nearly the same, but there are some exceptions that may be important. The table below summarizes the conditions and characteristics of these three limited access fishery permits. Day-at-sea leasing and temporary quota transfers are not listed in the table and in Alternative 1 (Section 4.3.3.1.1) because they are not features of small-mesh multispecies fishery management.

Small-mesh multispecies fishery permitting issues that may differ from other fisheries may include whether or not there will be caps on permit ownership (Alternative 2, Section 4.3.3.1.2), whether or not there should be a one-year construction extension of the control date (Alternative 3, Section 4.3.3.1.3), whether or not more than one vessel qualifies for a permit based on its owner's history on a sold vessel

(Alternative 4, Section 4.3.3.1.4), whether or not upgrade restrictions should apply (Alternative 4, Section 4.3.3.1.5), whether or not only qualifying vessels will be allowed to use small-mesh trawls in the exemption areas (Alternative 5, Section 4.3.3.2.1), whether or not vessels may exceed the incidental possession limit while on a NE Multispecies sector trip (Incidental permits Alternatives 1 and 2, Sections 4.3.3.2.1 and 4.3.3.2.2) or a while on a herrings or squids trip provided the vessel has a limited access permit for those fisheries (Incidental permits Alternative 2, Section 4.3.3.2.4). These are listed as separable alternatives that would substitute for characteristics and conditions listed in Alternative 1 (Section 4.3.3.1.1), if a small-mesh multispecies limited access program is implemented.

Table 7. Current limited access permit conditions and characteristics in the NE Multispecies, Atlantic herring, and squid, mackerel, and butterfish fisheries.

Attribute & CFR reference	**NE Multispecies**	**Herring**	**Squid, Mackerel, and Butterfish**
Limited access commercial permits	Common pool and individual DAS; handgear	Two area-specific and an all areas permit	Three tiers for mackerel
Incidental permit or limit		55,000 lbs. (25 mt)	2,500 lb (1.13 mt) of longfin squid, 600 lb (0.27 mt) of butterfish, or up to 10,000 lb (4.54 mt) of Illex squid
Open access permit		6,600 lbs. (3 mt); 20,000 lbs. (9 mt) in Areas 2 and 3 if issued a limited access Atlantic mackerel permit	
Eligibility	Must be: • Issued a moratorium permit for the preceding year, • Replacing a vessel that was issued a moratorium permit for the preceding year, OR • Replacing a vessel that was issued a confirmation of permit history	Same, but vessels may not exceed 165 feet Letter of Authorization or 750 GRT.	Same as NE Multispecies, but for Atlantic mackerel, vessels may not exceed 165 feet Letter of Authorization or 750 GRT, or the main propulsion may not exceed 3,000 HP.
Appeals §648.4 (a)(1)(i)(M)	Must be based on the grounds that information used to determine qualification was incorrect. Vessels may continue to fish pending the final outcome of an appeal.	Same	Same, but includes a secondary hearing request provision.
Accumulation limit §648.4 (a)(1)(i)(N)	5% cap on NE Multispecies limited access permit holdings, plus a 15.5% aggregate cap on potential sector contribution of allocated stocks. (Amendment 18).	No restrictions	No restrictions

Attribute & CFR reference	NE Multispecies	Herring	Squid, Mackerel, and Butterfish
History	One pound of regulated multispecies between 1988 and 1990.	Must have landed at least 500 mt (1,103,311 lbs.) for All Areas or 250 mt (551,156 lbs.) in Areas 2 and 3 during any one calendar year between 1993 and 2003. For an incidental permit, the vessel must have landed at least 15 mt (33,069 lbs.) in any calendar year between 1988 and 2003.	Mackerel Tier 1 – 400,000 lbs. (149.3 mt) between 1997 and 2005; Tier 2 – 100,000 lbs. (37.3 mt) between March 1, 1994 and December 31, 2005; Tier 3 – 1,000 lbs. (0.4 mt) in any one calendar year March 1, 1994 and December 31, 2005. Mackerel history before April 3, 2009 may be retained separate from non-mackerel limited access permits to qualify a different vessel.
Construction extension of eligibility	Unknown	An applicant who submits written evidence that a vessel was under construction, reconstruction, or was under written contract for purchase as of XXX, may extend the period for determining landings for one year from the control date.	None
Application/renewal §648.4 (a)(1)(i)(B)	All permits are issued for fishing years, except for owners of a CPH. Applications required no later than 30 days before the end of the permit year. Failure to renew bars renewal in subsequent years. Limited access vessels may not be issued an open access permit.	Same	Same

Attribute & CFR reference	NE Multispecies	Herring	Squid, Mackerel, and Butterfish
Qualification restriction §648.4 (a)(1)(i)(C)	No more than one vessel may qualify based on that or another vessel's fishing and permit history.	Same	Same, except that mackerel history may be generated and retained by separate parties to qualify more than one vessel.
Change in ownership §648.4 (a)(1)(i)(D)	Fishing and permit history presumed to transfer with the vessel unless there is a written agreement.	Same	Same
Replacement vessels §648.4 (a)(1)(i)(E)	Limited to one replacement per year, subject to upgrade limits.	Same, but vessels being replaced must have been issued a NE Multispecies, Atlantic mackerel, Atlantic herring, Squid, or Butterfish permit issued between November 10, 2003 and November 9, 2005. Replacement vessel must be owned by the same owner as the one being replaced, or have a written agreement retaining the permit and all herring landings history.	Same as NE Multispecies
Upgraded vessel §648.4 (a)(1)(i)(F)	120% of HP baseline 110% of length baseline	Same	Same, but for mackerel restricts fish hold capacity to 110% of baseline specification.
Consolidation restriction §648.4 (a)(1)(i)(G)	May not be combined or consolidated (except by lease or DAS transfer).	Same	Same

Attribute & CFR reference	NE Multispecies	Herring	Squid, Mackerel, and Butterfish
Vessel baseline specifications §648.4 (a)(1)(i)(H)	Determined by the vessel that was initially issued a limited access permit	Same, but applied to original vessel or CPH.	Same, but includes a fish hold specification for mackerel.
Change in permit category §648.4 (a)(1)(i)(I)	One change in category per year within 45 days of the permit's effective date	[Reserved]	[Reserved]
Confirmation of permit history (CPH) §648.4 (a)(1)(i)(J)	A CPH preserves fishing privileges and history of a qualified vessel. No later than 30 days before the end of the first full fishing year that a vessel permit cannot be issued, a person not owning a vessel may apply for a CPH for an eligible vessel that has been sunk, destroyed, or transferred to another person. A CPH may in the future be applied to another vessel, subject to the vessel replacement provisions and upgrade limits.	Same	Same
Permit abandonment §648.4 (a)(1)(i)(K)	Failure to renew or relinquishment of a permit retires that permit and its fishing history.	Same	Same
Restriction on permit splitting §648.4 (a)(1)(i)(L)	Only one permit may be issued based on the history of a qualified vessel or CPH.	The history of a sold vessel may not be used to qualify another vessel, if there is a written agreement transferring its history with the sold vessel. For the purposes of the Atlantic herring fishery, herrings landings history generated by separate owners of a single vessel at different times may be used the qualify more than one vessel, provided that each owner applying for a limited access permit, demonstrates that he/she created distinct fishing histories, and that such histories have been retained	Same as NE Multispecies, with an exception for mackerel history.

4.3.3.1 Limited access permit characteristics and conditions

4.3.3.1.1 Alternative 1 - Characteristics and conditions in common with other Northeast region limited access permits (Preferred)

The following permit characteristics and conditions would apply to Category I and II limited access small-mesh multispecies fishery permits:

Eligibility: Vessels may be issued a limited access permit if they were:

- Issued a moratorium permit for the preceding year,
- Replacing a vessel that was issued a moratorium permit for the preceding year, OR
- Replacing a vessel that was issued a confirmation of permit history

Appeals: Owners of vessels may appeal a denial of eligibility based on a vessel's history in the small-mesh multispecies fishery based on the grounds that information used to determine qualification was incorrect. Vessels may continue to fish pending the final outcome of an appeal.

Accumulation Limit: Consistent with the Amendment 18 regulations pertaining to Northeast Multispecies limited access permits, no individual, permit bank, or other entity shall hold over 5% of the Category I and II small-mesh multispecies fishery limited access permits currently issued. Partial or proportional ownership is counted as if it were whole ownership for the purposes of determining compliance.

History: See alternatives described in Section 4.1.

Due to a variety of marketing and sale arrangements in the high-volume small-mesh multispecies fishery, a substantial fraction of dealer reports do not encompass the entire landings of a trip and similarly, a dealer report can also include landings of more than one trip for a vessel. These reports are also often missing landings that occur via transfers at sea for the use of whiting and red hake as bait. Split trips: many times, a vessel lands and sells a trip's catch at two or three dealers. Sometimes a second or third dealer assumes that the fish were reported by another dealer. Sometimes landings at a dealer were reported, but no matching vessel trip report (VTR) exists, possibly because one or the other source has an inaccurate permit or VTR serial number.

To analyze the number and characteristics of qualifying vessels, the Council used the best landings from dealer reports, VTRs, or Dealer Matching Imputation System (DMIS). The latter source, available since 2008, is an amalgam of dealer and vessel reports, used for catch monitoring. Although NMFS uses dealer reports as the official record of fleet history, the Council encourages NMFS to evaluate the use of all supporting data to determine qualification. In all cases, the fleet history of a vessel is assumed to be associated with a moratorium right ID (MRI) number for vessels with other types of limited access fishing permits. For actual qualification, NMFS may also apply different associations of fleet history where it has written evidence that the history of a sold vessel was retained by the seller.

Construction extension of eligibility: An applicant who submits written evidence that a vessel was under construction, reconstruction, or was under written contract for purchase as of November 28, 2012, may extend the applicable vessel history for determining qualification to November 28, 2013.

Application/renewal: Except for owners of a CPH, all small-mesh multispecies permits would be issued for the entire fishing year. Permit applications would be required no later than 30 days before the end of the permit year. Failure to renew would bar renewal in subsequent years. Vessels issued a limited access permit would not be issued an (open access) incidental possession limit permit (a vessel with a limited access permit is assumed to also hold an incidental small-mesh multispecies permit). See CFR §648.4 (a)(1)(i)(B).

Qualification restriction: No more than one vessel could qualify based on that or another vessel's fishing and permit history. See CFR §648.4 (a)(1)(i)(C).

Change in ownership: Fishing and permit history would be presumed to transfer with the vessel unless there is a written agreement between the buyer and seller of a qualified limited access vessel. See CFR §648.4 (a)(1)(i)(D).

Replacement vessels: Vessels with a limited access small-mesh multispecies permit would be limited to one replacement per year, subject to upgrade limits. Vessels being replaced would need to have been issued a NE Multispecies, Atlantic mackerel, Atlantic herring, Squid, or Butterfish permit issued between November 10, 2003 and November 9, 2005. A replacement vessel must be owned by the same owner as the one being replaced, or have a written agreement retaining the permit and all herring landings history. See CFR §648.4 (a)(1)(i)(E).

Upgraded vessel: Vessels would not be able to increase HP above 120% and length above 110% of the vessel baseline established by the first issuance of a limited access small-mesh multispecies permit. See CFR §648.4 (a)(1)(i)(F).

Consolidation restriction: Small-mesh multispecies limited access permits would not be able to be combined or consolidated, but may participate in a NE Multispecies lease or DAS transfer which has no bearing on small-mesh multispecies fishing. See CFR §648.4 (a)(1)(i)(G).

Vessel baseline specifications would be determined by the vessel that was initially issued a limited access Category I or II permit. See CFR §648.4 (a)(1)(i)(H).

A **change in permit category** provision would not apply to a small-mesh multispecies limited access permitted vessel. Changes from a Category I to II or vice versa might be accomplished by vessel replacement.

Confirmation of permit history (CPH): A CPH preserves fishing privileges and history of a qualified vessel. No later than 30 days before the end of the first full fishing year that a vessel permit cannot be issued, a person not owning a vessel may apply for a CPH for an eligible vessel that has been sunk, destroyed, or transferred to another person. A CPH may in the future be applied to another vessel, subject to the vessel replacement provisions and upgrade limits. See CFR §648.4 (a)(1)(i)(J)

Permit abandonment: Failure to renew or relinquishment of a permit would retire that permit and its fishing history. See CFR §648.4 (a)(1)(i)(K).

Restriction on permit splitting: The history of a sold vessel could not be used to qualify another vessel, if there is a written agreement transferring its history with the sold vessel. For the purposes of the small-mesh multispecies fishery, small-mesh multispecies landings history generated by separate owners of a single vessel at different times could be used the qualify more than one vessel, provided that each owner applying for a limited access permit, demonstrates that he/she created distinct fishing histories, and that such histories have been retained by prior written agreement.

Rationale for permit characteristics and conditions: These measures are most consistent with limited access permit conditions and characteristics in other limited access fisheries that intersect with vessels having Category K small-mesh multispecies permits and probable qualifying vessels. Ownership caps would serve to maintain diversity in the fishery and limit impacts on smaller fishing communities.

Exemption programs: Vessels fishing for small-mesh multispecies in an exemption program must possess either a Category I or Category II small-mesh multispecies limited access permit, or an incidental possession limit permit and a limited access (Categories A-F) NE multispecies permit under the rules pertaining to each exemption area.

Rationale: This alternative would allow any vessel with a Multispecies permit to fish in the exemption areas, even if it does not qualify for a small-mesh multispecies limited access permit, but the applicable possession limits would apply. Thus, a vessel with an incidental small-mesh multispecies permit, for example, could fish in an exemption program and target small-mesh multispecies, but land a small amount under the incidental limit specified in the alternatives above.

Sector participants: If the vessel has a limited access NE multispecies permit AND a limited access Small-mesh Multispecies Category I or II permit, fishing for small-mesh multispecies may be conducted under the rules of an exemption program while the vessel is not fishing under a day-at-sea (DAS) and while declared out of the fishery (DOF), if the vessel is required to operate a Vessel Monitoring System (VMS).

Rationale: This requirement would be consistent with the current rules that apply to holders of a limited access NE multispecies permit, which specify that the vessel is not on a groundfish DAS while fishing for small-mesh multispecies.

4.3.3.1.2 Alternative 2 – No accumulation limit

There would be no limits on holdings of small-mesh limited access permits. Persons and entities could purchase qualified vessels and hold any number of Category I and II permits.

Rationale: Accumulation limits were implemented through Amendment 18 for Northeast multispecies limited access permits to prevent an individual or entity from acquiring or controlling excessive shares of the fishery access privileges, which could create undue hardship on the remaining permit holders that lack (or unable to obtain) quota for a species might be unable to fish for groundfish. The small-mesh multispecies fishery is not a Limited Access Privilege Program (LAPP), so allocations are not made to individuals or entities (e.g., to sectors under the Northeast multispecies LAPP). Because the whiting market is dominated by shipping product to NY markets, any aggregation of permits by persons or businesses is unlikely to harm smaller fishing communities.

4.3.3.1.3 Alternative 3 – Construction extension of eligibility

No qualification allowances for vessels under construction as of the November 28, 2012 control date would be made.

Rationale: The limited access program is meant to prevent increases in effort by vessels that entered the fishery after the control date.

4.3.3.1.4 Alternative 4 – Qualification restriction (Preferred)

History of a single vessel cannot be used to qualify more than one vessel.

Rationale: This alternative would prevent multiple vessels from qualifying for a limited access permit based on the history of a single vessel that had been sold or transferred to a different owner. It would be more consistent with the number of vessels that had actually fished for small-mesh multispecies, rather than the number of participants that had owned vessels which targeted small-mesh multispecies.

4.3.3.1.5 Alternative 5 - Upgraded vessels

Qualified vessels with Category I or II limited access permits would be able to replace or modify their vessels without restriction on size or horsepower.

Rationale: The intent of the proposed limited access program is to constrain new entrants to the fishery, not constrain capacity of existing participants, if there is spare capacity in the fishery (i.e. catches do not exceed annual limits).

4.3.3.2 Incidental permit conditions

The alternatives in Section 4.3.3.2 describe how vessels may or may not fish for small-mesh multispecies while in possession of an incidental permit (alternatives for whiting and red hake incidental possession limits are described in Section 4.3.2.3). Special provisions for vessels on a Multispecies DAS or when targeting herring or squid are presented as separate alternatives. For the final amendment, the Council may select none, one, or more than one of these alternatives if a limited access program is established.

4.3.3.2.1 Alternative 1 – Only vessels with a limited access small-mesh multispecies permit may fish in exemption programs.

Only vessels that qualify for either a Category I or II limited access small-mesh multispecies permit would be able to target whiting and red hake while fishing in a small-mesh multispecies exemption program. Vessels with an incidental possession limit permit would be prohibited from using small mesh trawls in small-mesh multispecies exemption areas.

Rationale: The intention of the exemption programs is to allow fishing with small-mesh trawls for whiting and red hake. Since landings of these species often have relatively low prices, vessels must land large quantities of fish and targeting whiting and red hake with an incidental possession limit is inconsistent with the intent of having limited access to the fishery. Allowing vessels to use small-mesh trawls in exemption areas for small amounts of whiting and red hake could cause enforcement problems.

4.3.3.2.2 Alternative 2a – Incidental possession limit permits and NE Multispecies limited access permits

Vessels using large-mesh groundfish gear[7] while on a NE Multispecies DAS would be able to exceed the incidental whiting and red hake limits described in Section 4.3.2.3, including small-mesh exemption areas and other open fishing areas. These vessels must also possess a Category I or Category II or incidental small-mesh multispecies permit.

[7] Including gill nets, longlines, and regulated large-mesh trawls

Rationale: The alternative would enable limited access NE Multispecies vessels to target small-mesh multispecies with large-mesh trawls and other legal groundfish gear, or land amounts greater than the incidental limit while targeting groundfish on a DAS. It would generally be unlikely to target whiting and red hake with large-mesh groundfish gear because smaller whiting and red hake would escape, but when there are large whiting present, catches greater than the incidental limit may be possible. Thus, this alternative would minimize whiting and red hake discards in the large-mesh NE Multispecies fishery.

4.3.3.2.3 Alternative 2b – Incidental possession limit permits and NE Multispecies limited access permits

Vessels fishing for small-mesh multispecies in an exemption program must possess a Category I or II small-mesh multispecies limited access permit. Vessels with a small-mesh multispecies AND a NE multispecies limited access permit may fish for small-mesh multispecies and exceed the incidental limit only while the vessel is not fishing under a day-at-sea (DAS) and while declared out of the fishery (DOF).

Rationale: This alternative specifies that a vessel fishing for small-mesh multispecies may not be on a groundfish day-at-sea and must be declared out of the groundfish fishery. Thus, vessels with NE multispecies limited access permits are not automatically qualified to fish for small-mesh multispecies with small- or large-mesh. Vessel owners may however obtain an open-access incidental possession limit permit to retain small-mesh multispecies up to the specified incidental whiting and red hake limits.

4.3.3.2.4 Alternative 3 (Preferred) – Incidental possession limit permits and Atlantic herring and Squid limited access permits

Vessels fishing in a small-mesh multispecies exemption area while targeting Atlantic herring or squid with a limited access permit issued for those fisheries would be able to exceed the incidental possession limit for whiting and red hake. Vessels would be able to retain and land whiting and red hake up to the limits that apply to vessels with a Category I limited access small-mesh multispecies permit, but not exceed the lower whiting exemption area possession limits that apply to vessels using trawls with mesh less than 3-inches.

Rationale: This allowance would minimize discards of whiting and red hake in other small-mesh fisheries (namely in the herring, northern shrimp, and squid/mackerel/butterfish fisheries), regardless of whether the vessel qualified for a small-mesh multispecies limited access permit.

4.3.3.2.5 Alternative 4 – Exempt Vessels with an Incidental Permit from Limited Access Regulations in Areas that Require the Use of a Raised Footrope Trawl

This alternative would allow any vessel that does not qualify for a Category I or II limited access permit to fish for whiting and red hake in specific exemption areas that require the use of a raised footrope trawl (as specified in §???). Currently, these areas include the Gulf of Maine Grate area, Small-Mesh Areas I and II, and the Raised Footrope Areas I and II (see Table 5) and the existing whiting and red hake possession limits would apply (see Table 6).

Rationale: The raised footrope gear is an established net that reduces catches of many regulated groundfish and other benthic species. By itself, this selective gear reduces concerns about bycatch exceeding acceptable levels and sub-ACLs that apply to the fishery. Because of the selective gear requirement, reducing access to the fishery when the target catch is below the applicable ACLs is not as problematic as it is in exemption areas that do not require selective gear.

4.4 Considered and Rejected Alternatives

4.4.1 Regional Limited Access Qualification

This alternative would allow vessels to qualify for a single or two-tier limited access permit using qualification criteria that are specified by region (see Section 4.3.1).

Rationale for rejection: Although it might allow more fine tuning of the number of qualifying vessels in each region, this alternative presents some difficult-to-solve fleet history concerns. If this amendment were to consider different qualification criteria by area fished, for example, vessels would have to show or prove in dealer data, vessel trip reports, or other documents that they had fished in a specific area. Split trips that fished in both areas would be problematic.

4.4.2 Automatic Qualification by Vessels with a NE Multispecies Limited Access Permit

In addition to vessels that qualify for a Category I or II small-mesh multispecies permit, vessels with a NE Multispecies limited access permit would be allowed to fish for small-mesh multispecies as they are currently allowed to do.

Rationale: This alternative would preserve the status quo, but allow continued access to the fishery by a limited number of vessels in the multispecies fishery. It could allow a limited number of vessels into the small-mesh multispecies fishery, relieving fishing pressure on large-mesh groundfish, without keeping the fishery open to an unlimited number of vessels. On the other hand, this alternative was considered and rejected because the number of vessels with a NE Multispecies limited access permit is much larger than the number of vessels that in recent decades have participated in the whiting fishery.

4.4.3 Triggered reductions to status quo possession limits

The Council considered a hybrid alternative that would have triggered reductions in small-mesh multispecies possession limits when certain conditions were met. The possession limit reductions would have applied to holders of Category II limited access and Incidental (i.e. non-qualifier) permits.

Initially, the limited access program would begin by qualifying vessels for limited access based on their history in the fishery, but all vessels would have the same whiting and red hake possession limits. If catches of target or non-target species had exceeded or approached a specified threshold relative to their ABC, possession limit reductions would have been automatically triggered via a tiered system.

Rationale: This alternative would retain the ability for vessels not qualifying for a Category I permit to fish under existing rules and possession limits for whiting and red hake. A triggered possession limit reduction would however reduce the opportunity for Category II vessels to increase fishing effort for target stocks of whiting and red hake, when one or more of the target stocks are at risk. The reduced possession limits are intended to be consistent with traditional levels of landings per trip by vessels qualifying for Category II permits before implementation of the limited access program.

The details of this alternative were not fully developed, although the PDT recommended a framework or system to make this alternative potentially viable. On further evaluation, the Council decided that the alternative would be too inflexible and presume conditions that could not be predicted. An automatic possession limit reduction under a future condition could be insufficient or too severe. In contrast, the FMP could achieve the same objectives as intended by this alternative by choosing Alternative 1 (status quo possession limits by permit category, Section 4.3.2) and making future adjustment through framework actions. A framework action would give a hard look at the then existing conditions and allow the Council to make adjustments by permit category, as needed. Due to the complexities and future unknown conditions, the Council felt that at this time this measure would be difficult to evaluate and forecast the probable effects.

5.0 AFFECTED ENVIRONMENT (EIS)

5.1 Biological Environment

5.1.1 Summary of life history characteristics

5.1.1.1 Silver hake

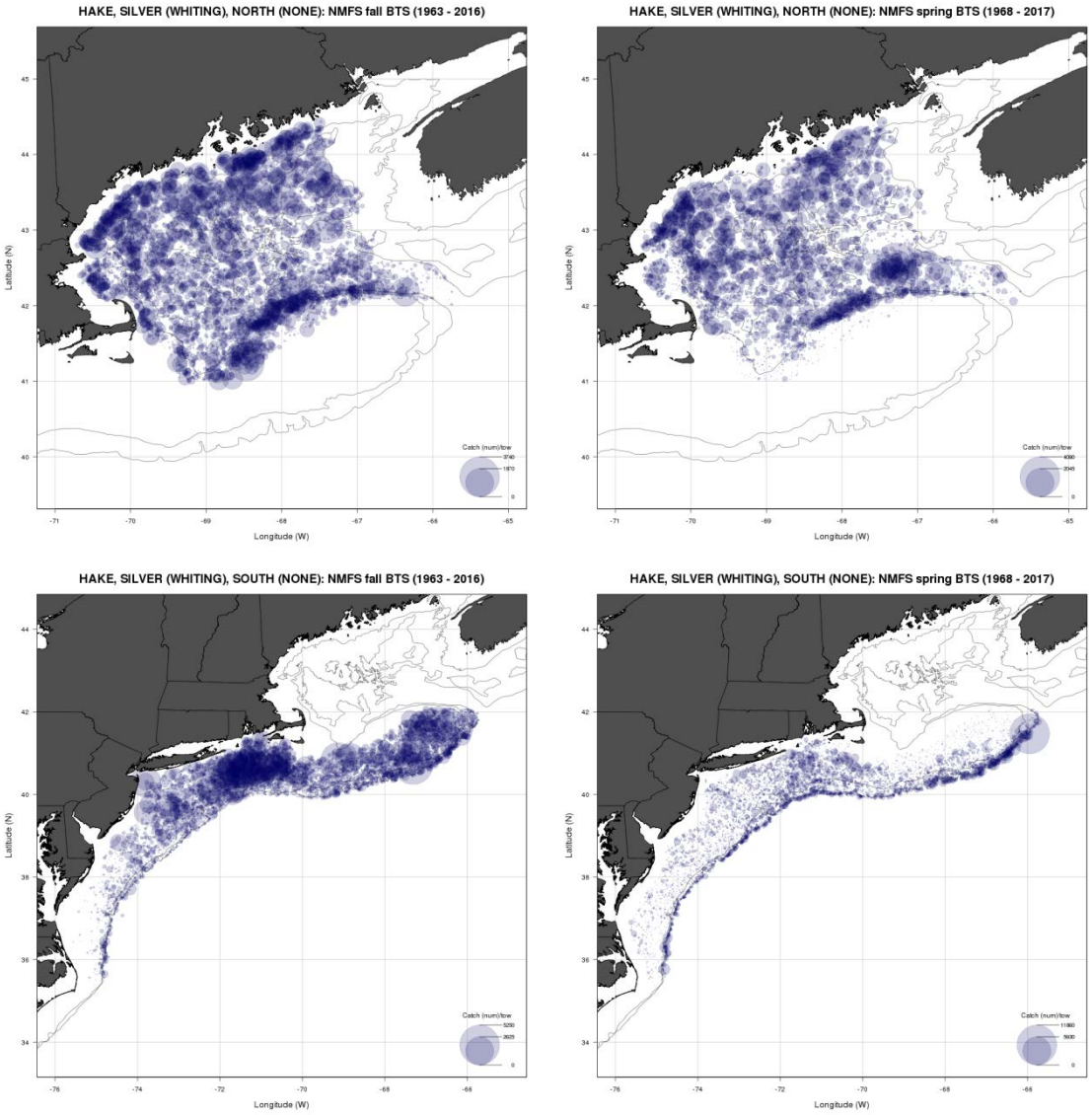
Silver hake, *Merluccius bilinearis*, also known as whiting, range from the Grand Banks of Southern Newfoundland to South Carolina (Brodziak, 2001, Lock and Packer 2004). In U.S. waters, two subpopulations of silver hake are assumed to exist within the EEZ based on numerous methods, primarily morphometric differences and otolith micro-constituent differences (Conover et al. 1967, Almeida 1987, Bolles and Begg 2000). The northern silver hake stock inhabits the Gulf of Maine to Northern Georges Bank waters, while the southern silver hake stock inhabits Southern Georges Bank to the Mid Atlantic Bight waters (Figure 3). However, Bolles and Begg (2000) reported some mixing of silver hake due to their wide migratory patterns, but the degree of mixing among the management areas is unknown. A re-evaluation of stock structure in the last silver hake assessment, based on trends in adult biomass, icthyolplankton survey, growth and maturity analyses, also suggests that reproductive isolation between the two stocks is unlikely (NEFSC, 2010). Based on the mixed evidence on silver hake stock structure (morphometrics, tagging, discontinuous larva distribution, homogeneous growth and maturity), it was concluded that there was no strong biological evidence to support either a separate or a single stock structure for silver hake. Thus, the two-stock structure definition remained as the basis for science and management (NEFSC, 2010).

Survey distribution suggests that most of the silver hake are in the Gulf of Maine and on Georges Bank in the fall and along the shelf edge in the spring (Figure 3). Silver hake migrate in response to seasonal changes in water temperatures, moving toward shallow, warmer waters in the spring. Silver hake spawn in shallow waters during late spring and early summer and then return to deeper waters in the autumn (Brodziak et al. 2001). The older, larger silver hake especially prefer deeper waters. During the summer, portions of both stocks can be found on Georges Bank. In winter, fish in the northern stock move to deep basins in the Gulf of Maine, while fish in the southern stock move to outer continental shelf and slope waters. Silver hake are widely distributed, and have been observed at temperature ranges of 2-17° C (36-63° F) and depth ranges of 11-500 m (36-1,640 ft). However, they are most commonly found between 7-10º C (45-50º F) (Lock and Packer 2004).

Female silver hake are serial spawners, producing and releasing up to three batches of eggs in a single spawning season (Collette and Klein-MacPhee eds. 2002). Major spawning areas include the coastal region of the Gulf of Maine from Cape Cod to Grand Manan Island, southern and southeastern Georges Bank, and the southern New England area south of Martha's Vineyard. Peak spawning occurs earlier in the south (May to June) than in the north (July to August). Over 50 percent of age-2 fish (20 to 30 cm, 8 to 12 in) and virtually all age-3 fish (25 to 35 cm, 10 to 14 in) are sexually mature (O'Brien et al. 1993). Silver hake grow to a maximum length of over 70 cm (28 in) and ages up to 14 years have been observed in U.S. waters, although few fish older than age 6 have been observed in recent years (Brodziak et al. 2001, NEFSC 2010). Silver hake are nocturnal, semi-pelagic predators, moving up in the water column to feed at night, primarily between dusk and midnight and returning to rest on the bottom during the day, preferring sandy, muddy or pebble substrate (Collette and Klein-MacPhee eds. 2002). Silver hake population constitutes an important link in the food web dynamics due to their high prey consumption capacity and as food source for major predators in the northwest Atlantic ecosystem. Consumptive estimates of silver hake indicate that predatory consumption represents a major source of silver hake

removals from the system and primarily includes goosefish, bluefish, windowpane, four spot flounder, red hake, cod, silver hake, thorny skate, winter skate, little skate, Pollock and spiny dogfish (Garrison and Link 2000, NEFSC, 2010). Silver hake are generally cannibalistic but their diet varies by region, size, sex, season, migration, spawning and age (Garrison and Link 2000, Lock and Packer 2004, Link et al. 2011).

Figure 3 Fall (left) and spring (right) survey distribution of silver hake in the northern stock (Top) and southern stock (Bottom) from the NEFSC bottom trawl surveys, 1963-2017.



5.1.1.2 Red hake

Red hake, *Urophycis chuss*, is a demersal gadoid species distributed from the Gulf of St. Lawrence to North Carolina, and are most abundant from the western Gulf of Maine through Southern New England

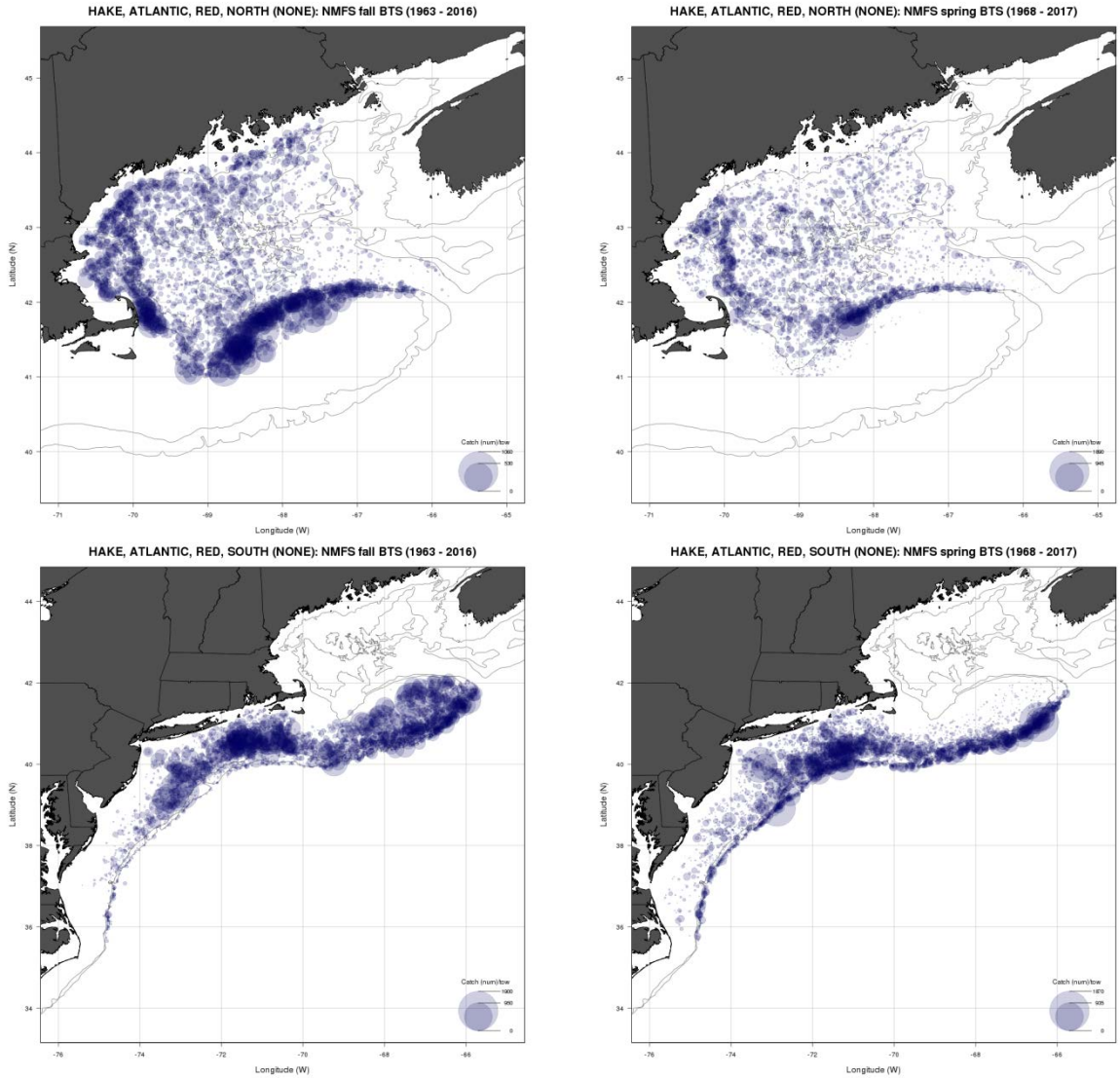
waters. Red hake are separated into northern and southern stocks for management purposes. The northern stock is defined as the Gulf of Maine to Northern Georges Bank region, while the southern stock is defined as the Southern Georges Bank to Mid-Atlantic Bight region (Figure 4). Survey distributions indicate that there are higher concentrations of red hake by catch weight (kg) during the NEFSC spring surveys than the NEFSC fall surveys. Less red hake are caught in the middle of Georges Bank in the spring than the fall. They tended to be more in the Gulf of Maine and along the shelf, than in the middle of the bank (Figure 4).

Red hake migrate seasonally, preferring temperatures between 5 and 12° C (41-54° F) (Grosslein and Azarovitz 1982). During the spring and summer months, red hake move into shallower waters to spawn, then move offshore to deep waters in the Gulf of Maine and the edge of the continental shelf along Southern New England and Georges Bank in the winter. Spawning occurs from May through November, with primary spawning grounds on the southwest part of Georges Bank and in the Southern New England area off Montauk Point, Long Island (Colton and Temple 1961).

Red hake do not grow as large as white hake, and normally reach a maximum size of 50 cm (20 in) and 2 kg (4.4 lb.) (Musick 1967). Females are generally larger than males of the same age, and reach a maximum length of 63 cm (25 in) and a weight of 3.6 kg (7.9 lb.) (Collette and Klein-MacPhee eds. 2002). Although they generally do not live longer than 8 years, red hake have been recorded up to 14 years old. In the northern stock, the age at 50 percent maturity is 1.4 years for males and 1.8 years for females, and the size at 50 percent maturity is 22 cm (8.7 in) for males and 27 cm (10.6 in) for females (O'Brien et al. 1993). In the southern red hake stock, the age at 50 percent maturity is 1.8 years for males and 1.7 years for females, and the size at 50 percent maturity is 24 cm (9.5 in) for males and 25 cm (9.8 in) for females (O'Brien et al. 1993).

Red hake prefer soft sand or muddy bottom, and feed primarily on crustaceans such as euphausiids, decapods, and rock crabs as well as fish such as haddock, silver hake, sea robins, sand lance, mackerel and small red hake (Bowman et al. 2000). Primary predators of red hake include spiny dogfish, cod, goosefish, and silver hake (Rountree 1999). As juveniles, red hake seek shelter from predators in scallop beds, and are commonly found in the mantle cavities of (or underneath) sea scallops. In the fall, red hake likely leave the safety of the scallop beds due to their increasing size and to seek warmer temperatures in offshore waters (Steiner et al. 1982).

Figure 4 Fall (left) and spring (right) survey distribution of red hake in the northern stock (Top) and southern stock (Bottom) from the NEFSC bottom trawl surveys, 1963-2017



5.1.1.3 Offshore hake

Offshore hake (*Merluccius albidus*) is a data-poor stock and very little is known about its biology and life history. They are commonly distributed from southern Georges Bank through the Mid-Atlantic Bight, at depths of 160-550 meters and temperatures ranging between 11-13ºC. They are known to co-occur with silver hake in the outer continental slopes of the Atlantic Ocean and are easily confused with silver hake because of their strong morphological resemblances. There appears to be seasonal differences in the patterns of distribution with concentrations shifting south of Georges Bank in the winter months and extending to the southern flank of Georges Bank and further south in the spring (Figure 5).

The primary source of biological information for offshore hake is the annual fishery independent surveys conducted by the Northeast Fisheries Science Center (NEFSC). Offshore hake Survey catches are generally low and variable relative to other hake species.

Offshore hake are located primarily on the continental shelf and presumably beyond the NEFSC survey area. Offshore hake tend to be concentrated in the southern Georges Bank region in the fall, whereas in the spring, they are found further south in the Mid-Atlantic Bight. However, offshore hake appear to be more abundant during the winter months.

Offshore hake appear to be sexually dimorphic with females slightly larger than males. Females mature at a larger length than males, like other gadoid species (O'Brien et al 1993). Maximum size observed in the survey was approximately 56 cm. Length at 50 percent maturity also differed significantly between sexes with females maturing at larger sizes (28 cm) relative to males (23 cm). Spawning generally occurs between April and July. Maximum observed size was approximately 43 cm for males and 56 cm for female (Traver et al. 2011).

Figure 5 Fall (left) and Spring (right) survey distribution of offshore hake from the NEFSC bottom trawl surveys, 1967-2017.

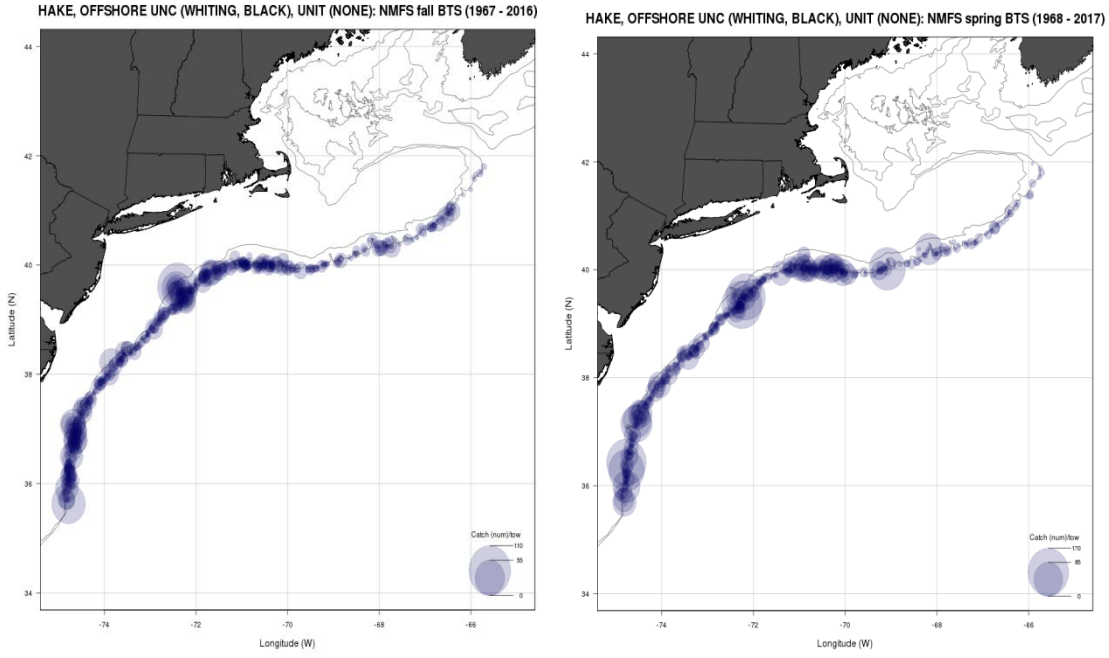
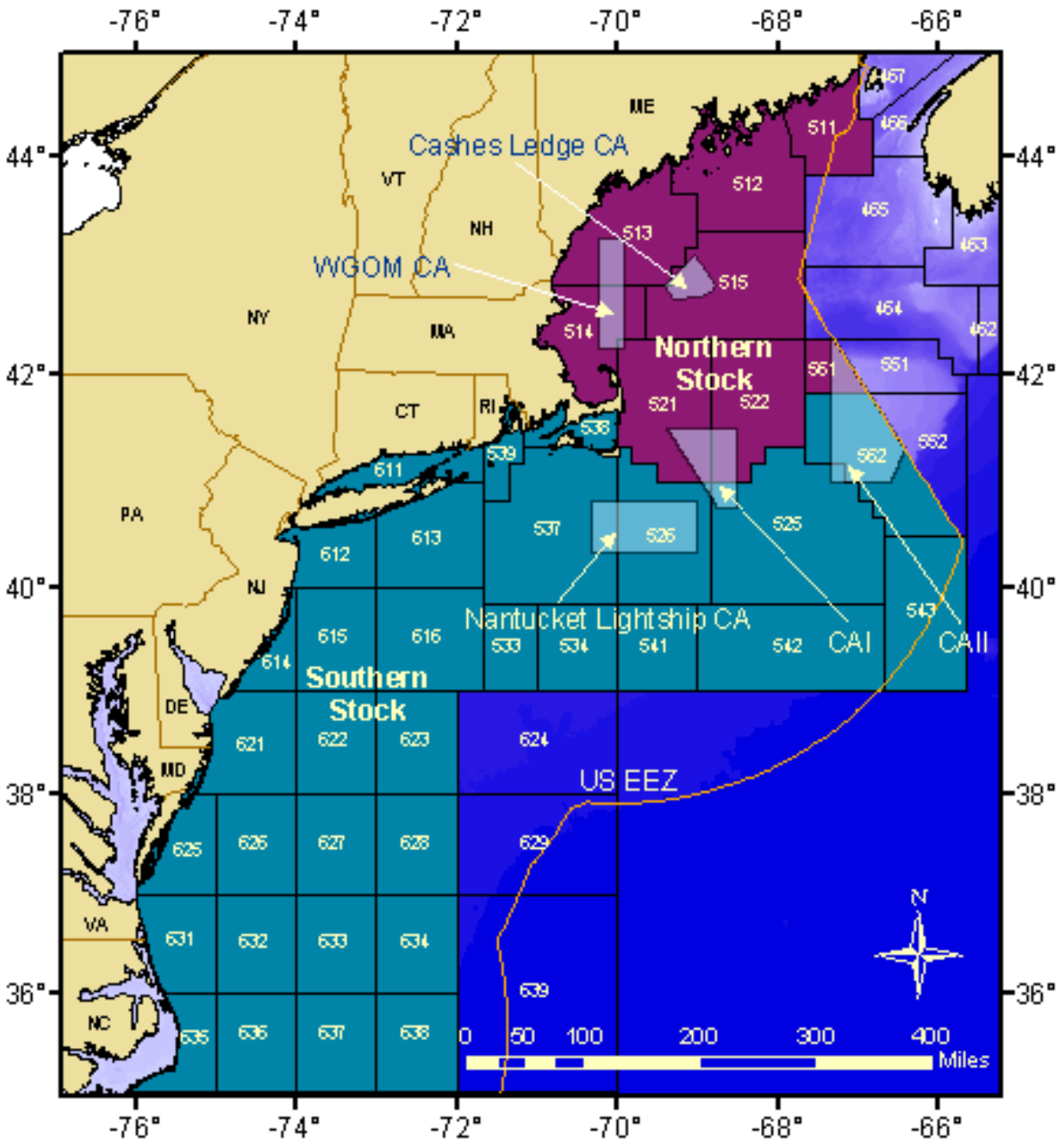


Figure 6. Statistical area used to define red and silver hake in the northern and southern management areas. Offshore hake statistical areas are restricted to the southern management region only.



5.1.2 Stock status

An update assessment was performed by the Northeast Fisheries Science Center (NEFSC) and presented to the Whiting PDT. This assessment followed the same procedures that were applied in the benchmark assessment using new survey data and catch estimates. Also, scientific uncertainty in these estimates

were estimated and the full range of potential ABC values as well as probability of overfishing (ABC>OFL) which will be presented to the Scientific and Statistical Committee (SSC) on October ???, 2017. These estimates included the ABC at the 25th percentile for silver hake and the 40th percentile for red hake, separately for the northern and southern management areas. For offshore hake, there was no reliable information about catch or trends in abundance and biomass to guide management of offshore hake.

5.1.2.1 Silver hake

The 2017 silver hake assessment update for both the northern and southern management areas included survey data from the NEFSC fall bottom trawl survey, commercial fishing data from vessel trip reports, dealer landings, and on-board fishery observer data through 2016 and will be the basis for this report.

In the absence of an analytical assessment for silver hake, the biological reference points for both the northern and southern silver hake stocks are as follows:

Silver hake is overfished when the three-year moving average of the fall survey weight per tow (i.e. the biomass threshold) is less than one half the B_{MSY} proxy, where the B_{MSY} proxy is defined as the average observed from 1973-1982. The most recent estimates of the biomass thresholds are 3.21 kg/tow for the northern stock, and 0.83 kg/tow for the southern stock.

Overfishing occurs when the ratio between the catch and the arithmetic fall survey biomass index from the most recent three years exceeds the overfishing threshold. The most recent estimates of the overfishing threshold are 2.78 kt/kg for the northern stock and 34.19 kt/kg for the southern stock of silver hake.

Overfishing thresholds are based on annual exploitation ratios (catch divided by arithmetic fall survey biomass) averaged from 1973-1982 (Table 8). Catch per tow is in "Albatross" units.

Table 8. Silver hake overfishing definition reference points.

Stock	**Threshold**	**Target**
Northern Silver Hake	½ B_{MSY} Proxy (3.21 kg/tow) F_{MSY} Proxy (2.78 kt/kg)	B_{MSY} Proxy (6.42 kg/tow) F_{MSY} Proxy (n/a)
Southern Silver Hake	½ B_{MSY} Proxy (0.83 kg/tow) F_{MSY} Proxy (34.19 kt/kg)	B_{MSY} Proxy (1.65 kg/tow) F_{MSY} Proxy (n/a)

In the northern management area (Table 9; Figure 7), the three-year average arithmetic mean biomass based on the NEFSC fall bottom trawl survey for data 2014-2016 (19.92 kg/tow) was above the management threshold (3.21 kg/tow) and above the target (6.42 kg/tow). The three-year average exploitation index (total catch divided by biomass index) for 2014-2016 (0.15kt/kg) was below the overfishing threshold (2.78 kt/kg).

In the southern management area (Table 10; Figure 8), the three-year arithmetic also based on the NEFSC fall bottom trawl survey data for 2014-2016 (1.05 kg/tow) was above the biomass threshold (0.83 kg/tow) but below the target (1.65 kg/tow). The three-year average exploitation index (total catch divided by biomass index) for 2014-2016 (2.95 kt/kg) was below the overfishing threshold (34.19 kt/kg). Therefore, based on the 2017 silver hake updated assessment, it is recommended that both stocks so silver hake are NOT overfished and overfishing is NOT occurring.

Table 9. Northern silver hake stock - summary of catch and survey indices in albatross units for northern silver hake, 1955-2016.

Year	Northern Fall Survey Arithmetic kg/tow	Northern Fall Survey 3-year Average	Northern Total Landings (000's mt)	Northern Discards (000's mt)	Northern Total Catch (000's mt)	Northern Exploitation Index (kg/000's mt)	Northern Exploitation Index 3-year Average
1955			53.36		53.36		
1956			42.15		42.15		
1957			62.75		62.75		
1958			49.90		49.90		
1959			50.61		50.61		
1960			45.54		45.54		
1961			39.69		39.69		
1962			79.00		79.00		
1963	23.10		73.92		73.92	3.20	
1964	4.34		94.46		94.46	21.77	
1965	7.06	11.50	45.28		45.28	6.41	10.46
1966	4.19	5.20	47.81		47.81	11.41	13.20
1967	2.27	4.51	33.37		33.37	14.70	10.84
1968	2.28	2.91	41.38		41.38	18.15	14.75
1969	2.41	2.32	24.06		24.06	9.98	14.28
1970	3.03	2.57	27.53		27.53	9.09	12.41
1971	2.67	2.70	36.40		36.40	13.63	10.90
1972	5.78	3.83	25.22		25.22	4.36	9.03
1973	4.12	4.19	32.09		32.09	7.79	8.60
1974	3.45	4.45	20.68		20.68	5.99	6.05
1975	8.09	5.22	39.87		39.87	4.93	6.24
1976	11.25	7.60	13.63		13.63	1.21	4.05
1977	6.72	8.69	12.46		12.46	1.85	2.66
1978	6.32	8.10	12.61		12.61	2.00	1.69
1979	6.18	6.41	3.42		3.42	0.55	1.47
1980	7.23	6.58	4.73		4.73	0.65	1.07
1981	4.52	5.98	4.42	2.64	7.05	1.56	0.92
1982	6.28	6.01	4.66	2.91	7.57	1.21	1.14
1983	8.76	6.52	5.31	2.64	7.95	0.91	1.22
1984	3.36	6.13	8.29	2.59	10.88	3.24	1.78
1985	8.28	6.80	8.30	2.56	10.86	1.31	1.82
1986	13.04	8.23	8.50	2.35	10.86	0.83	1.79
1987	9.79	10.37	5.66	2.11	7.77	0.79	0.98
1988	6.05	9.63	6.79	1.79	8.57	1.42	1.01
1989	10.53	8.79	4.65	2.32	6.96	0.66	0.96
1990	15.61	10.73	6.38	1.96	8.34	0.53	0.87
1991	10.52	12.22	6.06	1.26	7.31	0.69	0.63
1992	10.25	12.13	5.31	1.42	6.73	0.66	0.63
1993	7.50	9.42	4.36	0.69	5.05	0.67	0.67
1994	6.84	8.20	3.90	0.24	4.14	0.61	0.65
1995	12.89	9.08	2.59	0.63	3.22	0.25	0.51
1996	7.57	9.10	3.62	0.82	4.44	0.59	0.48
1997	5.66	8.71	2.80	0.24	3.05	0.54	0.46
1998	18.91	10.71	2.05	0.69	2.74	0.14	0.42
1999	11.15	11.91	3.45	0.74	4.19	0.38	0.35

Year	Northern Fall Survey Arithmetic kg/tow	Northern Fall Survey 3-year Average	Northern Total Landings (000's mt)	Northern Discards (000's mt)	Northern Total Catch (000's mt)	Northern Exploitation Index (kg/000's mt)	Northern Exploitation Index 3-year Average
2000	13.51	14.52	2.59	0.36	2.95	0.22	0.25
2001	8.33	11.00	3.39	0.48	3.87	0.46	0.35
2002	7.99	9.94	2.59	0.51	3.11	0.39	0.36
2003	8.29	8.20	1.81	0.20	2.01	0.24	0.37
2004	3.28	6.52	1.05	0.12	1.16	0.35	0.33
2005	1.72	4.43	0.83	0.06	0.89	0.52	0.37
2006	3.69	2.90	0.90	0.04	0.94	0.26	0.38
2007	6.44	3.95	1.01	0.75	1.76	0.27	0.35
2008	5.27	5.13	0.62	0.17	0.79	0.15	0.23
2009	6.89	6.20	1.04	0.19	1.23	0.18	0.20
2010	13.35	8.50	1.69	0.79	2.48	0.19	0.17
2011	9.97	10.07	1.93	0.12	2.04	0.20	0.19
2012	20.43	14.58	1.95	0.29	2.24	0.11	0.17
2013	16.75	15.72	1.37	0.25	1.62	0.10	0.14
2014	18.77	18.65	2.55	0.47	3.02	0.16	0.12
2015	19.49	18.34	2.19	0.31	2.50	0.13	0.13
2016	21.51	19.92	3.07	0.31	3.37	0.16	0.15

Table 10. Southern silver hake stock– summary of catch and survey indices in albatross units for northern silver hake, 1955- 2016.

Year	Southern Fall Survey Arithmetic kg/tow	Southern Fall Survey 3-year Average	Southern Total Landings (000's mt)	Southern Discards (000's mt)	Southern Total Catch (000's mt)	Southern Exploitation Index (kg/000's mt)	Southern Exploitation Index 3-year Average
1955			13.26		13.26		
1956			14.24		14.24		
1957			16.43		16.43		
1958			12.90		12.90		
1959			16.39		16.39		
1960			8.82		8.82		
1961			12.65		12.65		
1962			17.94		17.94		
1963	4.66		89.43		89.43	19.19	
1964	4.06		147.05		147.05	36.22	
1965	5.28	4.67	294.12		294.12	55.70	37.04
1966	2.64	3.99	202.32		202.32	76.64	56.19
1967	2.44	3.45	87.38		87.38	35.81	56.05
1968	2.73	2.60	58.16		58.16	21.30	44.58
1969	1.26	2.14	74.89		74.89	59.44	38.85
1970	1.35	1.78	26.83		26.83	19.87	33.54
1971	2.21	1.61	70.51		70.51	31.90	37.07
1972	2.13	1.90	88.18		88.18	41.40	31.06
1973	1.70	2.01	102.08		102.08	60.05	44.45
1974	0.85	1.56	102.40		102.40	120.47	73.97
1975	1.79	1.45	72.16		72.16	40.31	73.61
1976	1.99	1.54	64.61		64.61	32.47	64.42
1977	1.68	1.82	57.16		57.16	34.02	35.60
1978	2.50	2.06	25.83		25.83	10.33	25.61
1979	1.68	1.95	16.40		16.40	9.76	18.04
1980	1.63	1.94	11.68		11.68	7.17	9.09
1981	1.12	1.48	13.43	3.50	16.93	15.12	10.68
1982	1.56	1.44	14.15	4.65	18.80	12.05	11.44
1983	2.57	1.75	11.86	4.81	16.67	6.49	11.22
1984	1.40	1.84	12.96	4.88	17.84	12.74	10.43
1985	3.55	2.51	12.82	3.87	16.69	4.70	7.98
1986	1.45	2.13	9.70	4.33	14.03	9.68	9.04
1987	1.95	2.32	9.55	4.25	13.80	7.08	7.15
1988	1.78	1.73	8.95	4.50	13.45	7.56	8.10
1989	1.87	1.87	13.00	6.57	19.57	10.47	8.37
1990	1.52	1.72	13.02	5.97	18.99	12.49	10.17
1991	0.85	1.41	9.74	3.08	12.82	15.08	12.68
1992	0.99	1.12	10.53	3.45	13.98	14.12	13.90
1993	1.28	1.04	12.49	5.17	17.66	13.80	14.33
1994	0.79	1.02	12.18	5.94	18.12	22.94	16.95
1995	1.59	1.22	11.99	1.40	13.39	8.42	15.05
1996	0.45	0.94	12.13	0.48	12.61	28.02	19.79
1997	0.83	0.96	12.55	0.62	13.17	15.87	17.44
1998	0.57	0.62	12.56	0.53	13.09	22.96	22.28
1999	0.82	0.74	10.42	3.55	13.97	17.04	18.62

Year	Southern Fall Survey Arithmetic kg/tow	Southern Fall Survey 3-year Average	Southern Total Landings (000's mt)	Southern Discards (000's mt)	Southern Total Catch (000's mt)	Southern Exploitation Index (kg/000's mt)	Southern Exploitation Index 3-year Average
2000	0.72	0.70	9.47	0.33	9.80	13.61	17.87
2001	2.04	1.19	8.88	0.19	9.07	4.45	11.70
2002	1.18	1.31	4.89	0.41	5.30	4.49	7.52
2003	1.42	1.55	6.28	0.60	6.88	4.85	4.59
2004	1.24	1.28	6.97	1.20	8.17	6.59	5.31
2005	0.94	1.20	6.40	1.58	7.98	8.49	6.64
2006	1.42	1.20	4.58	0.16	4.74	3.34	6.14
2007	0.87	1.08	5.07	0.15	5.22	6.00	5.94
2008	1.36	1.22	5.58	1.03	6.61	4.86	4.73
2009	1.10	1.11	6.75	0.84	7.59	6.90	5.92
2010	2.82	1.76	6.39	0.78	7.17	2.54	4.77
2011	1.77	1.90	5.75	1.81	7.56	4.27	4.57
2012	1.98	2.19	5.43	1.02	6.45	3.25	3.35
2013	1.33	1.70	4.79	0.64	5.42	4.07	3.86
2014	1.44	1.58	4.71	0.66	5.37	3.74	3.69
2015	0.42	1.06	4.26	0.29	4.56	10.87	6.22
2016	1.30	1.05	3.29	0.54	3.83	2.95	5.85

Figure 7. ***Northern Silver hake*** fall survey biomass in kg/tow (LEFT) and relative exploitation ratios (RIGHT) of the total catch to the fall survey indices in kt/kg and associated 3-yr moving averages (red lines). The horizontal dash lines represent the biomass and overfishing thresholds and the solid line is the biomass target. The BOTTOM panels reflect the most recent 23 years of the entire time series.

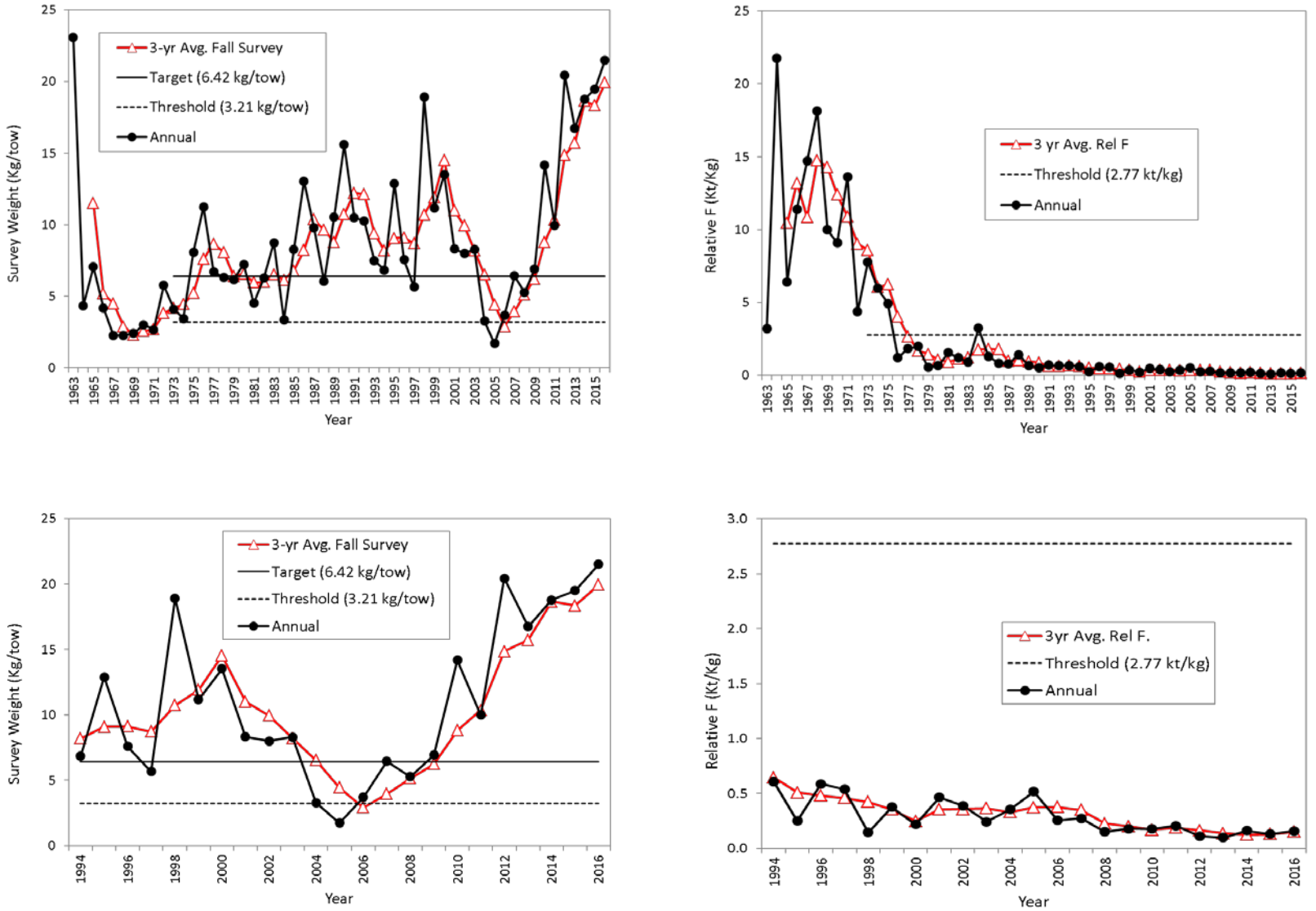
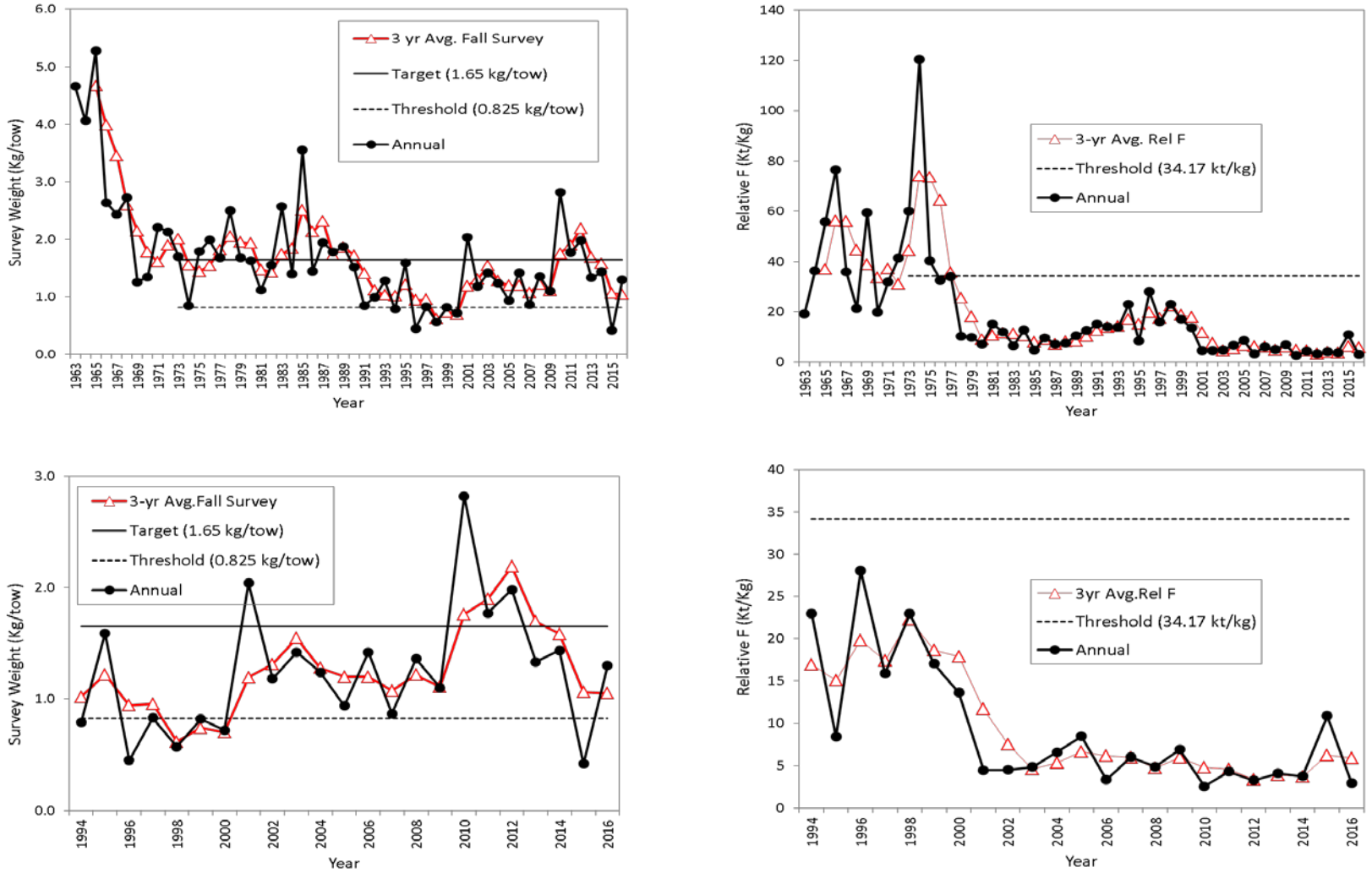


Figure 8. ***Southern silver hake*** fall survey biomass in kg/tow (LEFT) and relative exploitation ratios (RIGHT) of the total catch to the fall survey indices in kt/kg and associated 3-yr moving averages (red lines). The horizontal dash lines represent the biomass and overfishing thresholds and the solid line is the biomass target. The BOTTOM panels reflect the most recent 23 years of the entire time series



The range of years (1973-1982) adopted during the benchmark assessments for deriving the overfishing definition reference points are considered to be uncertain. The transition from the 1970's to the 1980's highlight a period of high and low productivity with respect to the stock dynamics. This time period also does not include more recent years as basis for defining the F_{MSY} proxy. Recognizing the potential for non-stationary productivity in the stock dynamics and the implications on estimates of the OFL, the Council chose to set silver hake ABC using the 25th percentile on the OFL distribution of scientific uncertainty estimates, corresponding to a low probability of overfishing. This choice was made in part due to the economic and ecological importance of silver hake.

5.1.2.2 Red hake

The 2017 red hake assessment update for both the northern and southern management areas included survey data from the NEFSC spring bottom trawl survey through 2017, commercial fishing data from vessel trip reports, dealer landings, and on-board fishery observer data through 2016. (Table 12 and Table 13). In the absence of an analytical assessment for red hake, the biological reference points for both the northern and southern silver stocks are as follows:

Red hake is overfished when the three-year moving arithmetic average of the spring survey weight per tow (i.e., the biomass threshold) is less than one half of the B_{MSY} proxy, where the B_{MSY} proxy is defined as the average observed from 1980 – 2010. The current estimates of $B_{THRESHOLD}$ for the northern and southern stocks are 1.27 kg/tow and 0.51 kg/tow, respectively.

Overfishing occurs when the ratio between catch and spring survey biomass for the northern and the southern stocks exceeds 0.163 kt/kg and 3.038 kt/kg, respectively, derived from AIM analyses from 1980-2009.

Table 11. Red hake overfishing definition reference points.

Stock	Threshold	Target
Northern Red Hake	½ B_{MSY} Proxy (1.27kg/tow) F_{MSY} Proxy (0.163 kt/kg)	B_{MSY} Proxy (n/a) F_{MSY} Proxy (n/a)
Southern Red Hake	½ B_{MSY} Proxy (0.51 kg/tow) F_{MSY} Proxy (3.038 kt/kg)	B_{MSY} Proxy (n/a) F_{MSY} Proxy (n/a)

Table 12. Northern red hake stock - summary of catch and survey indices in albatross units for northern silver hake, 1962-2017.

Year	Northern Spring Survey arithmetic (kg/tow)	Northern Spring Survey 3-year Average (kg/tow)	Total Northern Commercial Landings (000's mt)	Northern Commercial Discards (000's mt)	Northern Recreational Catch (000's mt)	Northern total Catch (000's mt)	Northern Exploitation Index (kg/000's mt)	Northern Exploitation Index 3-year Average (kg/000's mt)
1955								
1956								
1957								
1958								
1959								
1960								
1961								
1962			1.91	1.60	0.007	3.52		
1963			3.28	1.60	0.004	4.89		
1964			1.41	1.70	0.001	3.11		
1965			2.77	1.62	0.001	4.40		
1966			5.58	1.60	0.003	7.18		
1967			1.86	1.40	0.002	3.27		
1968	1.14		2.63	1.30	0.002	3.93	3.45	
1969	0.64		2.02	1.12	0.001	3.14	4.91	
1970	0.54	0.77	1.03	1.10	0.001	2.13	3.94	4.10
1971	0.65	0.61	4.81	1.16	0.001	5.97	9.21	6.02
1972	1.56	0.92	15.03	0.96	0.002	15.99	10.25	7.80
1973	4.31	2.17	15.29	0.91	0.001	16.20	3.76	7.74
1974	2.43	2.77	7.22	0.82	0.003	8.04	3.31	5.77
1975	4.25	3.67	8.70	1.20	0.002	9.90	2.33	3.13
1976	3.37	3.35	6.34	0.93	0.002	7.26	2.15	2.60
1977	2.66	3.43	0.89	1.08	0.003	1.98	0.74	1.74
1978	2.57	2.87	1.22	1.12	0.004	2.34	0.91	1.27
1979	2.04	2.42	1.52	1.22	0.006	2.75	1.35	1.00
1980	3.88	2.83	1.03	1.37	0.004	2.40	0.62	0.96
1981	6.35	4.09	1.25	1.32	0.031	2.60	0.41	0.79
1982	2.13	4.12	1.21	1.46	0.003	2.67	1.26	0.76
1983	3.70	4.06	0.90	1.35	0.000	2.25	0.61	0.76
1984	2.98	2.94	1.06	1.33	0.001	2.39	0.80	0.89
1985	3.91	3.53	0.99	1.27	0.000	2.26	0.58	0.66
1986	3.26	3.39	1.46	1.19	0.000	2.65	0.81	0.73
1987	2.94	3.37	1.01	1.05	0.000	2.07	0.70	0.70
1988	2.00	2.73	0.86	0.90	0.004	1.76	0.88	0.80
1989	1.65	2.20	0.78	1.45	0.000	2.22	1.35	0.98
1990	1.33	1.66	0.83	0.60	0.004	1.43	1.07	1.10
1991	1.62	1.53	0.74	0.82	0.002	1.56	0.96	1.13
1992	2.50	1.82	0.92	0.73	0.001	1.65	0.66	0.90
1993	2.82	2.32	0.77	0.08	0.001	0.85	0.30	0.64
1994	1.59	2.31	0.73	0.08	0.002	0.81	0.51	0.49
1995	1.97	2.13	0.19	0.06	0.001	0.25	0.13	0.31
1996	1.79	1.79	0.41	0.66	0.005	1.07	0.60	0.41
1997	1.81	1.86	0.34	0.13	0.001	0.46	0.26	0.33
1998	2.52	2.04	0.19	0.13	0.000	0.32	0.13	0.33
1999	2.32	2.22	0.22	0.47	0.000	0.69	0.30	0.23
2000	3.19	2.68	0.20	0.06	0.000	0.25	0.08	0.17

Year	Northern Spring Survey arithmetic (kg/tow)	Northern Spring Survey 3-year Average (kg/tow)	Total Northern Commercial Landings (000's mt)	Northern Commercial Discards (000's mt)	Northern Recreational Catch (000's mt)	Northern total Catch (000's mt)	Northern Exploitation Index (kg/000's mt)	Northern Exploitation Index 3-year Average (kg/000's mt)
2001	3.58	3.03	0.22	0.14	0.000	0.36	0.10	0.16
2002	4.46	3.74	0.28	0.10	0.000	0.38	0.08	0.09
2003	1.00	3.01	0.21	0.09	0.000	0.30	0.30	0.16
2004	1.77	2.41	0.10	0.06	0.000	0.16	0.09	0.16
2005	1.10	1.29	0.10	0.06	0.000	0.15	0.14	0.18
2006	0.91	1.26	0.10	0.18	0.001	0.28	0.30	0.18
2007	2.06	1.36	0.07	0.13	0.000	0.20	0.10	0.18
2008	3.49	2.15	0.05	0.06	0.000	0.11	0.03	0.14
2009	1.78	2.44	0.09	0.10	0.002	0.18	0.10	0.08
2010	2.79	2.69	0.07	0.24	0.001	0.31	0.11	0.08
2011	2.18	2.25	0.14	0.10	0.001	0.24	0.11	0.11
2012	1.73	2.23	0.10	0.19	0.001	0.29	0.17	0.13
2013	1.35	1.75	0.10	0.22	0.003	0.31	0.23	0.17
2014	3.02	2.03	0.07	0.19	0.012	0.27	0.09	0.16
2015	6.27	3.55	0.10	0.27	0.002	0.37	0.06	0.13
2016	4.46	4.58	0.14	0.26	0.003	0.41	0.09	0.08
2017	4.66	5.13						

Table 13. Southern red hake stock - summary of catch and survey indices in albatross units for northern silver hake, 1962-2010.

Year	Southern Spring Survey arithmetic kg/tow	Southern Spring Survey 3-year Average kg/tow	Total Southern Commercial Landings (000's mt)	Southern Commercial Discards (000's mt)	Southern Recreational Catch (000's mt)	Southern total Catch (000's mt)	Southern Exploitation Index (kg/000's mt)	Southern Exploitation Index 3-year Average (kg/000's mt)
1955								
1956								
1957								
1958								
1959								
1960								
1961								
1962			11.87	4.00	0.892	16.76		
1963			31.90	4.00	0.770	36.67		
1964			43.37	3.76	0.848	47.98		
1965			92.99	4.29	0.634	97.92		
1966			107.92	3.77	0.094	111.79		
1967			58.78	3.66	0.165	62.61		
1968	1.29		18.14	3.72	0.575	22.43	17.45	
1969	1.08		52.93	3.62	0.489	57.04	52.72	
1970	1.72	1.36	11.45	3.14	0.410	15.01	8.71	26.29
1971	3.49	2.10	35.13	2.31	0.287	37.73	10.82	24.08
1972	3.59	2.93	61.19	2.10	0.177	63.47	17.68	12.40
1973	3.99	3.69	51.36	2.24	0.317	53.92	13.51	14.00
1974	2.84	3.47	26.64	2.16	0.191	28.99	10.22	13.80
1975	3.18	3.34	19.98	1.76	0.052	21.79	6.85	10.19
1976	5.31	3.78	22.47	1.83	0.645	24.94	4.69	7.25
1977	2.30	3.60	7.06	1.82	0.750	9.63	4.19	5.24
1978	7.65	5.09	5.46	2.44	0.971	8.87	1.16	3.35
1979	1.51	3.82	7.59	2.67	0.245	10.50	6.94	4.09
1980	2.38	3.85	4.08	2.70	0.144	6.93	2.91	3.67
1981	4.61	2.84	2.32	2.72	0.176	5.21	1.13	3.66
1982	3.34	3.45	3.17	3.78	0.029	6.98	2.09	2.04
1983	2.21	3.39	1.44	3.89	0.135	5.47	2.48	1.90
1984	1.33	2.29	1.27	3.91	0.548	5.73	4.30	2.96
1985	1.39	1.64	0.90	2.97	0.029	3.90	2.80	3.19
1986	1.73	1.49	0.69	3.39	0.205	4.29	2.47	3.19
1987	0.88	1.33	0.94	3.31	0.472	4.73	5.38	3.55
1988	1.01	1.21	0.87	3.46	0.251	4.58	4.56	4.14
1989	0.49	0.79	0.93	5.01	0.436	6.37	13.09	7.68
1990	0.71	0.73	0.80	4.75	0.514	6.06	8.57	8.74
1991	0.61	0.60	0.93	2.61	0.285	3.82	6.26	9.30
1992	0.47	0.59	1.25	6.34	0.194	7.78	16.74	10.52
1993	0.42	0.50	0.92	5.31	0.089	6.32	14.91	12.63
1994	0.68	0.52	0.98	1.72	0.069	2.77	4.11	11.92
1995	0.52	0.54	1.43	1.33	0.045	2.80	5.43	8.15
1996	0.45	0.55	0.70	0.38	0.019	1.10	2.43	3.99
1997	1.16	0.71	1.00	2.42	0.173	3.59	3.10	3.65
1998	0.21	0.61	1.15	0.74	0.053	1.95	9.10	4.87
1999	0.46	0.61	1.35	1.06	0.053	2.46	5.42	5.87
2000	0.42	0.36	1.42	0.25	0.044	1.71	4.04	6.19

Year	Southern Spring Survey arithmetic kg/tow	Southern Spring Survey 3-year Average kg/tow	Total Southern Commercial Landings (000's mt)	Southern Commercial Discards (000's mt)	Southern Recreational Catch (000's mt)	Southern total Catch (000's mt)	Southern Exploitation Index (kg/000's mt)	Southern Exploitation Index 3-year Average (kg/000's mt)
2001	0.64	0.51	1.47	0.14	0.024	1.63	2.54	4.00
2002	0.54	0.54	0.66	0.33	0.010	1.00	1.85	2.81
2003	0.21	0.46	0.62	0.35	0.018	0.99	4.79	3.06
2004	0.15	0.30	0.59	0.62	0.015	1.22	7.92	4.85
2005	0.38	0.25	0.36	1.01	0.118	1.48	3.94	5.55
2006	0.38	0.30	0.38	0.67	0.077	1.13	2.96	4.94
2007	0.86	0.54	0.47	1.55	0.151	2.17	2.53	3.14
2008	0.47	0.57	0.58	0.81	0.117	1.51	3.19	2.90
2009	1.44	0.92	0.58	0.87	0.133	1.58	1.10	2.27
2010	0.94	0.95	0.58	0.74	0.153	1.47	1.56	1.95
2011	1.79	1.39	0.50	1.01	0.094	1.60	0.89	1.18
2012	1.06	1.26	0.75	0.65	0.085	1.49	1.40	1.29
2013	0.64	1.16	0.44	0.58	0.143	1.16	1.82	1.37
2014	0.63	0.78	0.56	0.52	0.089	1.16	1.85	1.69
2015	0.58	0.62	0.39	0.85	0.027	1.26	2.17	1.95
2016	0.31	0.51	0.39	0.76	0.130	1.28	4.13	2.72
2017	0.25	0.38						

In the north, the three-year arithmetic mean biomass index (Figure 9), based on the NEFSC spring bottom trawl survey for 2015-2017 (5.13 kg/tow) was above the management threshold (1.27 kg/tow) and above the target (2.54 kg/tow). The exploitation index (catch divided by biomass index for 2016 (0.09 kt/kg) was below the threshold (0.16 kt/kg; Figure 9).

In the south, the three year arithmetic mean biomass index (Figure 10), based on the NEFSC spring bottom trawl survey for 2015-2017 (0.38 kg/tow) was below both the management threshold (0.51 kg/tow) and the target (1.02 kg/tow). The exploitation index (catch divided by biomass index for 2016 (4.03 kt/kg) was above the threshold (3.04 kt/kg). Therefore, based on the 2017 assessment update, the northern is not overfished and overfishing is not occurring while in the south, the stock is overfished and overfishing is occurring.

Figure 9. ***Northern red hake*** spring survey biomass in kg/tow (LEFT) and relative exploitation ratios (RIGHT) of the total catch to the spring survey indices in kt/kg and associated 3-yr moving averages (red lines). The horizontal dash lines represent the biomass and overfishing thresholds and the solid line is the biomass target. The BOTTOM panels reflect the most recent 24 years of the entire time series.

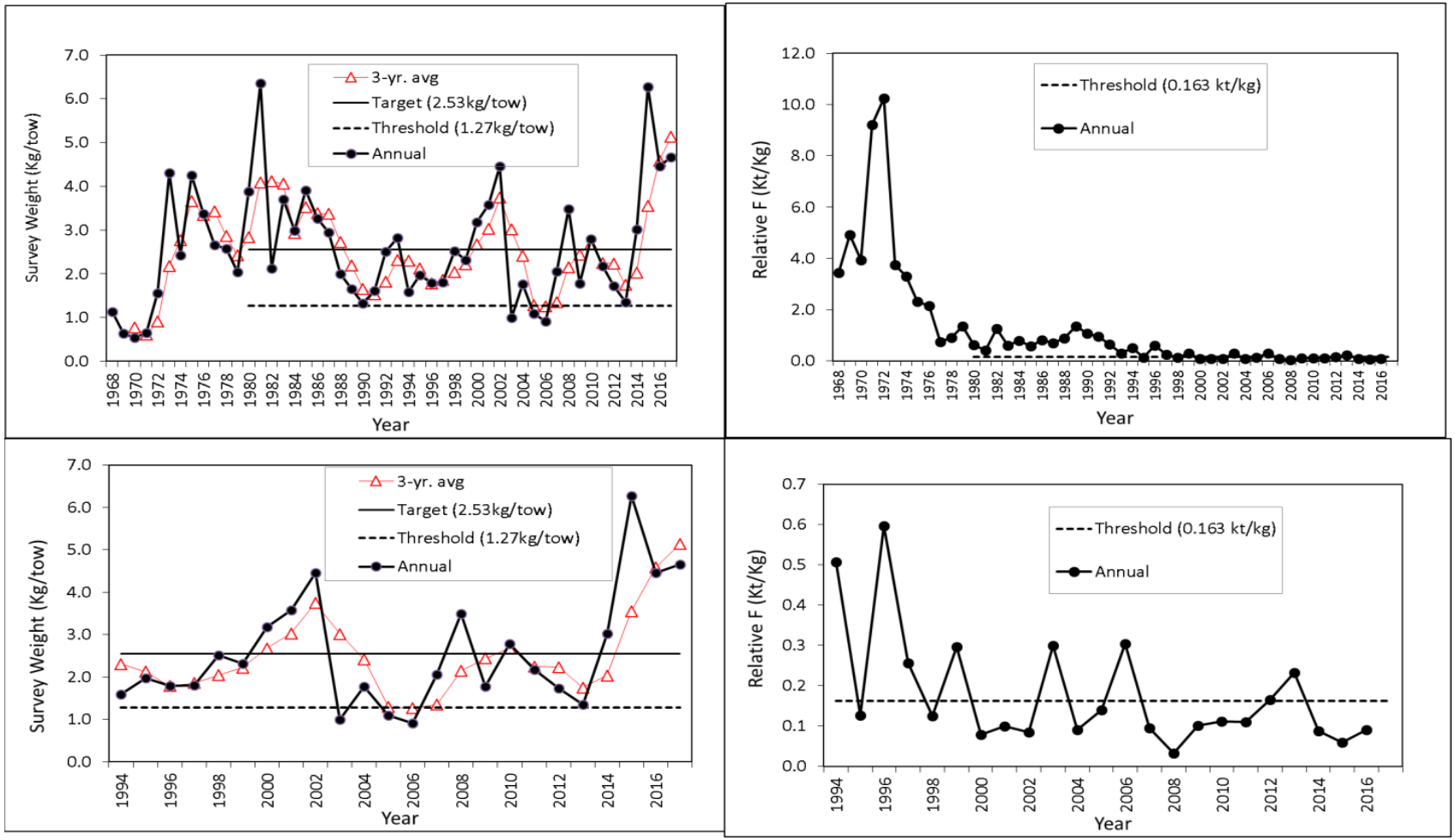
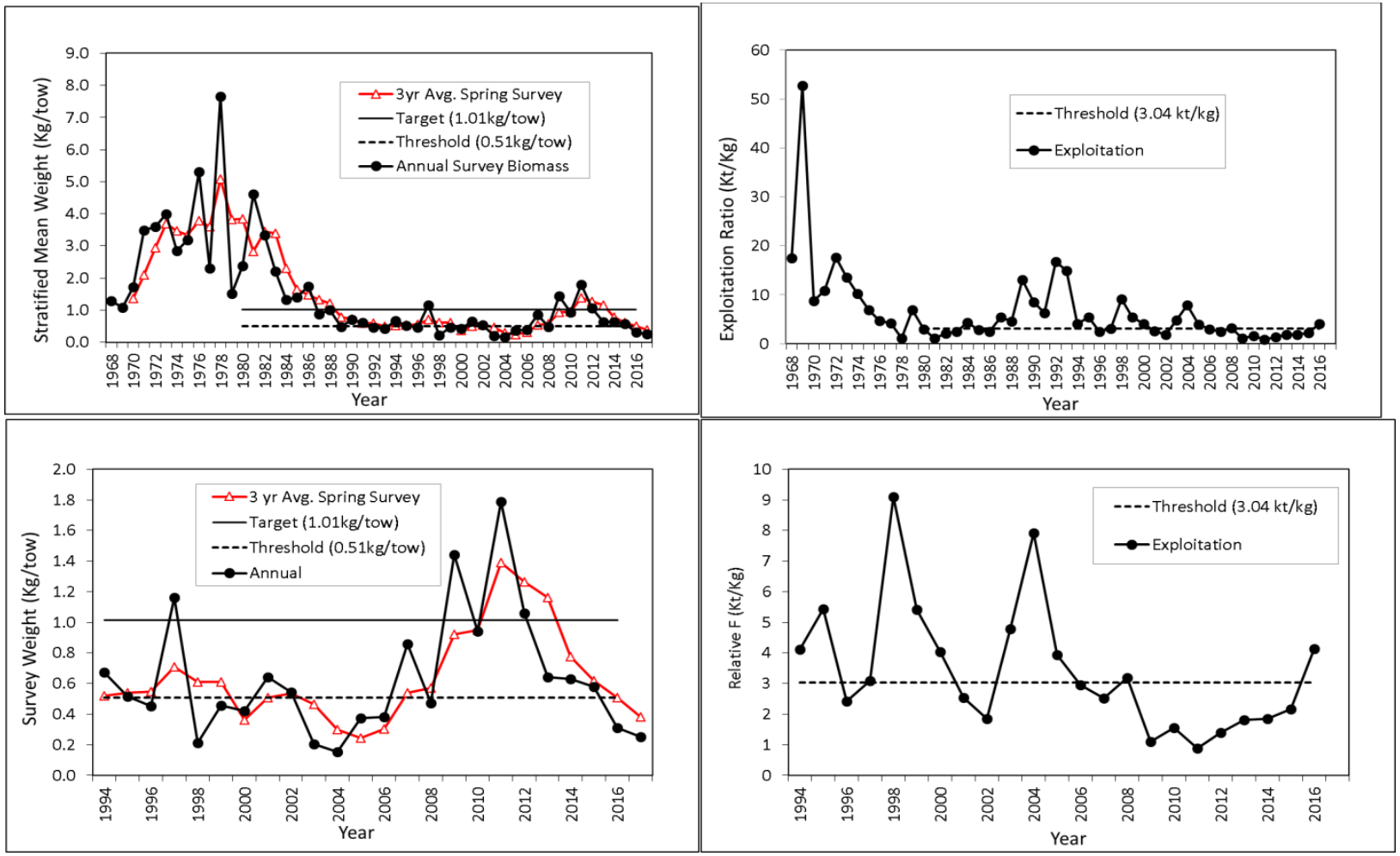


Figure 10. ***Southern red hake*** spring survey biomass in kg/tow (LEFT) and relative exploitation ratios (RIGHT) of the total catch to the spring survey indices in kt/kg and associated 3-yr moving averages (red lines). The horizontal dash lines represent the biomass and overfishing thresholds and the solid line is the biomass target. The BOTTOM panels reflect the most recent 24 years of the entire time series.



5.1.2.3 Offshore hake

The new 2010 benchmark assessment concluded that information was not available to determine stock status for offshore hake because fishery data were insufficient and the survey data are not considered to reflect stock trends. It was not possible to recommend a reference points for offshore hake and the overfished and overfishing status of offshore hake is therefore unknown.

5.1.3 Landings and discards of target species

Using data from the 2017 assessment update (NEFMC 2017), the Whiting PDT calculated discards as a percent of total catch, including 'landings' reported by fishermen on VTRs as being transferred at sea for sale as bait. These data were used to estimate and set the TALs by stock area (see Sections ???).

Red and silver hake discards were estimated by applying the observed discard to total landings ratio (D/K_all) to total landings of all trips from a strata. Strata used for this analysis included gear type, three-digit statistical area, and half-year. Landings data with no matching observed trips in a stratum were filled as appropriate. More details are provided in NEFSC 2011b.

Silver hake

The discard rate for silver hake is typically lower than it is for red hake, presumably because of more market demand and better tolerance of shipping and handling. Nominal discards in the northern stock area were variable, peaking at 750 mt in 2007, and has been steadily declining but variable and currently estimated at 310 mt in 2016 (Figure 12). Much of this variability in discards appears to be related to market demand. These peaks in discards resulted in the discard rate spiking to 43% in 2008 and 32% in 2010 (Figure 12). The thee year moving average is of course is more stable, fluctuating from 27% in 2008 to 30% in 2009 and to 12% in 2016.

The silver hake discard rate in the southern stock area is typically even lower, under 20% throughout the time series (Figure 12). The proportion discard in the southern area appears to be varying without trend. Discards were estimated to be only 150 mt in 2007, but increased to 1800 mt in 2011, before declining to 290 mt in 2015 and estimated at 540mt in 2016 (Figure 12). The three-year moving average was approximately 11% of the total catch in 2016.

Figure 11. Northern and southern silver hake discard rate (percent of total catch).

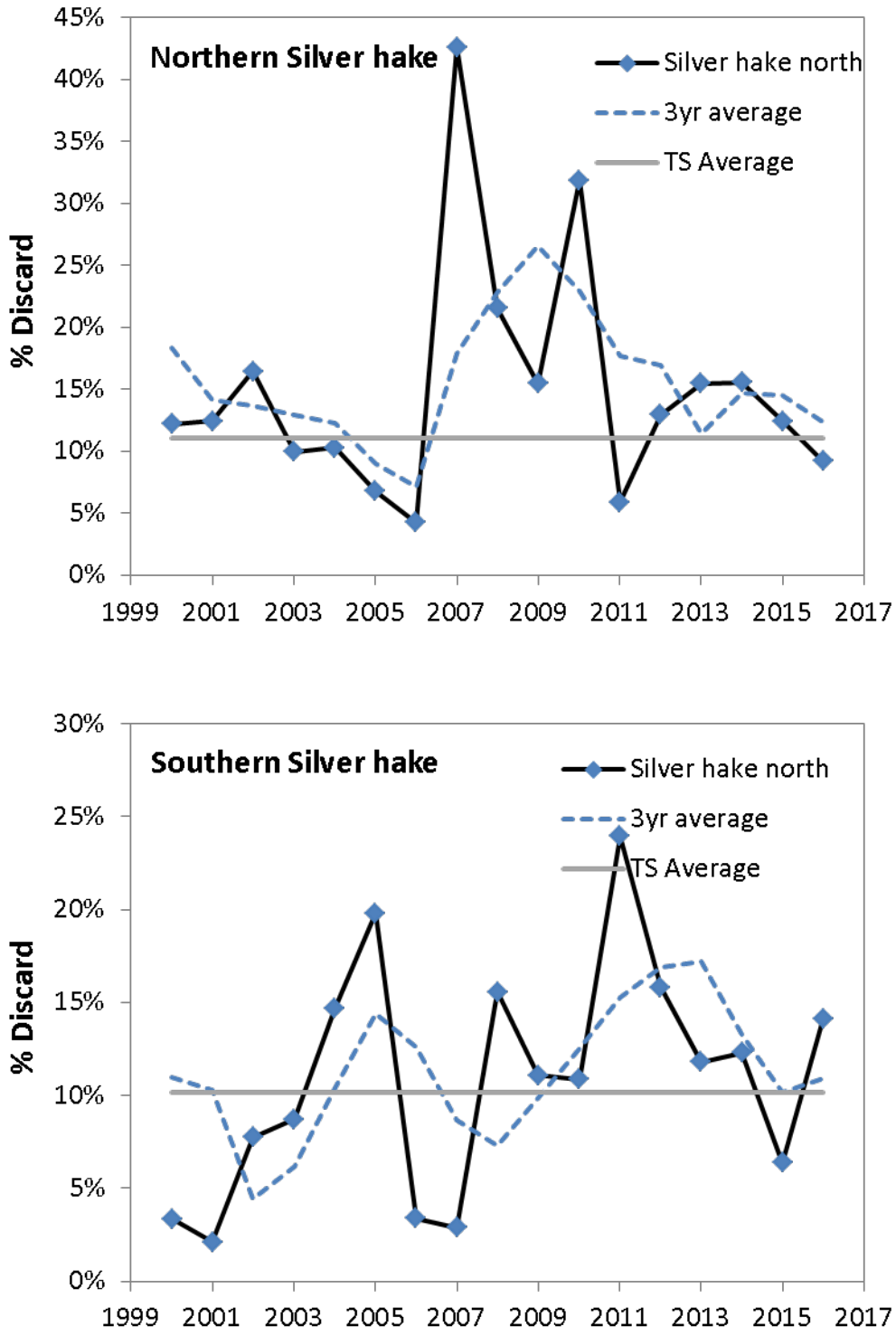
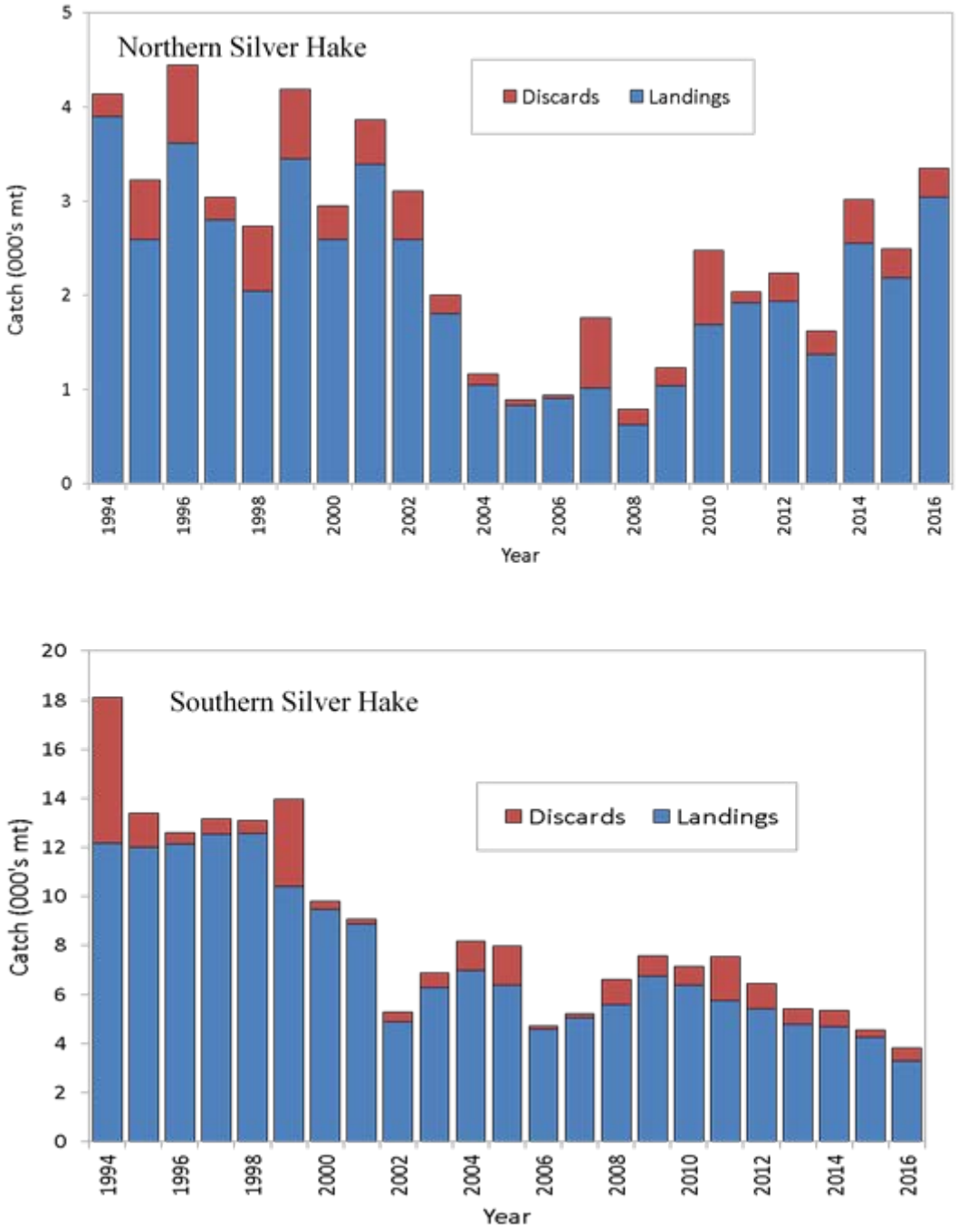


Figure 12. Landings and estimated nominal discards (mt) for northern and southern stocks of silver hake, 2000-2010. Source: NEFSC 2011a, updated by Whiting PDT analysis.



Red hake

Red hake discards were comparatively high, ranging from 10-40% from 2000-2003, increasing to 50-80% from 2005 to present (Figure 13), in both the northern and southern stock areas. The main cause of the

increasing discard rate appears to be related to limited markets and decreasing landings, rather than increases in discarding from higher red hake catches.

Nominal discard estimates in the northern region however increased from 59 mt in 2008 and 95 mt in 2009 to 244 mt in 2010 (Figure 14). This discard increase drove the 2010 discards to 78%, from 52% in 2008 and 51% in 2009 (Figure 13). Since, proportion of discards in the total catch has fluctuated around approximately 64% per year. The three-year moving average proportion discard (used to set the TAL), also increased from 61% in 2008 and 57% in 2009 to 70% in 2016.

Nominal discard rates in the southern region also increased through the time series in Figure 13, through 2005 but since then has been more stable. The proportion discards on average since 2010 is approximately 14% per year. In 2016, discard was 66% of the total catch. The three-year moving average has been declining but variable since and was estimated at 61% in 2016.

Figure 13. Northern and southern red hake discard rate (percent of total catch).

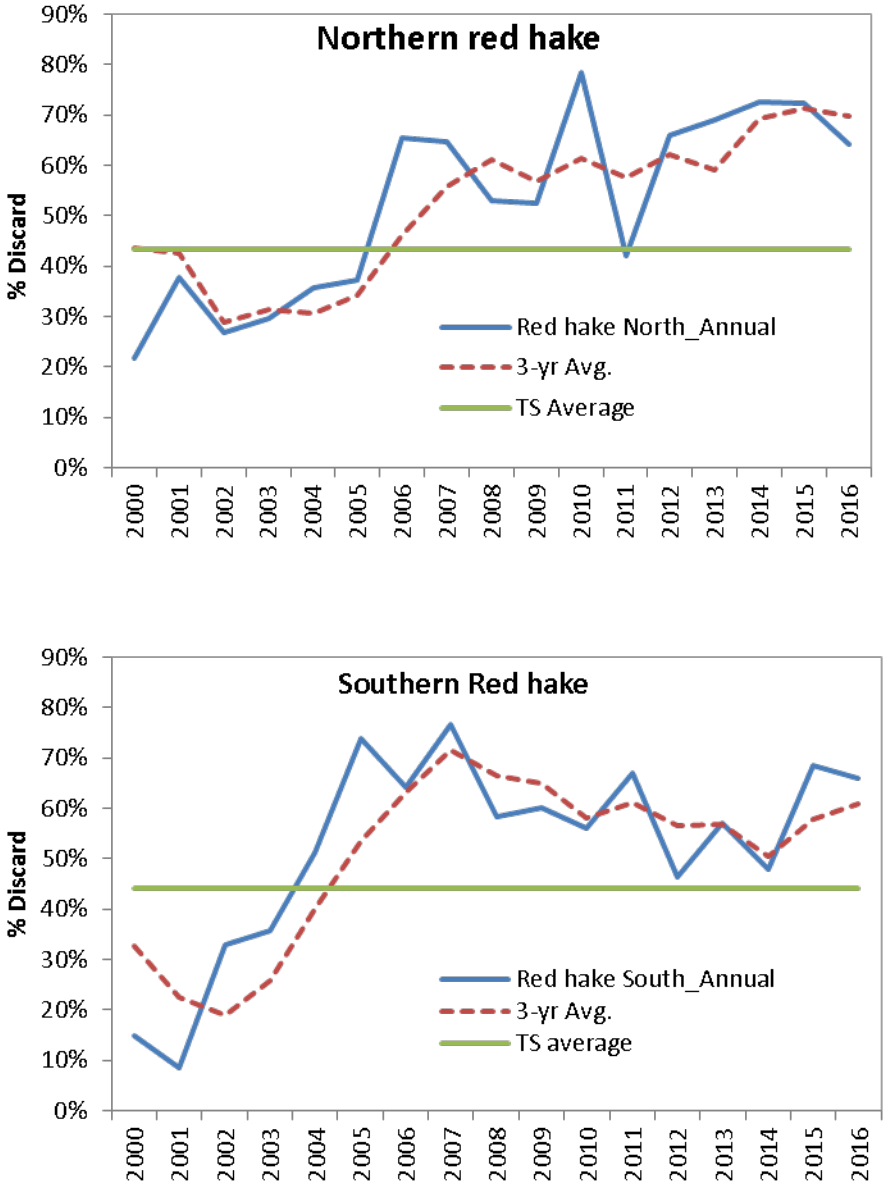
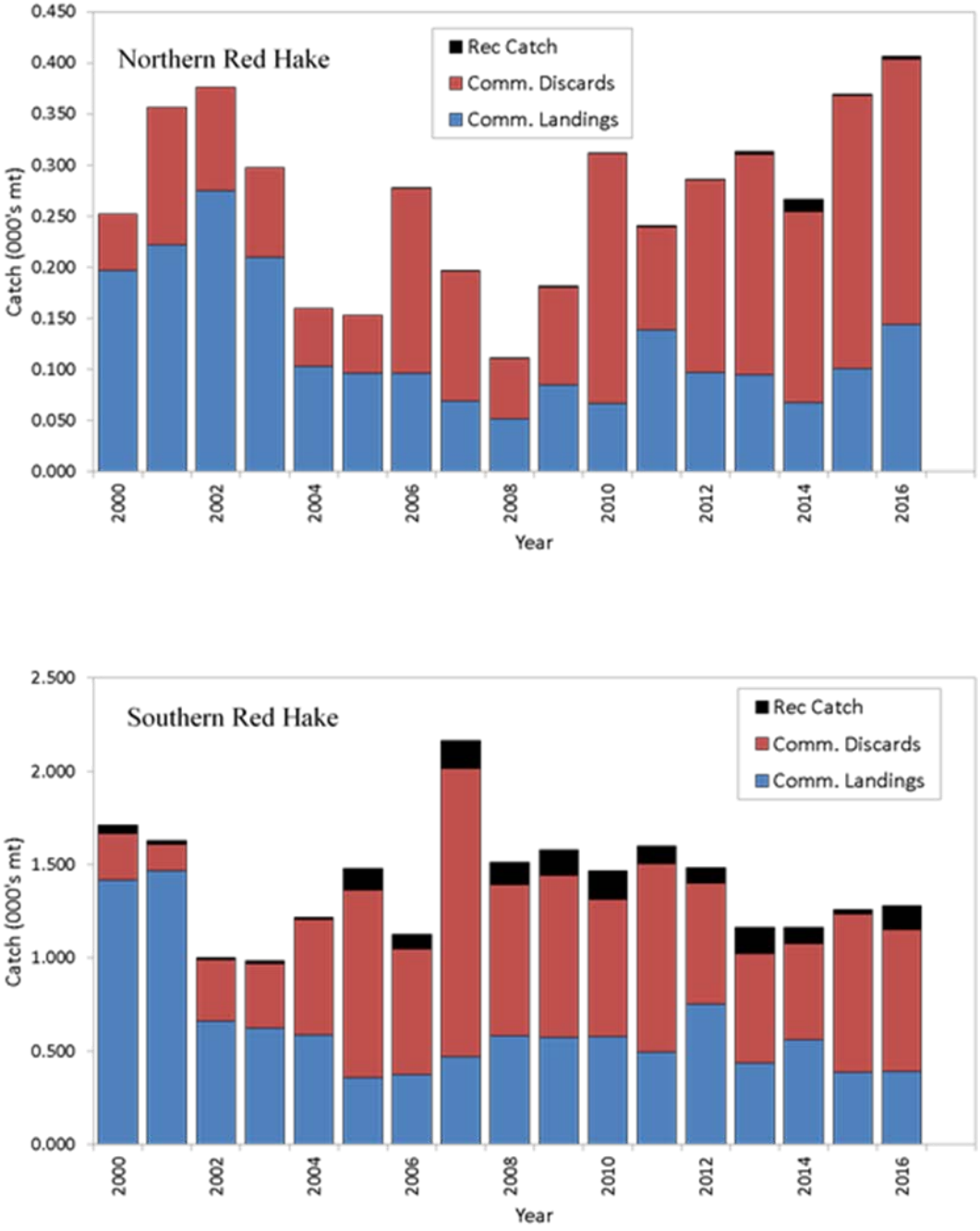


Figure 14. Landings and estimated nominal discards (mt) for northern and southern stocks of red hake, 2000-2010. Source: NEFSC 2011a, updated by Whiting PDT analysis.



5.1.4 Landings and discards of non-target species

Bycatch in the small-mesh multispecies fishery was estimated by applying the ∑D/∑Kall (discard to kept-all) ratios from all observed tows (NEFOP and ASM) to landings off all species on trips using small-mesh trawls and landing 2,000 lbs. of whiting or 400 lbs. of red hake, stratified by year, quarter, and management area[8]. All observed tows on NEFOP and ASM were used to calculate the discard ratios (Table 15 and Table 16) Estimates of discards on unobserved tows were not applied.

In the northern area (Table 14, left panel), haddock (356.9 mt average), spiny dogfish (196.1 mt average), red hake (175.1 mt average), silver hake (114.4 mt average), winter skate (73.4 mt average), and Atlantic herring (34.0 mt average) were the top six species over 2014-2016. Haddock discards have been high as a result of an historically strong 2013 year class. It was also the top discard species in an experimental small-mesh trawl fishery conducted in June 2016 and observed by MA Division of Marine Fisheries (M. Griffin pers comm.). Red hake discards increased in response to a strong 2014 year class, which became vulnerable to capture in 2015 and is now contributing to the increase in specifications for 2018-2020. Silver hake discards increased during 2016 for unknown reasons, but it would be consistent with the higher 2016 silver hake landings (Table 26).

In the southern area, the top discards were comprised of red hake (1052.2 mt average), spiny dogfish (347.3 mt average), silver hake (317.3 mt average), butterfish (266.0 mt average), and little skate (126 mt average) (Table 14, right panel) during 2014-2016. Haddock discards declined from 234 mt in 2015 to 76 mt in 2016, possibly due to growing haddock moving out of the Cultivator Shoals Area.

[8] Note that the small-mesh multispecies management areas do not coincide with groundfish stock areas. For example, the Cultivator Shoals Area is a northern management area for small-mesh multispecies, but the catch of haddock is considered to be from the Georges Bank stock area for groundfish monitoring.

Table 14. Total discard estimates for vessels using small mesh trawls on trips landing more than 2,000 lbs. of whiting or 400 lbs. of red hake. Source: D/Kall ratios on NEFOP and ASM small-mesh multispecies trips applied to landings of all species by year, quarter, and management area.

Northern

Species	Calendar year 2014	2015	2016
Red hake	91.4	224.1	209.6
Haddock	476.8	241.0	353.0
Winter skate	6.8	114.9	98.4
Spiny dogfish	98.3	90.7	399.2
Butterfish	4.0	4.2	1.5
Little skate	12.3	29.1	44.6
Silver hake	175.2	34.5	133.5
Barndoor skate	2.9	4.0	7.5
Atlantic herring	20.2	77.3	4.6
Monkfish	0.9	2.6	5.7
Summer flounder	4.8	1.5	1.5
.Yellowtail flounder	3.0	13.7	7.9
Witch flounder	1.5	4.9	14.0
.Winter flounder	5.6	2.3	1.5
Ocean pout	0.1	0.7	0.6
American plaice	4.0	3.2	10.5
Cod	0.7	0.8	1.4
Windowpane	1.1	0.2	5.6
White hake	1.3	2.6	1.4
Smooth skate	0.0	0.0	0.0
Thorny skate	0.4	0.0	0.4
Pollock	0.9	0.1	0.2
Redfish	0.7	1.4	0.1
Total	913.0	853.8	1302.6

Southern

Species	Calendar year 2014	2015	2016
Red hake	657.0	1099.0	1400.6
Haddock	199.9	233.7	76.0
Winter skate	29.7	13.4	285.2
Spiny dogfish	534.9	376.3	130.8
Butterfish	376.5	260.4	161.2
Little skate	140.2	66.6	171.1
Silver hake	619.0	101.5	231.5
Barndoor skate	37.2	51.7	151.9
Atlantic herring	1.5	11.4	0.0
Monkfish	4.4	24.5	135.6
Summer flounder	21.7	129.5	93.4
.Yellowtail flounder	1.5	0.0	0.8
Witch flounder	9.6	57.2	9.7
.Winter flounder	15.1	0.2	25.6
Ocean pout	58.3	5.2	13.3
American plaice	0.0	0.0	0.1
Cod	0.3	0.0	1.1
Windowpane	2.3	0.0	2.0
White hake	0.0	0.1	1.1
Smooth skate	0.0	0.0	0.0
Thorny skate	0.0	0.0	0.0
Pollock	0.1	0.0	0.5
Redfish	0.0	0.0	0.0
Total	2709.3	2430.9	2891.5

Table 15. D/Kall statistics from NEFOP and ASM observed tows on small-mesh multispecies trips in the northern management area.

		QUARTER	Statistic				
		1	1	3	3	4	4
YEAR	Values	Arithmetic Mean	Coefficient of Variation	Arithmetic Mean	Coefficient of Variation	Arithmetic Mean	Coefficient of Variation
2014	American plaice	0.002	0.654	0.024	4.222	0.002	2.863
2014	Atlantic herring	-		0.020	11.826	0.166	4.825
2014	Barndoor skate	0.001	2.646	0.002	6.931	0.003	1.986
2014	Butterfish	-		0.004	11.877	0.000	3.338
2014	Cod	-		0.001	6.804	0.001	3.127
2014	Haddock	0.002	0.654	0.402	3.501	0.095	0.827
2014	Little skate	-		0.008	7.210	0.007	2.724
2014	Monkfish	0.006	0.847	0.001	8.283	0.001	3.519
2014	Ocean pout	-		0.000	12.481	-	
2014	Red hake	0.002	2.236	0.286	4.573	0.017	1.843
2014	Silver hake	0.068	2.440	0.091	4.323	0.021	1.432
2014	Smooth skate	0.000	2.646	-		0.000	8.307
2014	Spiny dogfish	0.092	0.707	0.056	4.310	0.115	2.293
2014	Summer flounder	-		0.013	5.974	0.000	3.509
2014	Thorny skate	-		0.000	3.000	0.002	4.028
2014	White hake	0.004	1.083	0.001	4.532	0.002	3.503
2014	Windowpane flounder	-		0.001	9.428	0.003	2.718
2014	Winter flounder	-		0.006	6.350	0.001	2.996
2014	Winter skate	-		0.002	5.397	0.014	2.249
2014	Witch flounder	0.000	1.708	0.014	5.326	0.002	3.598
2014	Yellowtail flounder	-		0.007	5.689	0.005	1.712
2015	American plaice			0.010	5.708	0.012	1.406
2015	Atlantic herring			0.120	13.427	1.280	1.768
2015	Barndoor skate			0.023	9.692	0.014	2.236
2015	Butterfish			0.005	13.347	-	
2015	Cod			0.002	12.102	-	
2015	Haddock			0.712	6.566	0.333	1.758
2015	Little skate			0.174	11.003	0.007	1.491
2015	Monkfish			0.010	10.589	-	
2015	Ocean pout			0.004	11.147	-	
2015	Red hake			0.271	5.643	1.383	1.783
2015	Silver hake			0.020	9.684	0.064	1.953
2015	Smooth skate			-		-	
2015	Spiny dogfish			1.250	7.739	0.028	3.882
2015	Summer flounder			0.001	11.172	0.008	2.236
2015	Thorny skate			0.000	6.856	-	
2015	White hake			-		0.059	1.571
2015	Windowpane flounder			0.011	10.076	-	
2015	Winter flounder			0.010	10.189	-	
2015	Winter skate			0.190	6.039	0.010	1.482
2015	Witch flounder			0.011	6.328	0.056	1.251
2015	Yellowtail flounder			0.022	5.966	0.010	0.682
2016	American plaice			0.042	5.782	0.006	1.423
2016	Atlantic herring			0.007	6.668	0.018	1.895
2016	Barndoor skate			0.016	7.715	0.003	3.742
2016	Butterfish			0.004	14.171	-	
2016	Cod			0.002	11.579	-	
2016	Haddock			1.392	10.337	0.242	3.383
2016	Little skate			0.125	8.731	0.157	5.183
2016	Monkfish			0.006	9.111	0.006	4.800
2016	Ocean pout			0.000	16.149	0.001	2.098
2016	Red hake			0.475	9.247	0.078	3.585
2016	Silver hake			0.227	8.921	0.302	2.719
2016	Smooth skate			-		-	
2016	Spiny dogfish			0.047	5.407	0.748	3.536
2016	Summer flounder			0.001	4.413	-	
2016	Thorny skate			0.000	11.455	0.000	3.742
2016	White hake			0.009	5.527	0.003	2.604
2016	Windowpane flounder			0.002	3.767	-	
2016	Winter flounder			0.001	8.310	0.001	3.742
2016	Winter skate			0.531	10.768	0.172	4.493
2016	Witch flounder			0.015	5.717	0.048	3.400
2016	Yellowtail flounder			0.018	6.773	0.001	3.742

Table 16. D/Kall statistics from NEFOP and ASM observed tows on small-mesh multispecies trips in the southern management area.

		QUARTER	Statistic						
		1	1	2	2	3	3	4	4
YEAR	Values	Arithmetic Mean	Coefficient of Variation	Arithmetic Mean	Coefficient of Variation	Arithmetic Mean	Coefficient of Variation	Arithmetic Mean	Coefficient of Variation
2014	American plaice	-		-		0.000	6.083	-	
2014	Atlantic herring	0.001	8.367	0.038	5.129	-		0.001	2.828
2014	Barndoor skate	0.048	6.371	0.101	9.924	0.014	5.214	0.082	6.592
2014	Butterfish	0.152	2.198	0.157	5.630	0.362	4.898	0.480	3.966
2014	Cod	-		0.001	3.051	-		-	
2014	Haddock	0.003	5.993	0.039	13.351	0.096	2.864	0.042	1.981
2014	Little skate	0.001	4.034	0.209	7.246	0.626	5.054	0.277	3.572
2014	Monkfish	0.004	2.565	0.014	7.747	0.000	6.083	0.012	5.689
2014	Ocean pout	-		0.156	3.541	-		-	
2014	Red hake	0.093	2.393	0.731	8.698	0.795	2.855	0.140	5.277
2014	Silver hake	0.027	5.512	0.366	4.625	0.887	3.204	0.105	6.015
2014	Smooth skate	-		-		-		-	
2014	Spiny dogfish	0.307	3.301	0.588	7.337	0.063	4.560	0.170	3.716
2014	Summer flounder	0.034	2.360	0.056	8.782	0.002	6.083	0.030	4.776
2014	Thorny skate	-		-		-		-	
2014	White hake	-		-		-		-	
2014	Windowpane flounder	0.007	8.190	0.008	4.790	0.012	3.113	0.000	2.236
2014	Winter flounder	-		0.021	4.884	0.032	4.969	0.010	2.178
2014	Winter skate	0.032	5.791	0.001	6.403	0.304	3.584	0.001	7.032
2014	Witch flounder	0.009	4.378	0.016	7.622	0.000	8.911	0.001	7.032
2014	Yellowtail flounder	0.010	8.205	0.000	2.823	0.122	6.197	0.018	3.399
2015	American plaice	-		-		0.000	6.708	0.000	9.381
2015	Atlantic herring	0.003	7.141	0.199	7.966	0.003	4.708	0.008	8.626
2015	Barndoor skate	0.046	4.150	0.076	5.832	0.020	4.820	0.041	6.241
2015	Butterfish	0.238	5.590	0.040	5.481	0.106	1.609	0.106	9.339
2015	Cod	-		0.000	9.592	-		0.000	9.381
2015	Haddock	0.001	5.256	0.127	3.180	0.047	1.936	0.129	8.966
2015	Little skate	0.039	5.925	0.773	6.996	0.193	3.234	0.093	6.004
2015	Monkfish	0.044	3.822	0.051	8.262	0.003	2.929	0.020	4.998
2015	Ocean pout	0.002	6.469	0.008	8.163	0.000	6.059	0.000	12.059
2015	Red hake	0.520	4.179	0.358	7.193	0.229	3.329	0.651	2.779
2015	Silver hake	0.021	2.423	0.024	3.222	0.140	3.735	0.209	6.161
2015	Smooth skate	-		-		-		-	
2015	Spiny dogfish	0.700	3.360	1.306	7.167	0.006	3.625	0.535	8.910
2015	Summer flounder	0.296	4.900	0.073	7.005	0.020	2.652	-	
2015	Thorny skate	-		-		-		-	
2015	White hake	0.003	4.583	-		0.000	3.847	0.000	7.611
2015	Windowpane flounder	-		0.001	7.781	0.009	4.482	-	
2015	Winter flounder	-		0.001	6.810	0.006	4.404	-	
2015	Winter skate	0.068	7.792	0.107	6.934	0.010	5.569	-	
2015	Witch flounder	0.040	3.481	0.016	9.236	0.001	4.559	-	
2015	Yellowtail flounder	-		-		0.003	3.564	-	
2016	American plaice	0.000	7.141	-		-		-	
2016	Atlantic herring	-		-		-		-	
2016	Barndoor skate	0.240	5.200	0.017	4.330	0.004	4.800	0.001	4.506
2016	Butterfish	0.436	6.189	0.091	3.504	0.077	5.074	0.046	2.583
2016	Cod	0.004	5.541	-		-		-	
2016	Haddock	0.066	2.053	0.005	7.728	0.002	3.437	0.001	3.139
2016	Little skate	0.046	5.643	0.028	3.362	0.141	1.263	0.226	3.702
2016	Monkfish	0.151	5.776	0.019	6.617	0.008	1.741	0.062	2.953
2016	Ocean pout	0.006	2.260	0.017	2.395	0.000	4.963	-	
2016	Red hake	0.844	4.226	0.508	5.705	0.025	1.328	0.098	2.367
2016	Silver hake	0.021	3.547	0.506	7.249	0.054	2.630	0.234	1.320
2016	Smooth skate	-		-		-		-	
2016	Spiny dogfish	2.132	7.761	0.040	5.247	0.029	3.119	0.014	3.667
2016	Summer flounder	0.715	5.349	0.002	3.124	0.007	2.042	0.029	2.810
2016	Thorny skate	-		-		-		-	
2016	White hake	0.000	7.141	-		0.002	5.616	-	
2016	Windowpane flounder	0.001	3.162	0.001	4.003	0.005	1.938	-	
2016	Winter flounder	-		0.008	3.148	0.022	2.518	0.003	6.691
2016	Winter skate	0.234	2.154	0.003	5.353	0.010	3.563	-	
2016	Witch flounder	0.017	7.669	0.006	2.268	0.000	5.320	0.000	4.840
2016	Yellowtail flounder	-		-		0.004	2.128	0.001	5.096

5.1.4.1 Bycatch in Exempted Areas and Other Fishing Areas

5.1.4.1.1 Gear Trials and Experimental Fisheries

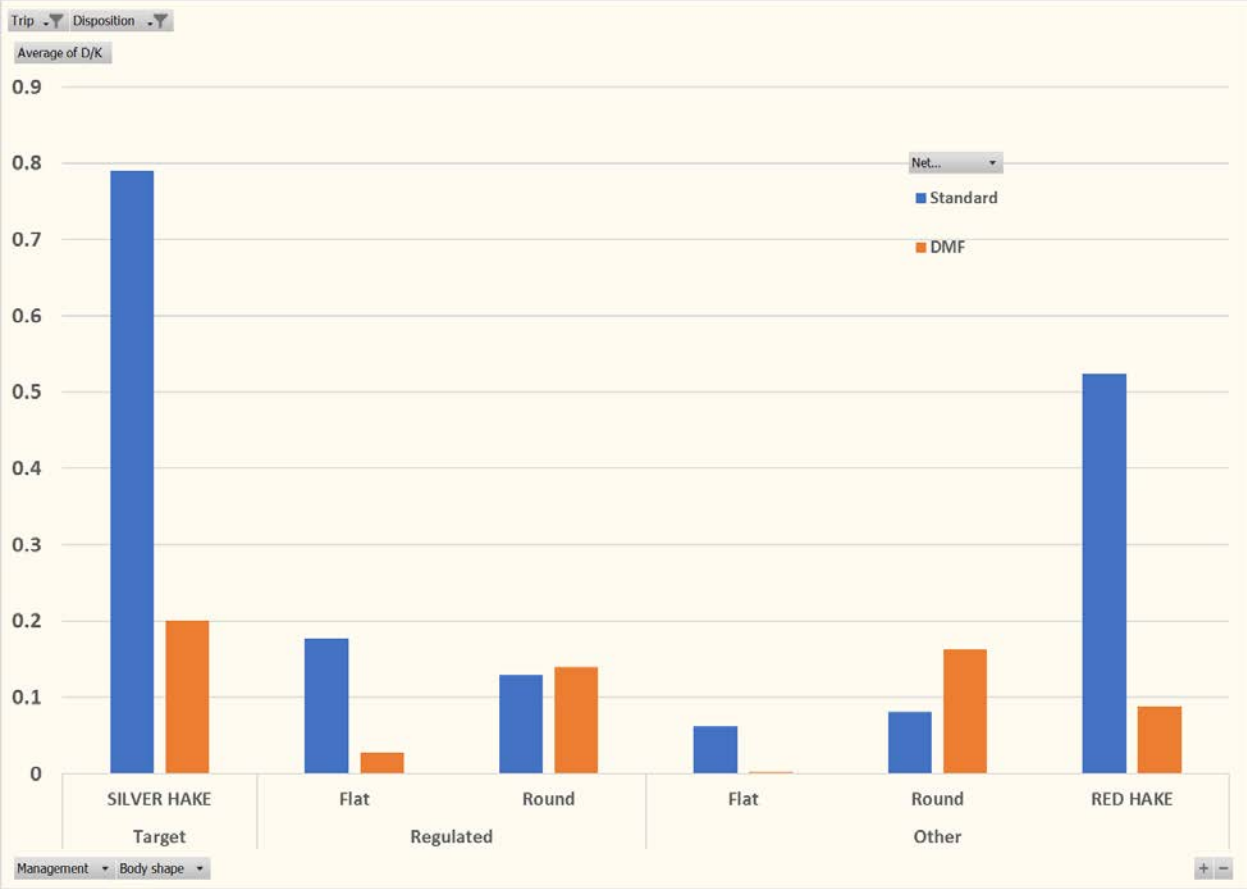
Fishing for small-mesh multispecies is allowed through a set of exemptions for the regulated mesh areas. On southern Georges Bank, in Southern New England, and the Mid-Atlantic (SNE/MA), small-mesh multispecies fishing is allowed with any type of trawl configuration and mesh (although the whiting possession limits vary by mesh size to encourage selective fishing with larger mesh trawls). This exempt Georges Bank (GB) fishing area are located within statistical reporting areas (SA) 525, 526, and 562. Trends of bycatch in the Southern New England and Mid-Atlantic areas were combined from observed hauls located in SAs 537 to 639.

The Cultivator Shoals Area (CSA) is a small-mesh exemption area open in the winter and spring to fish for whiting, squid, and other small-mesh species. Like areas to the south, this area does not require vessels to use any special gear configuration to reduce bycatch of regulated multispecies and other species. Interactions with regulated multispecies is achieved through area and season specifications (see Section ???). The Cultivator Shoals Area is almost entirely within statistical reporting area (SA) 522.

Small-mesh multispecies exemption areas in the western Gulf of Maine and the Outer Cape (O.Cape) require vessels to use a raised footrope trawl, a trawl designed and tested in the 1990s by MA Division of Marine Fisheries and Capt. Henry Souza (Carr 1996, McKiernan et al. 1998). Only six trips were tested using a control net, sequentially using a raised footrope trawl trawl and modified sweeps then using a standard 2 or 4-seam trawl with the same size small-mesh cod end. Catches of regulated multispecies were almost all lower with the raised footrope trawl compared to the standard trawl (see Figure 15) that had been in use to fish for small-mesh multispecies before the regulated mesh areas applied in 1994. Catches of the target whiting were also lower, but not as much. Catches of red hake were also reduced with the DMF raised footrope trawl by an amount similar to the observed reduction of silver hake catches. The comparable bycatch rate for roundfish (cod, haddock, pollock, etc) actually increased compared to the control net.

The researchers noted that net performance and characteristics were highly dependent on how the net was ‘tuned’ and that selectivity could be compromised by changing the sweep length. During testing, modification and modifications to the raised footrope trawl net were made to improve performance and selectivity, primarily by changing the number of floats in the headrope to lift the footrope off the bottom. The MA DMF researchers recommended that specification and enforcement of the net configuration would be required to ensure adequate performance on unobserved trips. To our knowledge, no formal review of gear configuration on observed trips since 1998 has been performed to evaluate how well the fishery is conforming to the original tested gear standard.

Figure 15. Comparable catches of silver hake (target), red hake, regulated multispecies, and other species by body shape for six raised footrope trawl/control trials in 1994. Data from Carr 1996, used with permission of MA DMF.



Following the initial testing against a control, MA DMF proposed and monitored an experimental fishery in 1997 and 1998. Vessels in the experimental fishery were required to use a raised footrope trawl to target small-mesh multispecies in five areas (see Map ???) of Massachusetts Bay and the Outer Cape. MA DMF (McKiernan et al. 1998, McKiernan 1999) compared the catches of regulated multispecies only to a 5% threshold (the ratio of the catch of regulated large-mesh multispecies to total catch[9]), which the Council set to evaluate whether to allow exempted fisheries in regulated multispecies mesh areas. In most cases, the regulated multispecies catches were below the 5% threshold. An acceptable low fraction of trips and tows exceeded the 5% threshold (Figure 16), except in experimental fishing area 2C (Figure 17), where the bycatch of cod was unacceptably high. MA DMF also totaled the ratio of total discards to total kept (∑D/∑Kall), noting that it was unclear which metric should be used to evaluate bycatch.

[9] N.B. This was a different ratio than the one currently used (discard to kept) ratio that is now used to estimate catch and monitor bycatch.

Map 2. Experimental small-mesh multispecies fishery areas and observed trips/hauls during 1998 (McKiernan et al. 1999) Map used with permission of MA DMF.

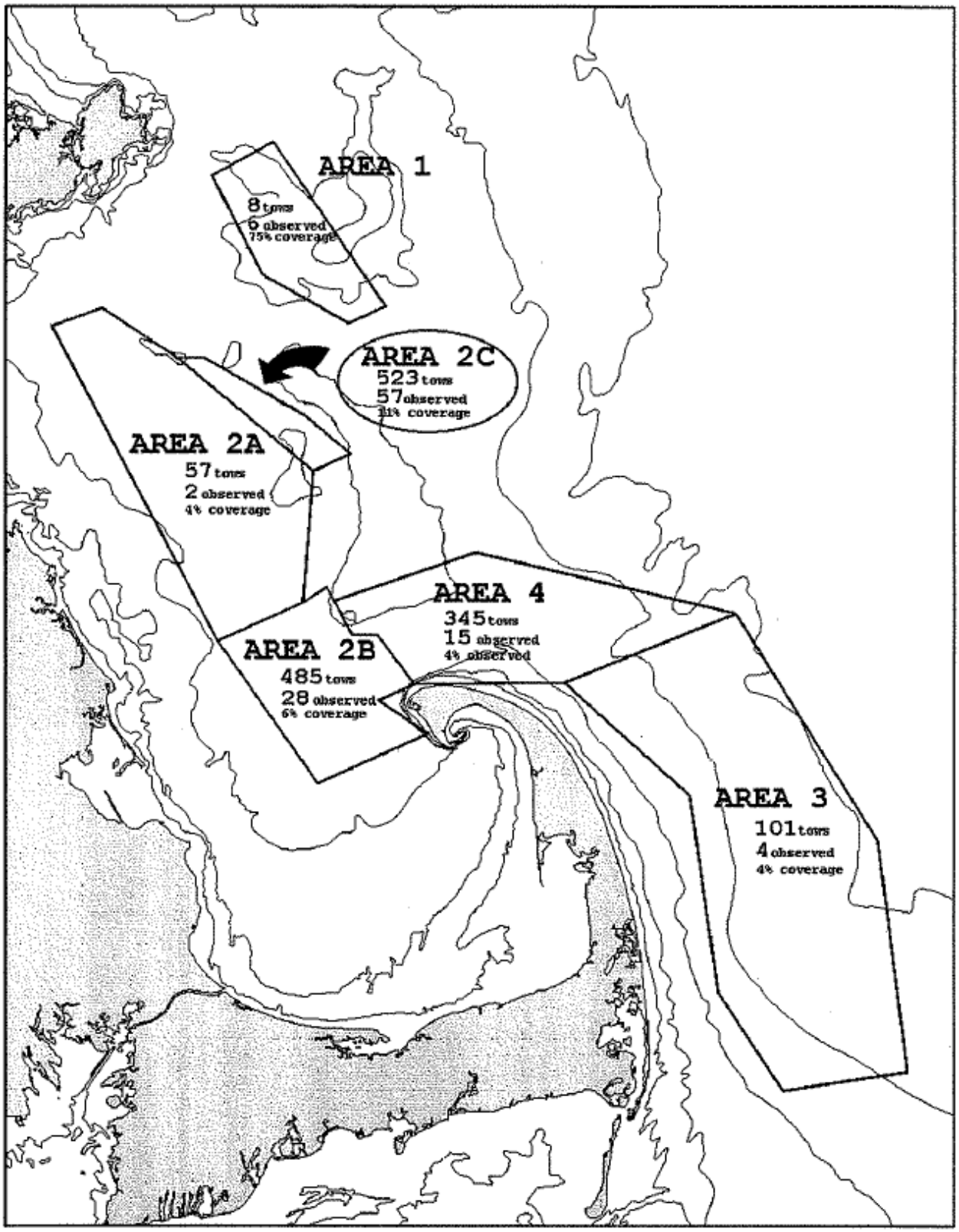


Figure 16. Regulated multispecies catch rates for the 1998 experimental fishery conducted in area 2B (McKiernan 1999). Used with permission of MA DMF.

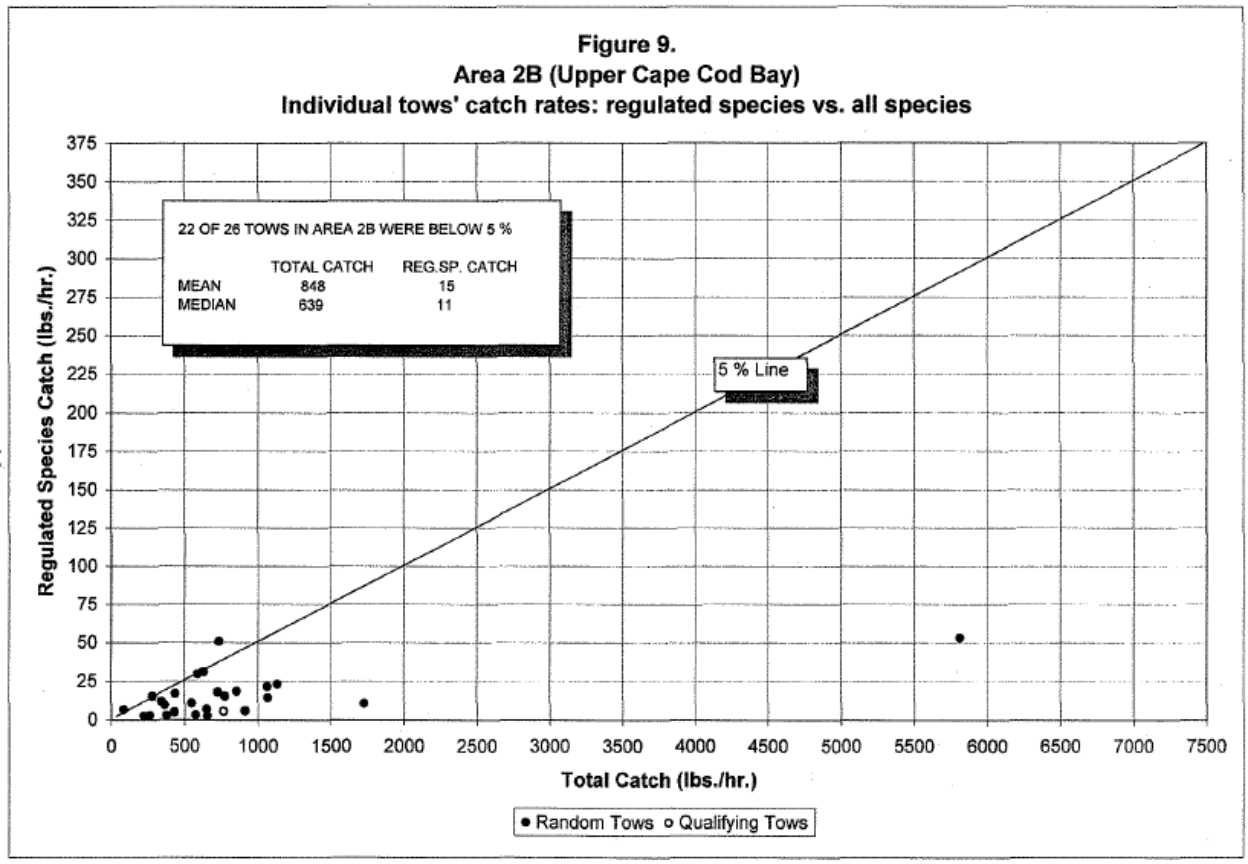
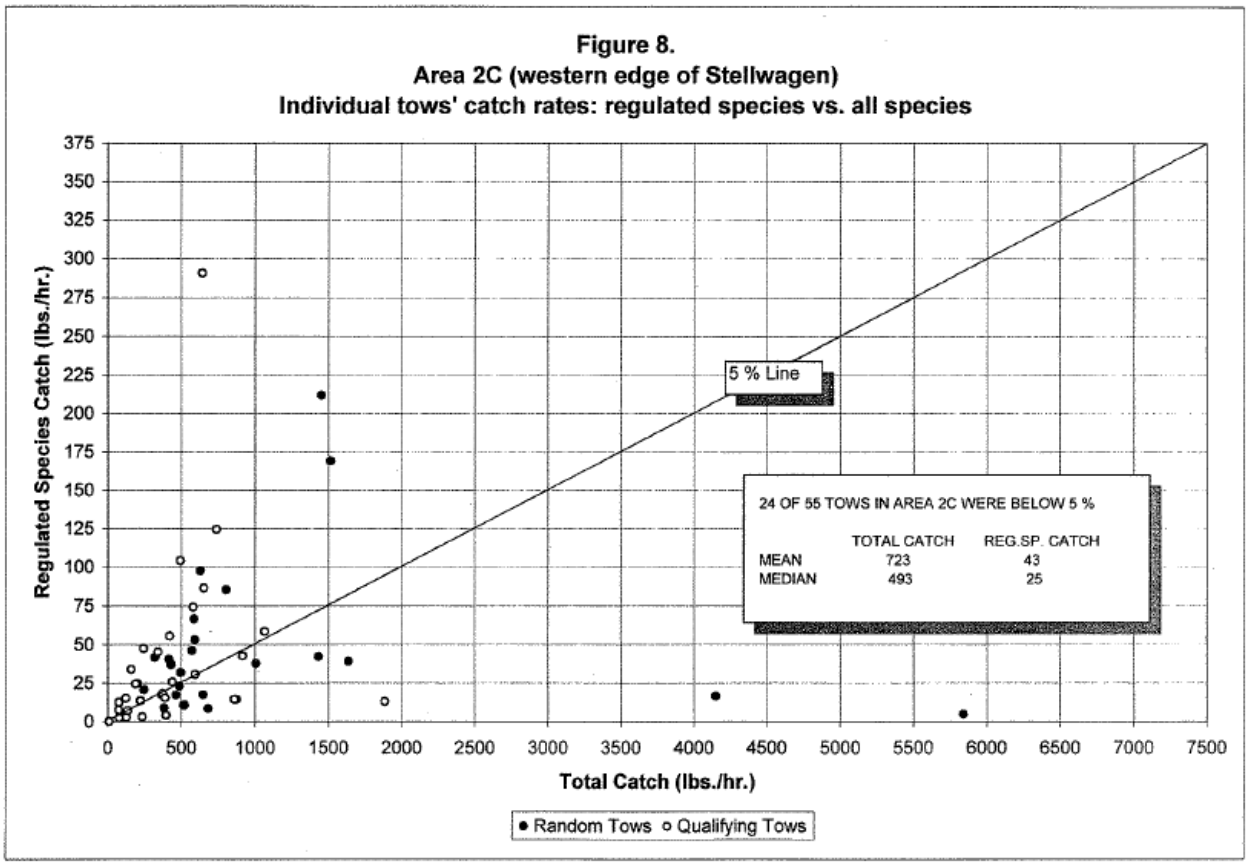


Figure 17. Regulated multispecies catch rates for the 1998 experimental fishery conducted in area 2C (western edge of Stellwagen) (McKiernan 1999). Used with permission of MA DMF.



5.1.4.2 Bycatch of Regulated Multispecies

5.1.4.2.1 Trends in Total Discard to Kept-all (∑D/∑Kall) ratios

Here we examine the trends from 1989 to 2016 in observed bycatch in the small-mesh multispecies fishery, comparing bycatch rates between the five general SA groups that encompass the small-mesh multispecies exemption areas. In the time available, we were not able to separate out the observed tows by individual exemption area (this would require more complex GIS processing), but binned the data by SAs. Small-Mesh Areas I and II and the Inner Cape raised footrope trawl area are located in SAs 513 and 514. The Outer Cape Raised Footrope Trawl Area is located in SA 521, and the Cultivator Shoals Area is almost entirely in SA 522.

Regulated multispecies bycatch rates (∑D/∑Kall) in the Cultivator Shoals Area have been generally below the 5% threshold for most of the period (Figure 18, 1st panel). The average bycatch rate exceeded the 5% threshold in 2004 and 2007, while most trips exceeded the standard from 2004-2007 as well as 2010-2011. For 2014-2016, catches of regulated multispecies have been well above the 5% threshold with more than 90% of the trips exceeding that threshold. As it turns out, most of the high regulated multispecies catch is comprised of haddock, following a series of strong haddock year classes.

In the Georges Bank SAs (Figure 18, 2nd panel), the ∑D/∑Kall ratios fluctuated around 5%, exceeding the threshold in 2004, 2007, 2012, and 2015-2015[10]. Most trips exceeded the 5% threshold in only one year, 2012. Generally, the bycatch of regulated multispecies has been less than that for the Cultivator Shoals Area and did not increase in 2014-2016 when strong year classes of Georges Bank haddock became selected by the small-mesh multispecies nets.

Bycatch of regulated multispecies (∑D/∑Kall) in SAs 513 and 514 where exemption areas require vessels to use a raised footrope trawl were mostly below the 5% threshold (Figure 18, 3rd panel), substantially exceeding the 5% threshold in only 2010. Only in 2006 and 2010, most trips exceeded a ∑D/∑Kall ratio of 5% and bycatch of regulated multispecies were generally less than that for the Cultivator Shoals Area and Georges Bank SAs.

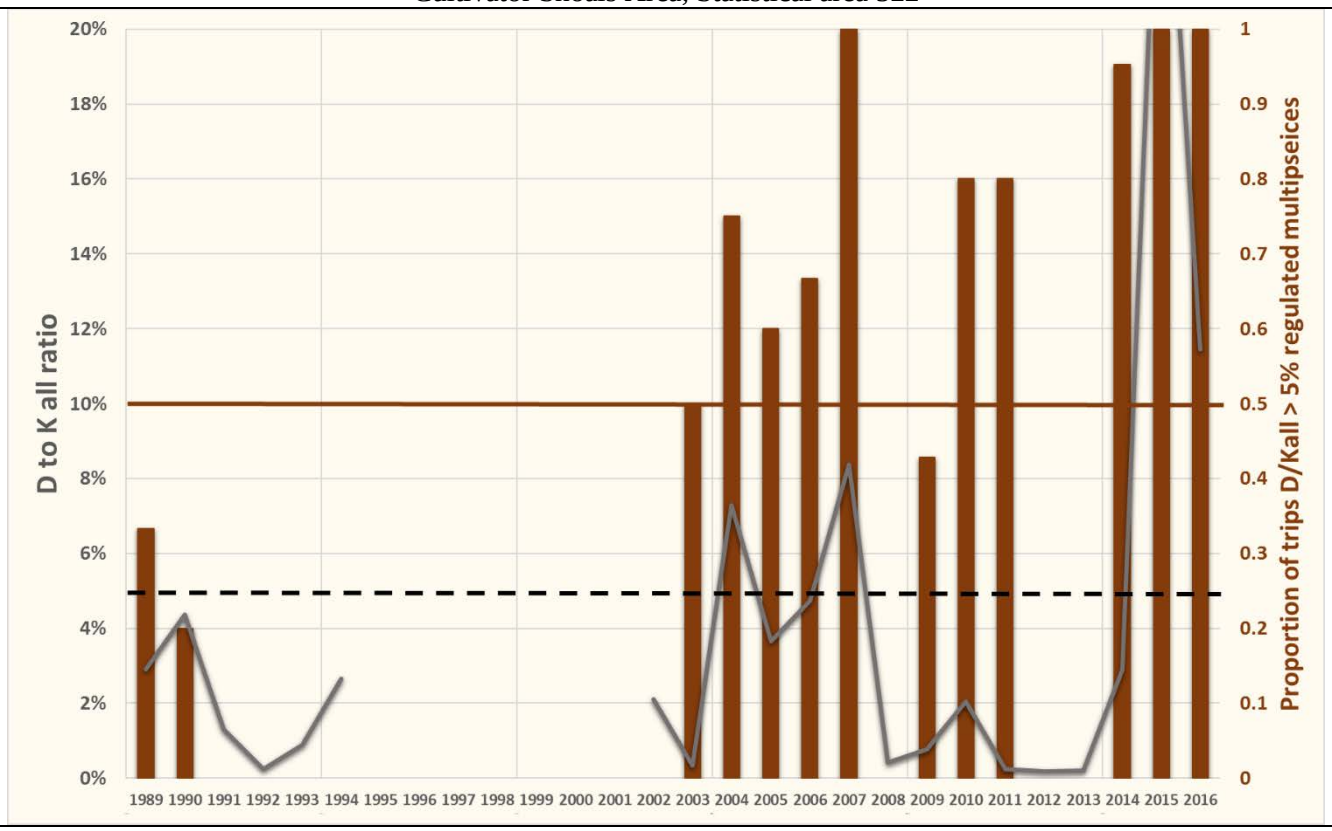
Samples on observed trips in SA 521, where the Outer Cape raised footrope trawl area is located, are generally sparse (Figure 18, 4th panel). Except for 2003, and 2016, the ∑D/∑Kall rato was below the 5% threshold. More than half of the trips exceed a 5% ∑D/∑Kall threshold in 2014 and 2016, like the pattern from the Cultivator Shoals Area, probably due to bycatch of abundant young haddock.

Except for 2007 when 50% of trips had ∑D/∑Kall ratios exceeding 5% of regulated multispecies, the regulated multispecies bycatch in SNE/MA areas has been low (Figure 18, 5th panel). Mainly, regulated multispecies bycatch is low because except for winter flounder groundfish abundance here is generally less than in the Gulf of Maine and on Georges Bank. Furthermore, most of the small-mesh multispecies fishery occurs in waters that are generally deeper than where groundfish inhabit.

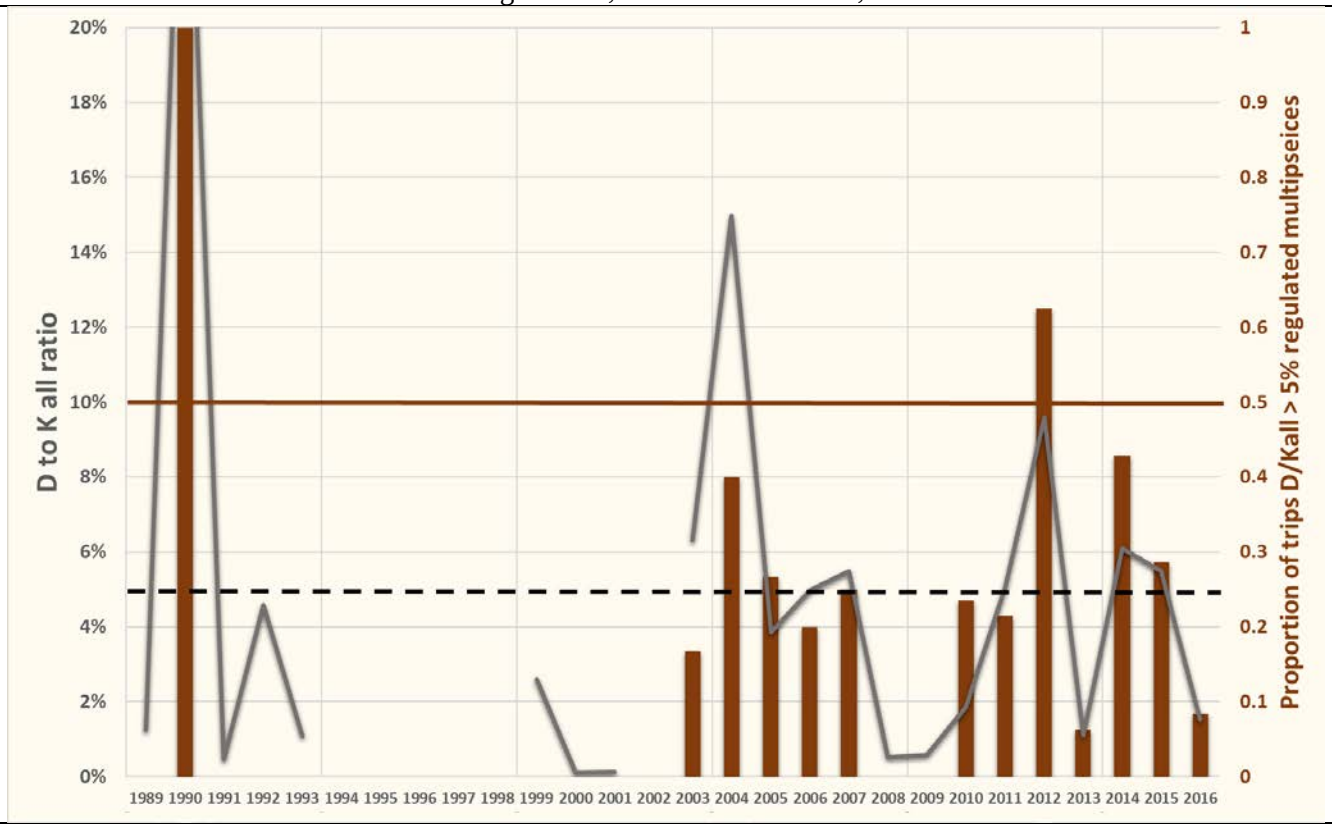
[10] Discount the high rate in 1990 because only one trip was sampled.

Figure 18. Regulated multispecies average annual discard to kept all ratios and trips exceeding the 5% threshold (dashed black line) by sub-area on small-mesh trawls trips landing more than 2000 lbs. whiting or 400 lbs. red hake. The solid red line represents when more than 50% of trips exceed the 5% threshold.

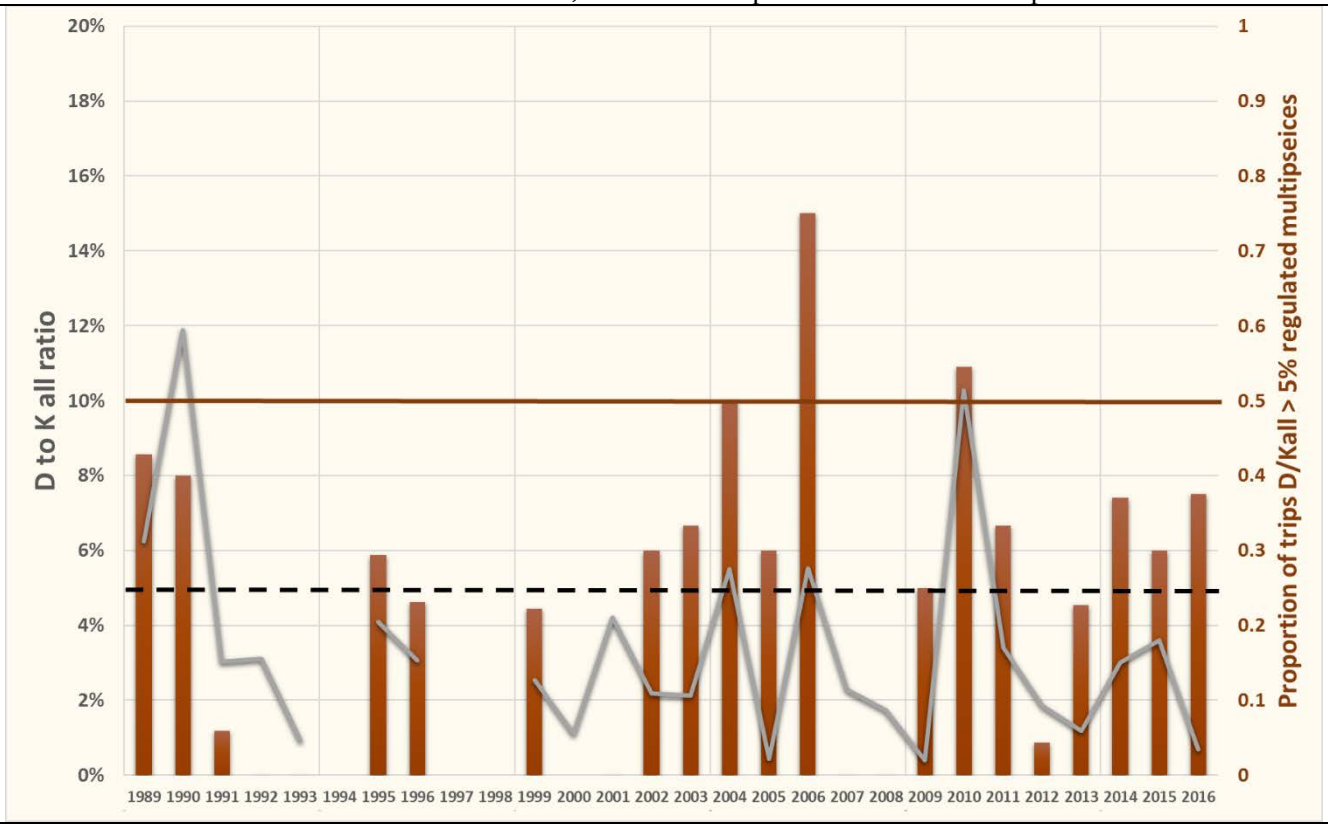
Cultivator Shoals Area, Statistical area 522



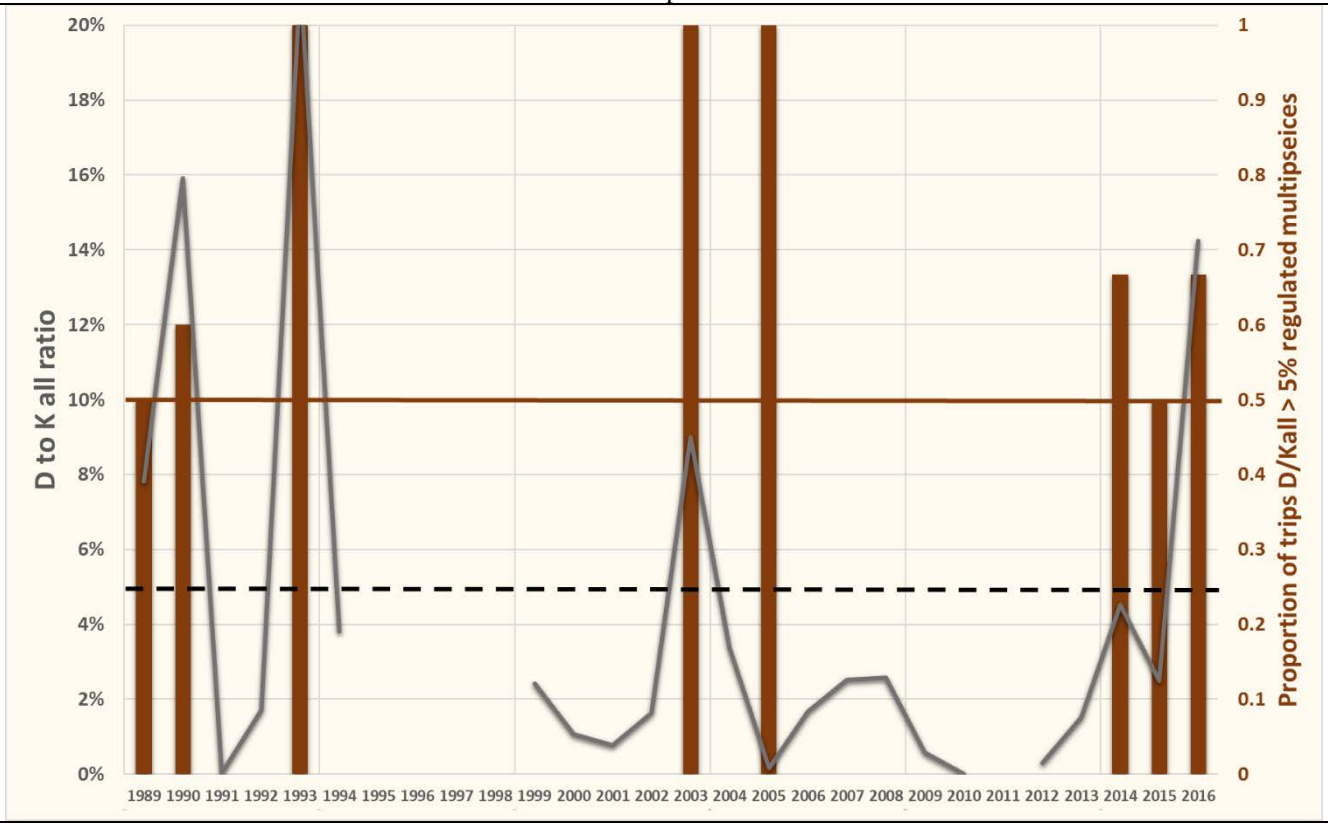
Georges Bank, Statistical areas 525, 526 and 562



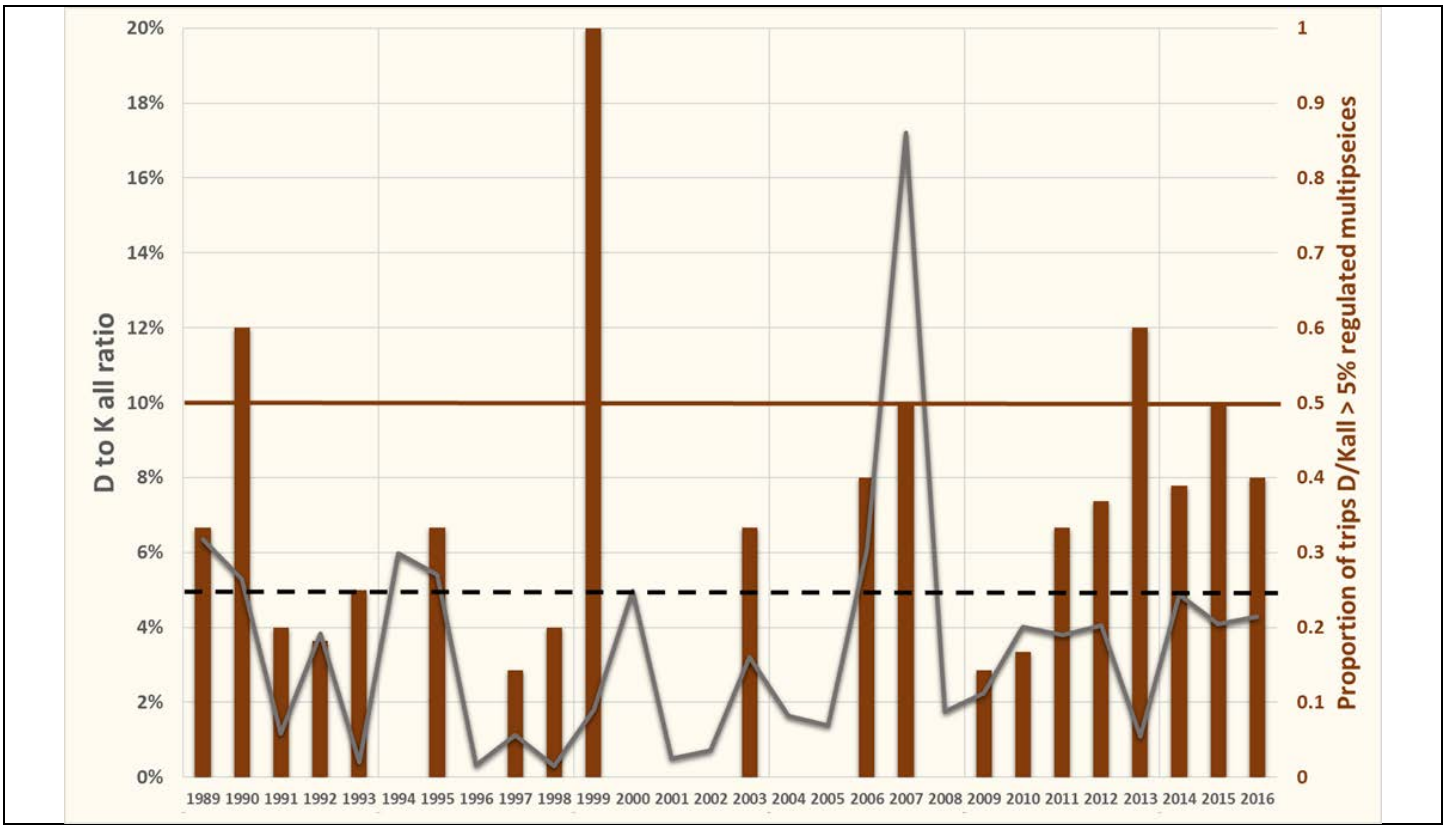
Gulf of Maine, Statistical areas 513-514
Small-Mesh Area 1 and 2; Raised Footrope Trawl area inside Cape



Outer Cape, Statistical area 521
Raised Footrope Trawl area



Southern New England/Mid-Atlantic; Statistical areas >= 537


D to K all ratio
Proportion of trips D/Kall > 5% regulated multipseices
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016

5.1.4.2.2 Trends in Discard to Kept ratios on Individual Observed Hauls

Another way of examining the bycatch trends is to summarize the discard to kept-all (D/Kall) statistics for individual hauls. The trends shown in Figure 19 are not as cleanly differentiated between areas as are the ∑D/∑Kall ratios described in the previous section, but there are some parallels as would be expected.

Generally the D/Kall rates are higher in the Cultivator Shoals Area then elsewhere and frequently exceed the 5% threshold. Both the Cultivator Shoals Area (SA 522) and Georges Bank (SA 525,526,562) have an elevated bycatch of regulated multispecies in 2014-2016. During this period, the regulated multispecies bycatch frequently exceeded a 5% ratio on many observed hauls (Figure 20). It is also notable that except for the Cultivator Shoals Area, the bycatch rate of regulated multispecies was relatively low (i.e. "clean tows" seldom exceeding 5%) when the kept portion exceeded 5000 lbs. (i.e.it caught a lot of whiting). It may also be correlated with tow duration, a factor that we did not examine.

5.1.4.2.3 Conclusions

Many observed hauls in the Cultivator Shoals Area even exceeded a 25% ratio. These high catch rates appear to be related to large year-classes of haddock (as shown below) becoming vulnerable to the small-mesh trawls. This is probably not due to the infrequent use of raised footrope trawls in the Cultivator Shoals Area, which as discussed above is a roundfish that was not less selective in the raised footrope trawl/control gear trials conducted by Carr 1996/

Figure 19. Annual regulated multispecies discard to kept-all ratios by sub-area for trips using small-mesh trawls and landing at least 2000 lbs. of whiting or 400 lbs. of red hake, 1989-2016. Reference line represents the 5% regulated multispecies standard applied as a factor to allow an exempted fishery. Sub-areas are CSA (Cultivator Shoals Area;SA=522), GB (Georges Bank;SA=525,526,562), GOM (Western Gulf of Maine; SA 513,514), O.Cape (SA=521), and SNE/MA (SA >= 537). The GOM and O.Cape sub-areas include exemption areas requiring a raised footrope trawl.

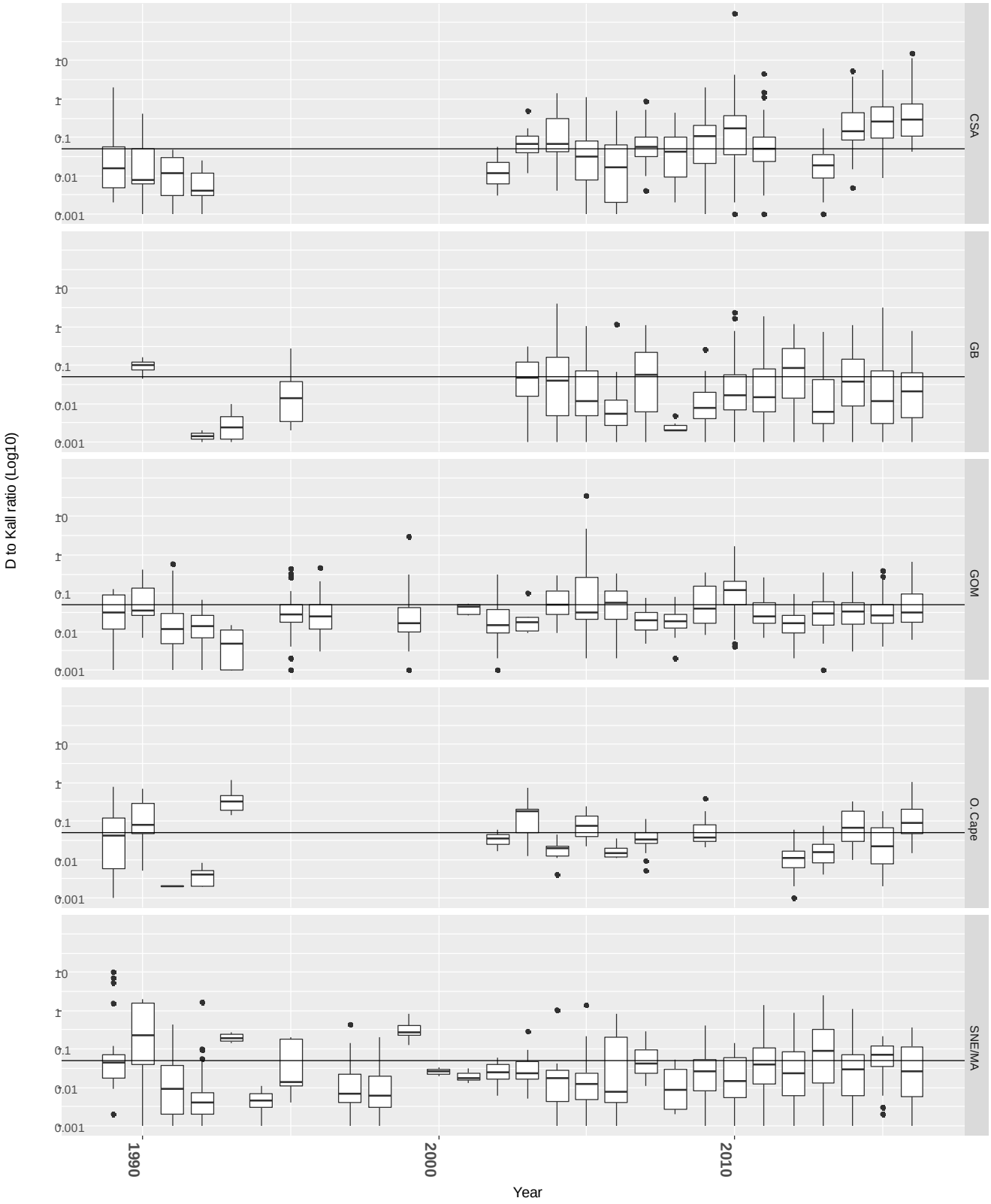
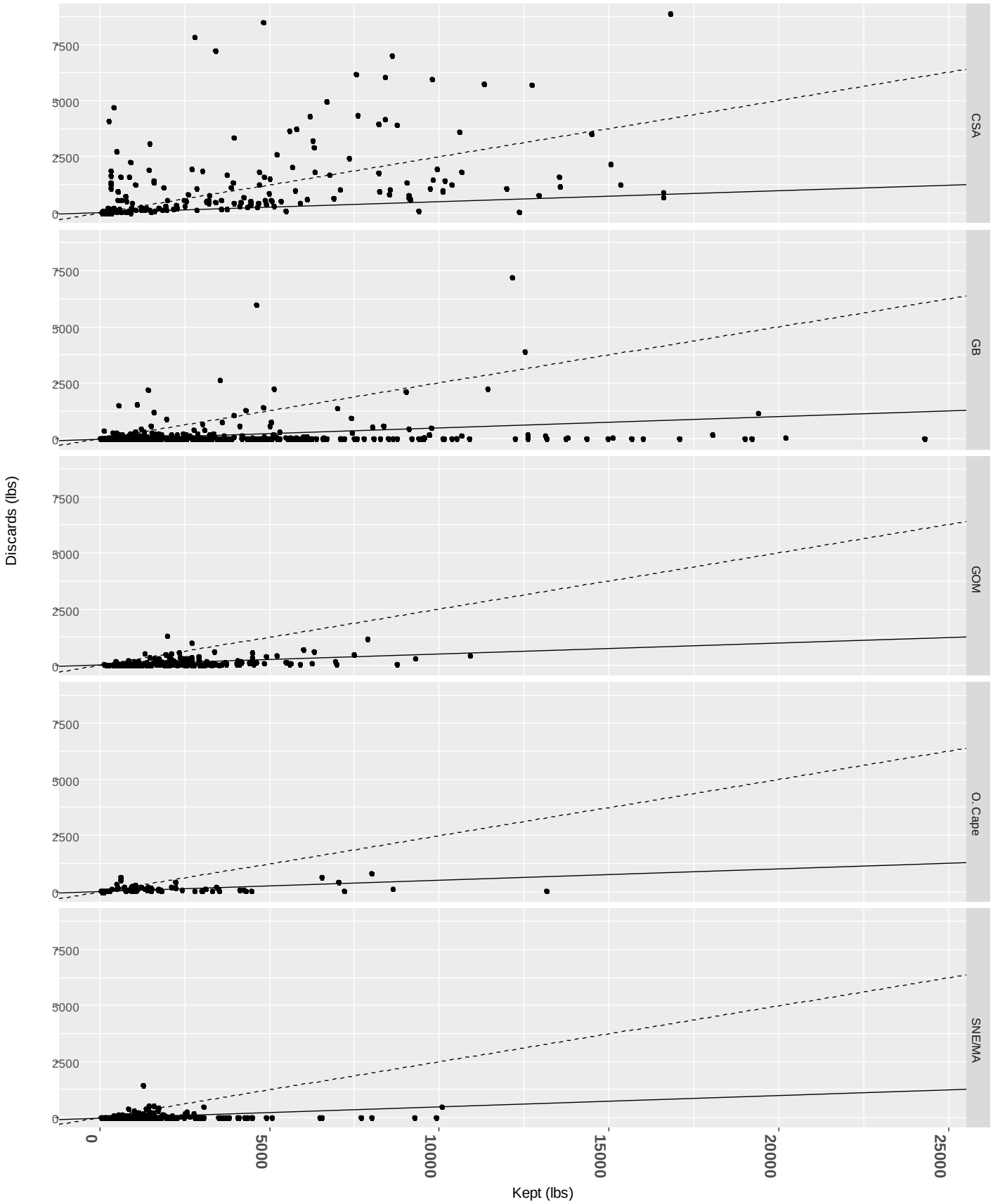


Figure 20. Regulated multispecies discard vs. kept by sub-area for observed hauls (each point represents a haul) during 2014-2016. Solid reference line = 5% ratio; dashed reference line = 25% ratio. Sub-area as in Figure 19.



5.1.4.2.4 Trends and Patterns in Species and Species Groups Bycatch

5.1.4.2.4.1 Roundfish (including haddock) and flatfish

Since the raised footrope trawl was designed to avoid catching flatfish (flounders, etc) and the net caught more roundfish than the control net in gear trials, it was worthwhile to compare the bycatch trends by area broken out by fish type. The trends and patterns for roundfish (cod, haddock, pollock, redfish, and ocean pout) are very similar to the overall trends and patterns for all regulated multispecies combined (Figure 21 and Figure 22). Catches of roundfish were below a 5% ratio, except for the Cultivator Shoals Area where the bycatch in 2014-2016 was dominated by haddock (Figure 25 and Figure 26).

Bycatch trends and patterns for flatfish (

Figure 23 and Figure 24) show a markedly different pattern. In general, the bycatch of flatfish (flounders, monkfish, and skates) appear to be lower in the raised footrope trawl areas (particularly Small-Mesh Areas I and II, SA 513-514: and the raised footrope trawl areas, SA 521) than elsewhere. Bycatch in the Cultivator Shoals Area (SA 522) did not increase in 2014-2016 as it did for haddock (a roundfish). It is also notable that the bycatch rate is generally lower for tows in all areas where the kept proportion (mainly whiting) exceeds 5000 lbs. per haul (i.e. they are clean tows).

Figure 21. Annual regulated multispecies roundfish (cod, haddock, pollock, redfish, ocean pout) discard to kept-all ratios by sub-area for trips using small-mesh trawls and landing at least 2000 lbs. of whiting or 400 lbs. of red hake, 1989-2016. Reference line represents the 5% regulated multispecies standard applied as a factor to allow an exempted fishery

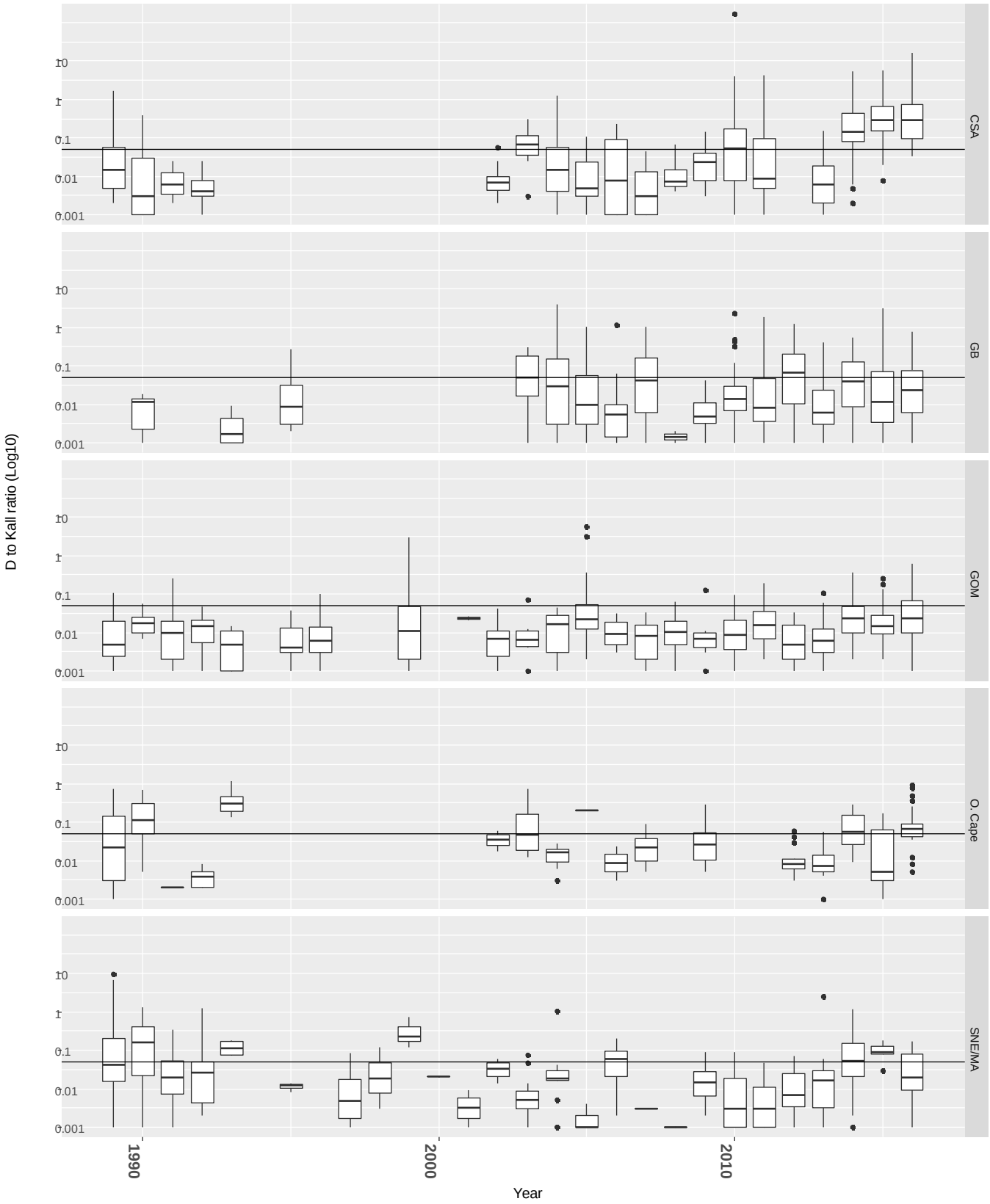


Figure 22. Regulated multispecies roundfish discard vs. kept by sub-area for observed hauls (each point represents a haul) during 2014-2016. Solid reference line = 5% ratio; dashed reference line = 25% ratio. Sub-area as in Figure 19.

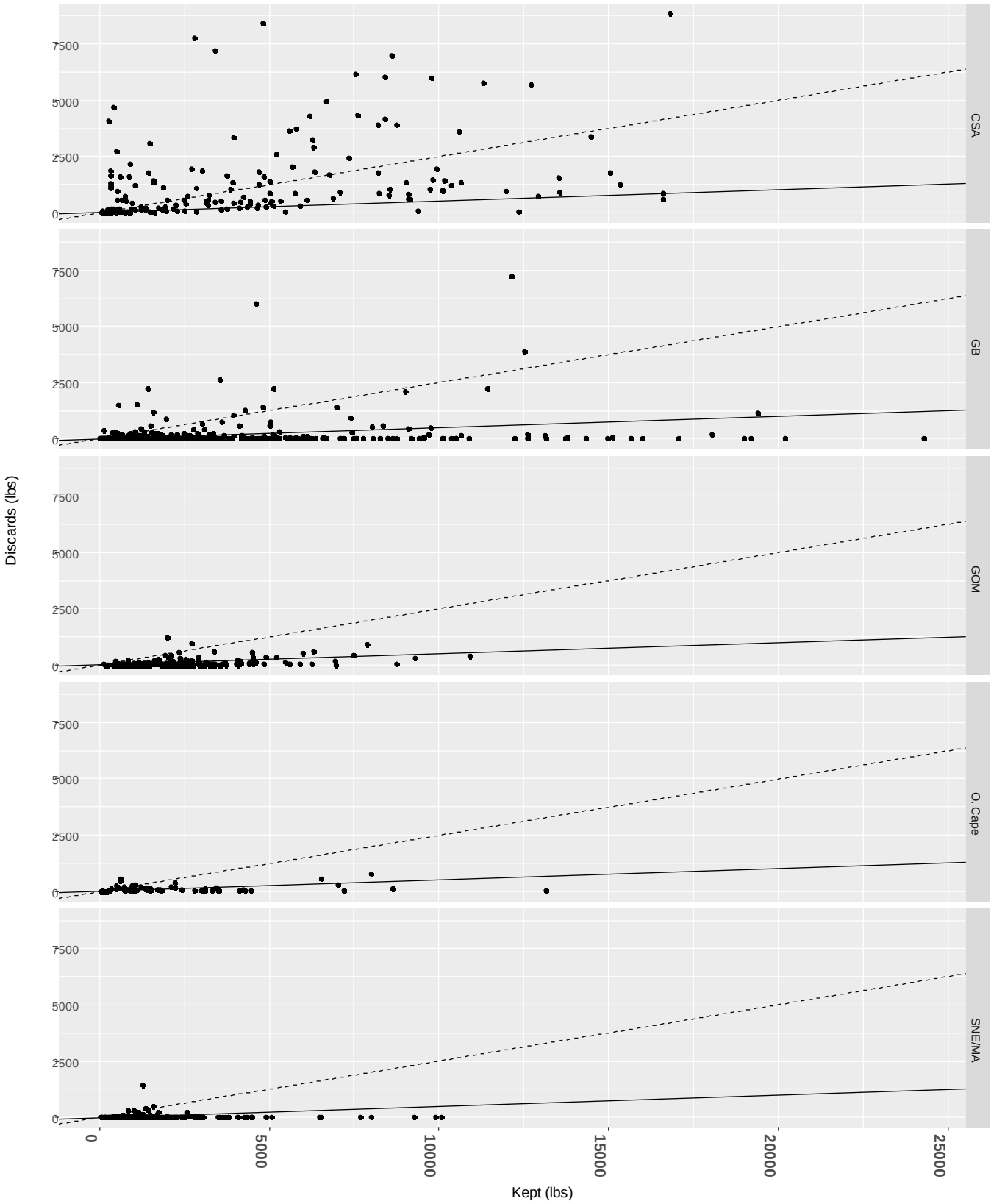


Figure 23. Annual flatfish (flounders, monkfish, and skates) discard to kept-all ratios by sub-area for trips using small-mesh trawls and landing at least 2000 lbs. of whiting or 400 lbs. of red hake, 1989-2016. Sub-area as in Figure 19.

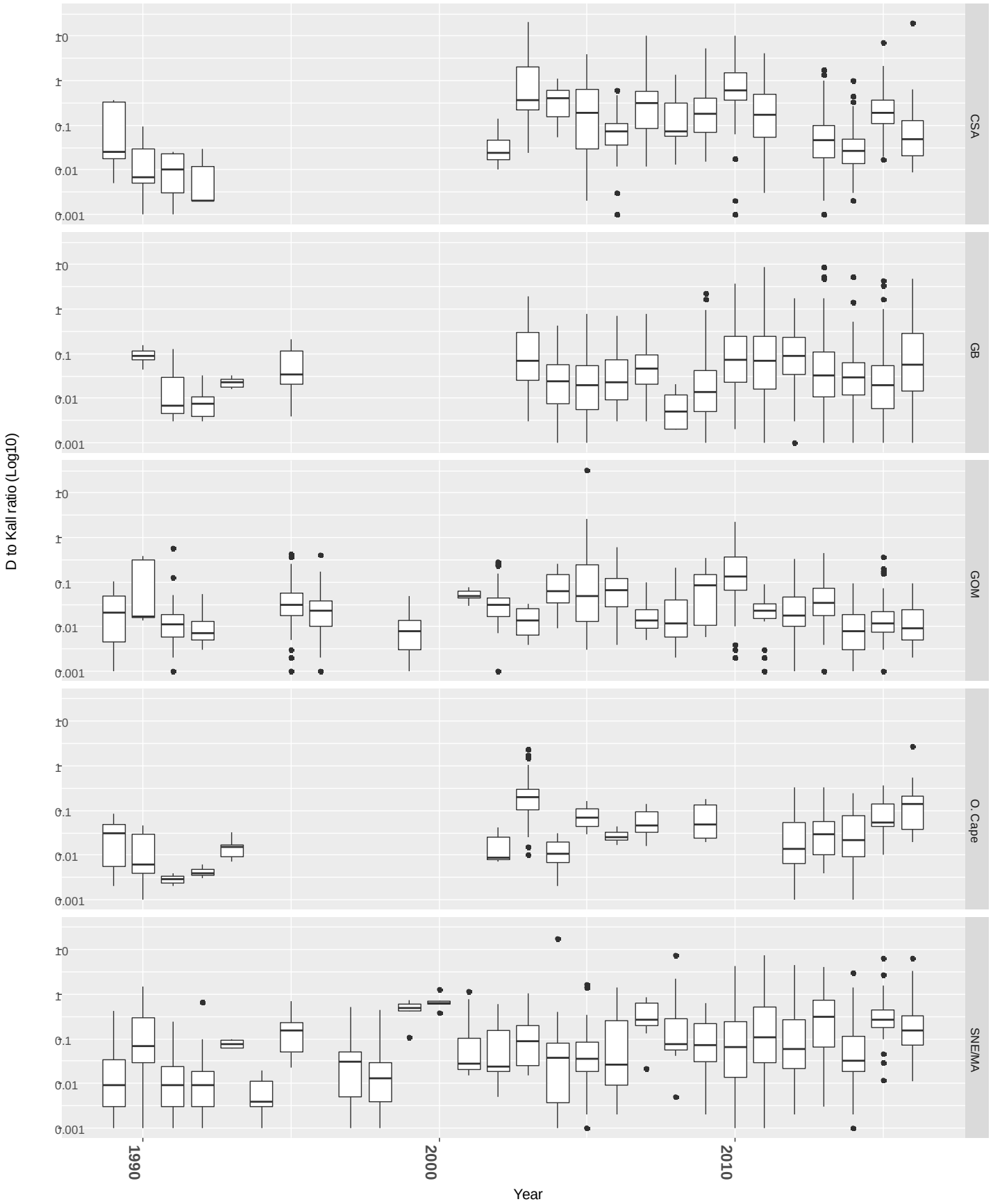


Figure 24. Flatfish discard vs. kept by sub-area for observed hauls (each point represents a haul) during 2014-2016. Solid reference line = 5% ratio; dashed reference line = 25% ratio. Sub-area as in Figure 19.

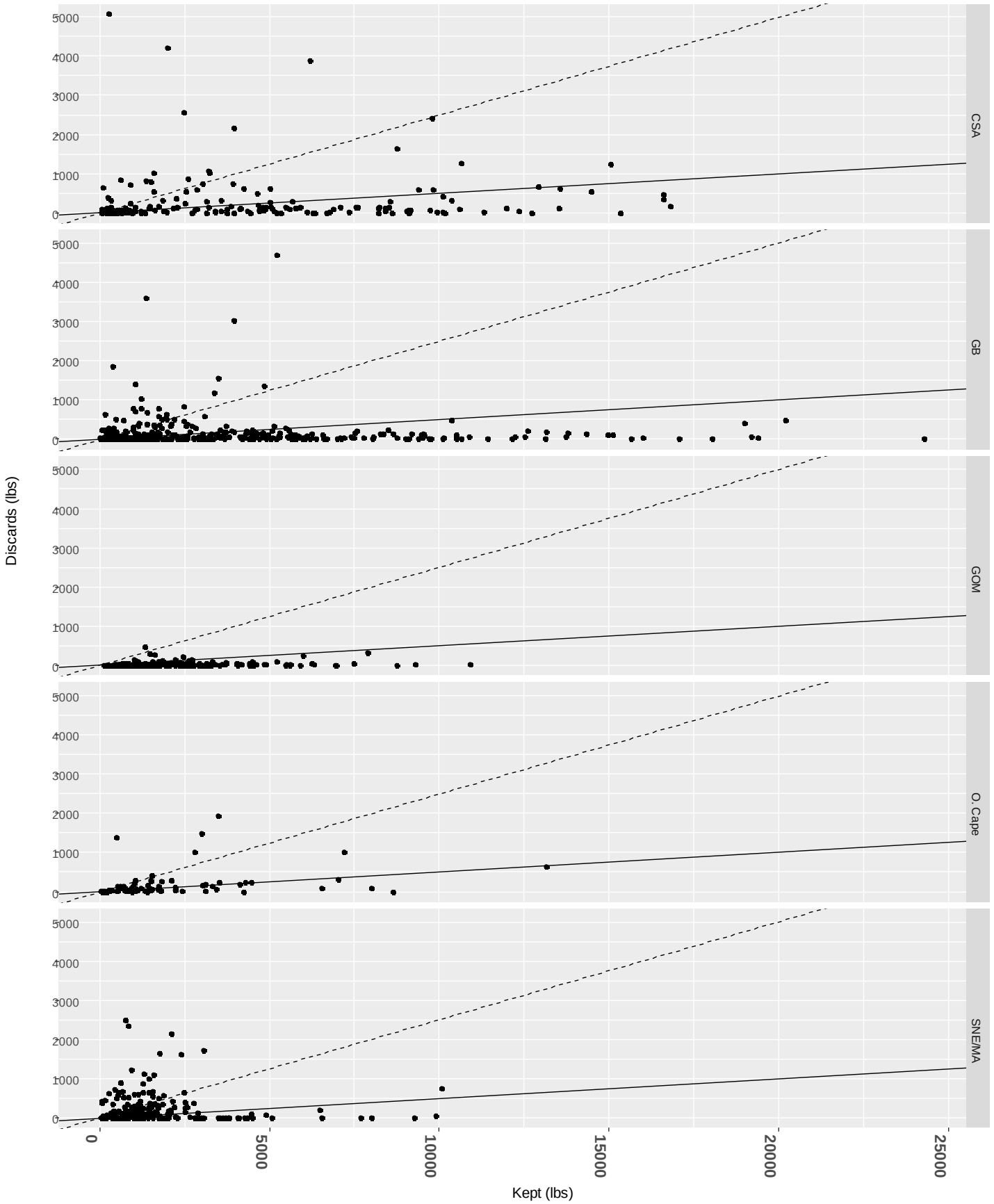


Figure 25. Annual haddock discard to kept-all ratios by sub-area for trips using small-mesh trawls and landing at least 2000 lbs. of whiting or 400 lbs. of red hake, 1989-2016. Sub-area as in Figure 19.

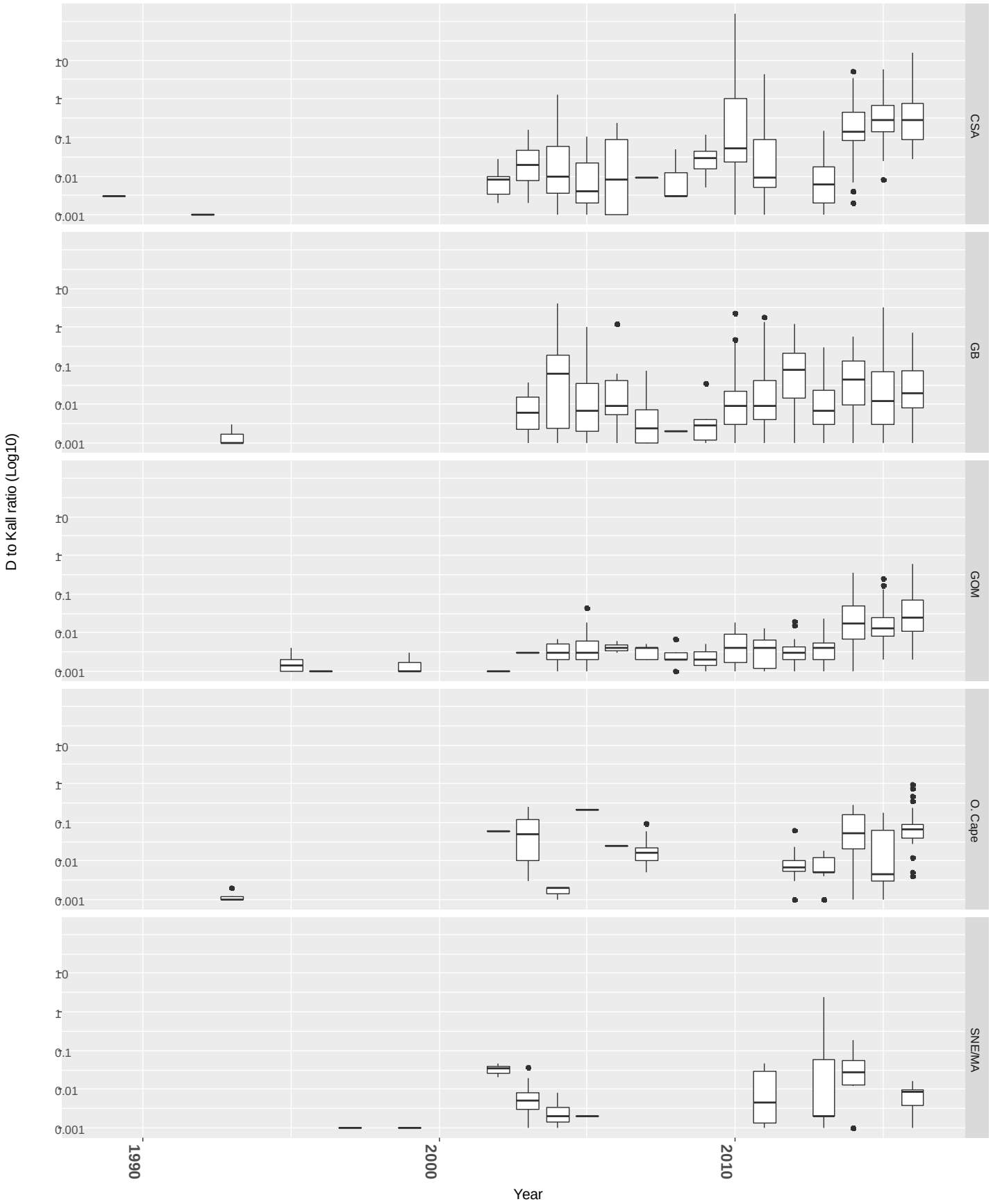
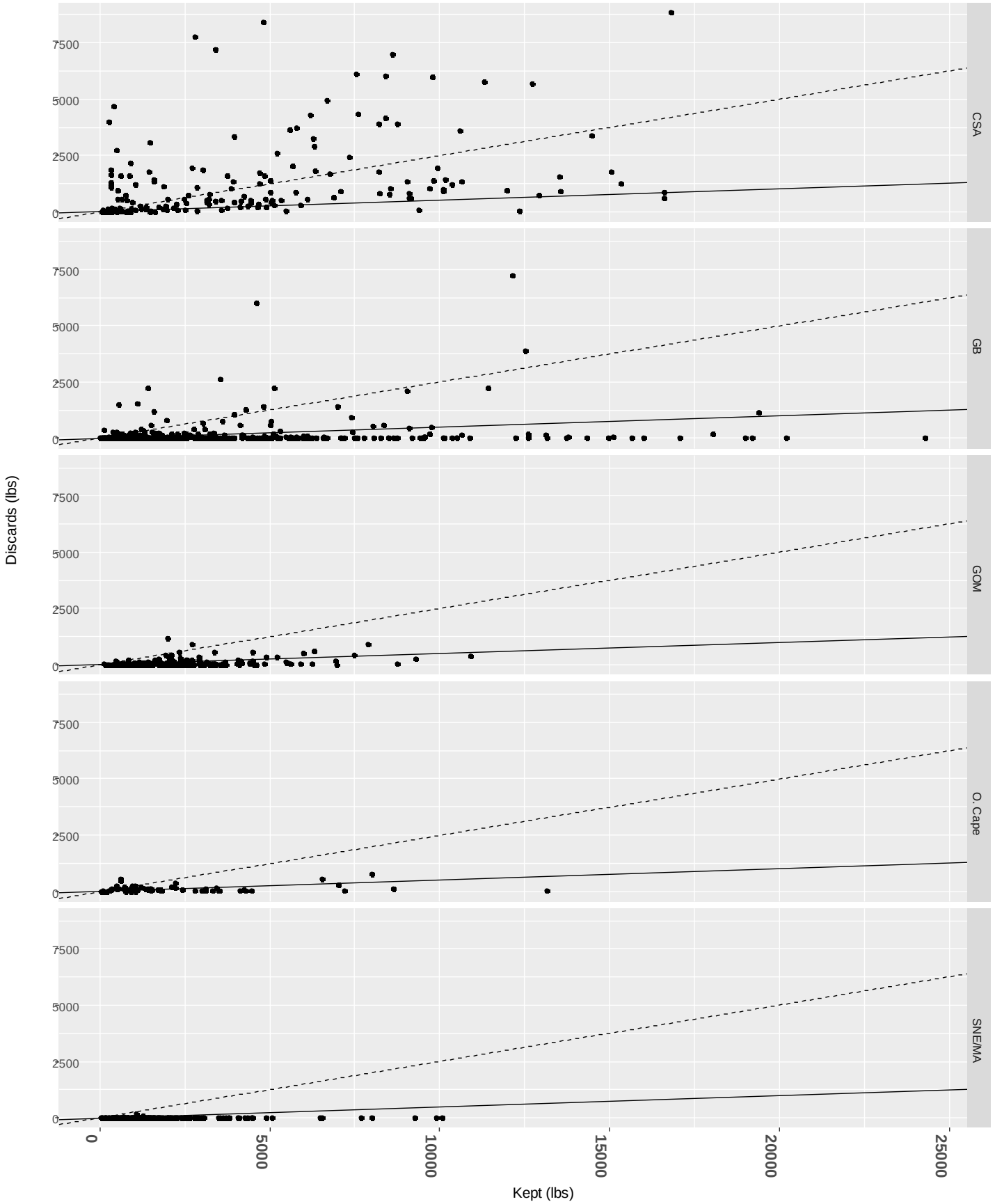


Figure 26. Haddock discard vs. kept by sub-area for observed hauls (each point represents a haul) during 2014-2016. Solid reference line = 5% ratio; dashed reference line = 25% ratio. Sub-area as in Figure 19.



5.1.4.2.4.2 Red hake

In the gear trials by Carr 1996, red hake catches were reduced slightly more in the raised footrope trawl than the catches of silver hake. Due to the low number of trips and tows observed, it is difficult to reach any conclusions about the catches of red hake from those data alone. Since then, we can compare the trends and patterns in red hake bycatch over time and between areas (Figure 27 and Figure 28). D/Kall ratios of red hake since 2004 appear to be relatively stable, varying around 10% in most areas. There appears to be a slight uptick in the red hake D/Kall ratio in the GOM (SA 513-514) since 2011, a period when accountability measures triggered an in-season reduction in the northern red hake possession limit to 400 lbs. Similar to the case for roundfish, the highest bycatch ratios appear to be correlated with low catch (kept) of the target species (i.e. whiting) (Figure 28).

Figure 27. Annual red hake discard to kept-all ratios by sub-area for trips using small-mesh trawls and landing at least 2000 lbs. of whiting or 400 lbs. of red hake, 1989-2016. Sub-area as in Figure 19.

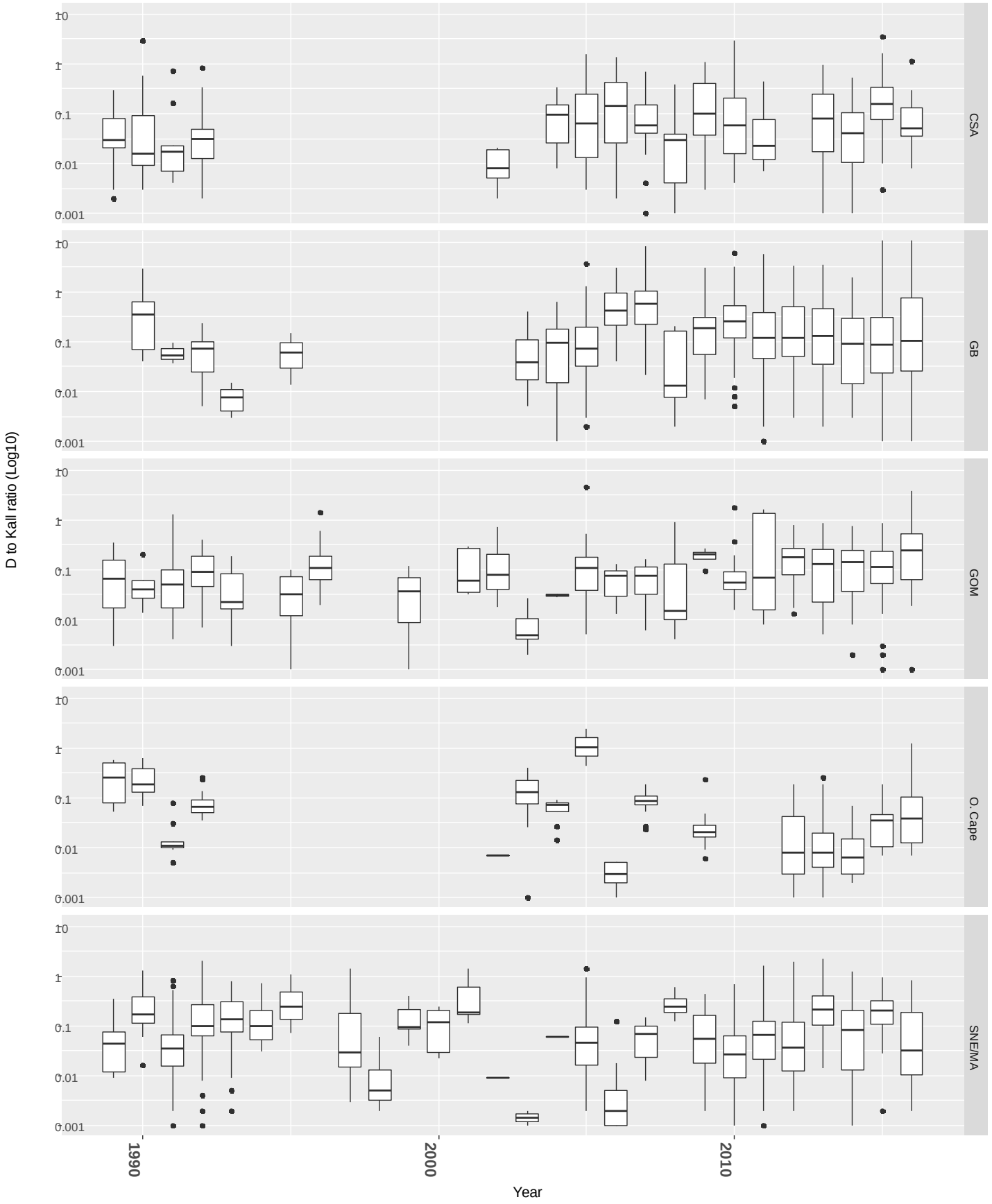
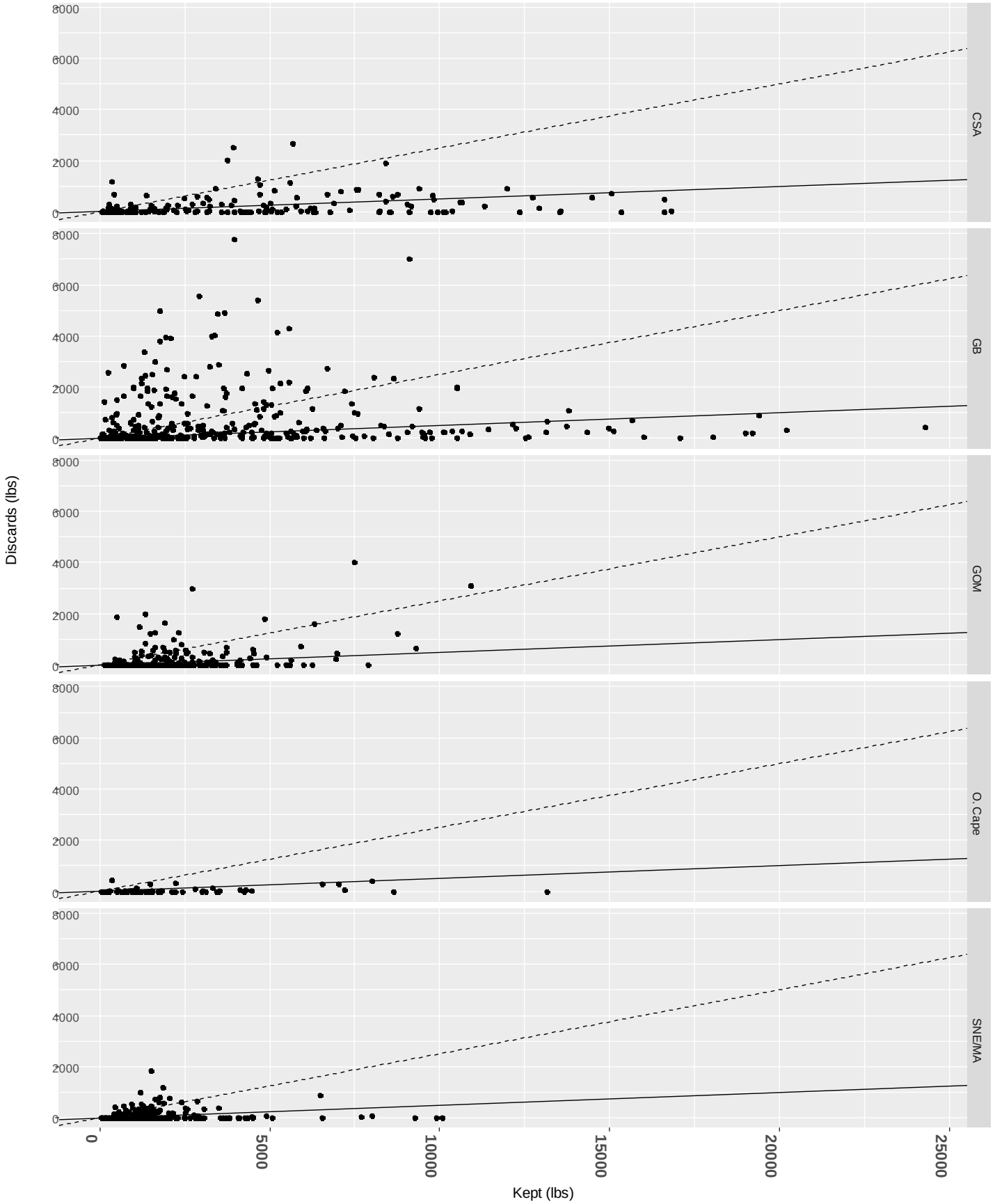


Figure 28. Red hake discard vs. kept by sub-area for observed hauls (each point represents a haul) during 2014-2016. Solid reference line = 5% ratio; dashed reference line = 25% ratio. Sub-area as in Figure 19.



5.1.4.3 Conclusions

Although it appears that the bycatch rate of regulated multispecies is lower in the areas where the raised footrope trawl is required, it is difficult to say whether this lower rate is due to the required gear or the season and area where the fishery is allowed to occur. The gear trials (Carr 1996) strongly suggest that the gear is very effective at reducing flatfish catch and this is corroborated by first-hand experience of fishermen. We do not however have the right type of data available to draw this type of conclusion from the observer data. On the other hand, it appears that the elevated ∑D/∑Kall and D/Kall ratios that exceed the 5% threshold is mainly due to recent strong year-classes of haddock, which it does not appear that the raised footrope trawl addresses. Whether other selective gears, like the experimental large-mesh belly panel net helps reduce bycatch of other potential 'choke' species like red hake will require further investigation.

5.2 Protected Species (including Fish, Sea Turtles, and Marine Mammals)

5.2.1 Species Present in the Area

Protected species are those afforded protections under the Endangered Species Act (ESA; species listed as threatened or endangered under the ESA) and/or the Marine Mammal Protection Act (MMPA). Table 17 provides a list of protected species that occur in the affected environment of the small-mesh multispecies fishery and the potential for the fishery to impact the species, specifically via interactions with fishing gear.

Table 17. Species protected under the ESA and/or MMPA that may occur in the affected environment of the small-mesh multispecies fishery. Marine mammal species (cetaceans and pinnipeds) italicized and in bold are considered MMPA strategic stocks[1]. Shaded rows indicate species who prefer continental shelf edge/slope waters (i.e., >200 meters).

Species	**Status[2]**	***Potential to interact with small-mesh multispecies fishing gear?***
Cetaceans		
North Atlantic right whale (Eubalaena glacialis)	***Endangered***	***No***
Humpback whale, West Indies DPS, (*Megaptera novaeangliae*)	Protected (MMPA)	No
Fin whale (Balaenoptera physalus)	***Endangered***	***No***
Sei whale (Balaenoptera borealis)	***Endangered***	***No***
Blue whale (Balaenoptera musculus)	***Endangered***	***No***
Sperm whale (Physeter macrocephalus	***Endangered***	***No***
Minke whale (*Balaenoptera acutorostrata*)	Protected (MMPA)	Yes
Pilot whale (Globicephala spp.)[3]	***Protected (MMPA)***	***Yes***
Pygmy sperm whale (*Kogia breviceps*)	Protected (MMPA)	No
Dwarf sperm whale (*Kogia sima*)	Protected (MMPA)	No
Risso's dolphin (*Grampus griseus*)	Protected (MMPA)	Yes
Atlantic white-sided dolphin (*Lagenorhynchus*	Protected (MMPA)	Yes

Species	**Status**[2]	***Potential to interact with small-mesh multispecies fishing gear?***
acutus)		
Short Beaked Common dolphin (*Delphinus delphis*)	Protected (MMPA)	Yes
Atlantic Spotted dolphin (*Stenella frontalis*)	Protected (MMPA)	No
Striped dolphin (*Stenella coeruleoalba*)	Protected (MMPA)	No
Beaked whales (*Ziphius and Mesoplodon spp*)[4]	Protected (MMPA)	No
Bottlenose dolphin (Tursiops truncatus)[5]	***Protected (MMPA)***	***Yes***
Harbor porpoise (*Phocoena phocoena*)	Protected (MMPA)	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)	No
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 Ocean DPS	Threatened	Yes
Hawksbill sea turtle (*Eretmochelys imbricate*)	Endangered	No
Fish		
Atlantic salmon	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
Alewife (Alosa pseudoharengus)	Candidate	Yes
Blueback herring (Alosa aestivalis)	Candidate	Yes
Critical Habitat		
Northwest Atlantic DPS of Loggerhead Sea Turtle	ESA (Protected)	No
North Atlantic Right Whale Critical Habitat	ESA (Protected)	No

Species	Status[2]	*Potential to interact with small-mesh multispecies fishing gear?*

Notes:

[1] A strategic stock is defined under the MMPA as a marine mammal stock for which: (1) the level of direct human-caused mortality exceeds the potential biological removal level; (2) based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; and/or (3) is listed as a threatened or endangered species under the ESA, or is designated as depleted under the MMPA (Section 3 of the MMPA of 1972).

[2] Status is defined by whether the species is listed under the ESA as endangered (i.e. at risk of extinction) or threatened (i.e. at risk of endangerment), or protected under the MMPA. Marine mammals listed under the ESA are also protected under the MMPA. Candidate species are those species for which ESA listing may be warranted.

[3] There are 2 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 referred to as *Globicephala spp*.

[4] There are multiple species of beaked whales in the Northwest Atlantic. They include the cuvier's (*Ziphius cavirostris*), blainville's (*Mesoplodon densirostris*), gervais' (*Mesoplodon europaeus*), sowerbys' (*Mesoplodon bidens*), and trues' (*Mesoplodon mirus*) beaked whales. Species of *Mesoplodon* are difficult to identify at sea, therefore, much of the available characterization for beaked whales is to the genus level only.

[5] This includes the Western North Atlantic Offshore, Northern Migratory Coastal, and Southern Migratory Coastal Stocks of Bottlenose Dolphins.

Cusk, alewife, and blueback herring 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. As a result, these species will not be discussed further in this and the following sections; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on candidate species from any proposed action. Additional information on cusk, alewife, and blueback herring can be found at: http://www.nmfs.noaa.gov/pr/species/esa/candidate.htm.

5.2.2 Protected Species and Critical Habitat Not Likely Affected (via interactions with gear or destruction of essential features of critical habitat) by the small-mesh multispecies fishery

Based on available information, it has been determined that this action is not likely to affect (via interactions with gear or destruction of essential features of critical habitat) multiple ESA listed and/or marine mammal protected species or any designated critical habitat (Table 17). 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 used to prosecute the small-mesh multispecies fishery (i.e., bottom otter trawl (small mesh); Waring et al. 2014a, 2015, 2016; Hayes et al. 2017; NMFS NEFSC FSB 2015, 2016, 2017; http://www.nefsc.noaa.gov/fsb/take_reports/nefop.html). In the case of critical habitat, this determination has been made because operation of the small-mesh multispecies fishery 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 2014; NMFS 2015a,b).

5.2.3 Species Potentially Affected by the Proposed Action

Kemp's ridley, leatherback, the North Atlantic DPS of green and the Northwest Atlantic DPS of loggerhead sea turtle are the four ESA-listed species of sea turtles that occur in the affected environment of the small-mesh multispecies fishery. Three of the four species are hard-shelled turtles (i.e., green, loggerhead, and Kemp's ridley). Additional background information on the range-wide status, descriptions, and life histories of these four species can be found in a number of published documents, including sea turtle status reviews and biological reports (NMFS and USFWS 1995; Hirth 1997; Turtle Expert Working Group [TEWG] 1998, 2000, 2007, 2009; NMFS and USFWS 2007a, 2007b; 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, 1998a), Kemp's ridley sea turtle (NMFS et al. 2011), and green sea turtle (NMFS and USFWS 1991, 1998b).

A general overview of sea turtle occurrence and distribution in waters of the Northwest Atlantic Ocean is provided below to assist in understanding how the small-mesh multispecies fishery overlaps in time and space with sea turtles. Maps depicting the range wide distribution and occurrence of sea turtles in the Greater Atlantic Region can be found at the following websites: https://www.greateratlantic.fisheries.noaa.gov/protected/section7/listing/index.html; http://marinecadastre.gov/; and, http://seamap.env.duke.edu/.

Hard-Shelled Sea Turtles

In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida to Cape Cod, Massachusetts, 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. Loggerheads, the most common hard-shelled sea turtle in the Greater Atlantic Region, 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).

Hard-shelled sea turtles occur year-round in waters off Cape Hatteras, North Carolina and south. As coastal water temperatures warm in the spring, loggerheads begin to migrate to inshore waters of the southeast United States and also move up the Atlantic Coast (Epperly *et al.* 1995a, 1995b, 1995c; Braun-McNeill and Epperly 2002; Morreale and Standora 2005; Griffin *et al.* 2013), occurring in Virginia foraging areas as early as late April and on the most northern foraging grounds in the Gulf of Maine in June (Shoop and Kenney 1992). The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine 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

Leatherbacks, a pelagic species, are known to use coastal waters of the U.S. continental shelf and to have a greater tolerance for colder water than hard-shelled sea turtles (James *et al.* 2005; Eckert *et al.* 2006;

Murphy *et al*. 2006; NMFS and USFWS 2013; Dodge *et al.* 2014). Leatherback sea turtles 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). They are found in more northern waters (i.e., Gulf of Maine) later in the year (i.e., similar time frame as hard-shelled sea turtles), with most leaving the Northwest Atlantic shelves by mid-November (James *et al.* 2005; James *et al*. 2006; Dodge *et al.* 2014).

Marine Mammals

Large Cetaceans

Multiple species of whales occur in the Northwest Atlantic, with the minke whale being the only whale species potentially affected by the proposed action (Table 17). In general, large whales, such as minke whales, 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; Waring et al. 2014, 2015, 2016; Hayes et al. 2017; NMFS 1991, 2005, 2010b, 2011a, 2012b). This, however, is a simplification of whale movements, particularly as it relates to winter movements. It remains unknown if all individuals of a population migrate to low latitudes in the winter, although, increasing evidence suggests that for some species (e.g., right and humpback whales), some portion of the population remains in higher latitudes throughout the winter (Waring et al. 2014, 2015, 2016; Hayes et al. 2017; Khan et al. 2009, 2010, 2011, 2012; Brown et al. 2002; NOAA 2008; Cole et al. 2013; Clapham et al. 1993; Swingle et al. 1993; Vu et al. 2012). Although further research is needed to provide a clearer understanding of large whale movements and distribution in the winter, the distribution and movements of large whales to foraging grounds in the spring/summer is well understood. Movements of whales into higher latitudes coincide with peak productivity in these waters. As a result, the distribution of large whales in higher latitudes is strongly governed by prey availability and distribution, with large numbers of whales coinciding with dense patches of preferred forage (Mayo and Marx 1990; Kenney et al. 1986, 1995; Baumgartner et al. 2003; Baumgartner and Mate 2003; Payne et al.1986, 1990; Brown et al. 2002; Kenney and Hartley 2001; Schilling et al. 1992). For additional information on the biology, status, and range wide distribution of whale species, such as the minke whale, please refer to marine mammal stock assessment reports provided at: http://www.nmfs.noaa.gov/pr/sars/region.htm.

To further assist in understanding how the small-mesh multispecies fishery may overlap in time and space with the occurrence of minke whales, a general overview on species occurrence and distribution in the area of operation for the small-mesh multispecies fishery is provided in the following table.

Table 18. Minke occurrence in the affected environment of the small-mesh multispecies fishery.

Species	Prevalence and Approximate Months of Occurrence
Minke	• Widely distributed throughout continental shelf waters (<100m deep) of the Mid-Atlantic (Southern New England included), Gulf of Maine, and Georges Bank. • Most common in the EEZ from spring through fall, with greatest abundance found in New England waters; fall through spring widespread and common in deep-ocean waters.
***Sources*:** Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; Hayes *et al*. 2017.	

Small Cetaceans

Small cetaceans can be found throughout the year in waters of the Northwest Atlantic Ocean (Waring *et al*. 2014a; Waring et al. 2015; Waring *et al*. 2016; Hayes *et al*. 2017). Within this range, however, there are seasonal shifts in species distribution and abundance. In regards to pinnipeds, species are found in the nearshore, coastal waters of the Northwest Atlantic Ocean. They are primarily found throughout the year or seasonally from New Jersey to Maine; however, increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, North Carolina (35ºN) (Waring *et al*. 2007, 2014a, 2015, 2016; Hayes *et al*. 2017).

To further assist in understanding how small-mesh multispecies fishery may overlap in time and space with the occurrence of small cetaceans and pinnipeds, a general overview of species occurrence and distribution in the affected environment of this fishery is provided in the table below

Table 19. Small cetacean and pinniped occurrence in the affected environment of the small-mesh multispecies fishery.

Species	Prevalence and Approximate Months of Occurrence
Atlantic White-Sided Dolphin	• Distributed throughout the continental shelf waters (primarily to 100 meter isobath) of the Mid-Atlantic (north of 35ºN), Southern New England, Georges Bank, and Gulf of Maine; however, most common in continental shelf waters from Hudson Canyon (~ 39ºN) to Georges Bank, and into the Gulf of Maine. • **January-May**: low densities found from Georges Bank to Jeffreys Ledge. • **June-September**: large densities found from Georges Bank through the Gulf of Maine. • **October-December**: intermediate densities found from southern Georges Bank to southern Gulf of Maine. • South of Georges Bank (Southern New England and Mid-Atlantic), low densities found year round, with waters off Virginia and NC representing southern extent of species range during winter months.
Short-Beaked Common Dolphin	• Regularly found throughout the continental shelf-edge-slope waters (primarily between the 100-2,000 meter isobaths) of the Mid-Atlantic, Southern New England, and Georges Bank (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 Georges Bank (35º to 42ºN). • **Mid-summer-fall**: occur primarily on Georges Bank with small numbers present in the Gulf of Maine; Peak abundance found on Georges Bank in the autumn.

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

Species	Prevalence and Approximate Months of Occurrence
Pilot Whales: *Short- and Long-Finned*	**Short-Finned Pilot Whales** • Except for area of overlap (see below), primarily occur south of 40°N • May through December (approximately): distributed primarily near the continental shelf break of the Mid-Atlantic and Southern New England; beginning in the fall, individuals appear to shift to southern waters (i.e., 35°N and south) . **Long-Finned Pilot Whales** • Except for area of overlap (see below), primarily occur north of 42°N. • Winter to early spring : primarily distributed along the continental shelf edge-slope. • Late spring through fall (: movements and distribution shift onto/within Georges Bank, the Great South Channel, and Gulf of Maine. **Area of Species Overlap:** between approximately 38°N and 41°N.
Harbor Seal	• Primarily distributed in waters from NJ to ME; however, increasing evidence indicates that their range is extending into waters as far south as Cape Hatteras, NC (35°N). • **Year Round**: waters of ME • **September-May**: waters from New England to NJ.
Gray Seal	• Distributed in waters from NJ to ME. • Year Round: waters from ME to MA. • September-May: waters from Rhode Island to NJ.
Harp Seal	• Winter-Spring (approximately January-May): waters from ME to NJ.
Hooded Seal	• Winter-Spring (approximately January-May): waters of New England.

Notes:

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

***Sources*:** Waring *et al*. 1992, 2007**,** 2014a, 2015, 2016; Hayes *et al*. 2017**;** Payne and Heinemann 1993; Payne *et al.* 1984; Jefferson *et al*. 2009.

Atlantic Sturgeon

The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. Atlantic sturgeon from all five DPSs have the potential to be located anywhere in this marine range (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, 2015 a, b; O'Leary et al. 2014; Waldman et al. 2013). Based on fishery-independent and dependent data, as well as data collected from tracking and tagging studies, in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour (Stein *et al*. 2004 a,b; Erickson *et al*. 2011; Dunton *et al*. 2010); however, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Timoshkin 1968; Collins and Smith 1997; Stein *et al*. 2004a,b; Dunton *et al*. 2010; Erickson *et al*. 2011). Data from fishery-independent surveys and tagging and tracking studies also indicate that some Atlantic sturgeon may undertake seasonal movements along the coast (Erickson *et al.* 2011; Dunton *et al*. 2010; Wipplehauser 2012). For instance, tagging and tracking studies found that satellite-tagged adult sturgeon from the Hudson River concentrated in the southern part of the Mid-Atlantic Bight, at depths greater than 20 meters, during winter and spring, while in the summer and fall, Atlantic sturgeon concentrations shifted to the northern portion of the Mid-Atlantic Bight at depths less than 20 meters (Erickson *et al.* 2011).

Within the marine range of Atlantic sturgeon, several marine aggregation areas have been identified adjacent to estuaries and/or coastal features formed by bay mouths and inlets along the U.S. eastern seaboard (i.e., waters off North Carolina, Chesapeake Bay, and Delaware Bay; New York Bight; Massachusetts Bay; Long Island Sound; and Connecticut and Kennebec River Estuaries); depths in these areas are generally no greater than 25 meters (Bain *et al.* 2000; Savoy and Pacileo 2003; Stein *et al*. 2004a; Laney *et al*. 2007; Dunton *et al*. 2010; Erickson *et al*. 2011; Oliver *et al*. 2013; Waldman *et al.* 2013; O'Leary *et al*. 2014; Wipplehauser 2012; Whipplehauser and Squiers 201). Although additional studies are still needed to clarify why these particular sites are chosen by Atlantic sturgeon, there is some indication that they may serve as thermal refuge, wintering sites, or marine foraging areas (Stein *et al*. 2004a; Dunton *et al*. 2010; Erickson *et al*. 2011).

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 Gulf of Maine DPS extends from the Gulf of Maine (primarily northern portion of the Gulf of Maine) to the coast of Greenland (NMFS and USFWS 2005, 2016; Fay *et al*. 2006). In general, smolts, post-smolts, and adult Atlantic salmon may be present in the Gulf of Maine 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; USASAC 2004; Hyvarinen *et al.* 2006; Lacroix and McCurdy 1996; Lacroix *et al.* 2004, 2005; Reddin 1985; Reddin and Short 1991; Reddin and Friedland 1993, Sheehan *et al.* 2012; NMFS and USFWS 2005, 2016; Fay *et al*. 2006). For additional information on the on the biology, status, and range-wide distribution of the Gulf of Maine DPS of Atlantic salmon please refer to NMFS and USFWS 2005, 2016; Fay *et al*. 2006.

5.2.4 Interactions Between Gear and Protected Species

The small-mesh multispecies fishery is prosecuted with small-mesh bottom trawl gear. Protected species described in Section 1.1.2 are all vulnerable to interactions with bottom trawl gear, including small-mesh bottom trawl gear. Available information provided below on protected species serious injury or mortality, or estimated annual interactions is not specific to small-mesh bottom trawl gear, per say, but instead considers bottom trawl effort as a whole to provide an overall risk to a given protected species (or species

group) from this gear type, in general.11 However, to provide an idea of the relative interaction risk associated with the small-mesh multispecies fishery, a section is provided that provides information on NEFOP observed interactions with the whiting fishery.

Gear Interactions with Sea Turtles

Bottom Otter Trawl

Sea turtle interactions with bottom trawl gear have been observed on Georges Bank, and in the Mid-Atlantic; however, most of the observed interactions have occurred in the Mid-Atlantic (Warden 2011a,b; Murray 2015). As no sea turtle interactions with bottom trawl gear have been observed in the Gulf of Maine, and few sea turtle interactions have been observed on Georges Bank, there is insufficient data available to conduct a robust model-based analysis on sea turtle interactions with bottom trawl gear in these regions or produce a bycatch estimate for these regions. As a result, the bycatch estimates and discussion below are for bottom trawl gear in the Mid-Atlantic.

Bottom trawl gear poses an injury and mortality risk to sea turtles, specifically due to forced submergence (Sasso and Epperly 2006). Green, Kemp's ridley, leatherback, loggerhead, and unidentified sea turtles have been documented interacting (e.g., bycaught) 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[12] was 292 (CV=0.13, 95% CI=221-369), with an additional 61 loggerheads (CV=0.17, 95% CI=41-83) interacting with trawls, but released through a Turtle Excluder Device (TED).13 The 292 average annual observable loggerhead interactions equates to approximately 44 adult equivalents (Warden 2011a,b). Most recently, Murray (2015) estimated that from 2009-2013, the total average annual loggerhead interactions in bottom trawl gear in the Mid-Atlantic[14] was 231 (CV=0.13, 95% CI=182-298); this equates to approximately 33 adult equivalents (Murray 2015). Bycatch estimates provided in Warden (2011a) and Murray (2015) 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).

Gear Interactions with Atlantic Sturgeon

Bottom Otter Trawl

Atlantic sturgeon interactions (i.e., bycatch) with bottom trawl gear have been observed since 1989; these interactions have the potential to result in the injury or mortality of Atlantic sturgeon (NMFS NEFSC FSB 2015, 2016, 2017). Three documents, covering three time periods, that use data collected by the Northeast Fisheries Observer Program to describe bycatch of Atlantic sturgeon in 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

11 Overall bottom trawl effort in relation to protected species interactions does take into consideration bottom trawl effort with small mesh gear used in the whiting fishery; see literature cited in sections discussing gear interactions with sea turtles, marine mammals, Atlantic salmon, and Atlantic sturgeon.

12 Warden (2011a) defined the Mid-Atlantic as south of Cape Cod, Massachusetts, to approximately the North Carolina/South Carolina border.

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

14 Murray 2015b defined the Mid-Atlantic as the boundaries of the Mid-Atlantic Ecological Production; roughly waters west of 71°W to the North Carolina/South Carolina border)

Segment. Miller and Shepard (2011), the most recent of the three documents, analyzed fishery observer data and VTR data in order to estimate the average annual number of Atlantic sturgeon interactions in otter trawl in the Northeast Atlantic that occurred from 2006 to 2010. This timeframe included the most recent, complete data and as a result, Miller and Shepard (2011) is considered to represent the most accurate predictor of annual Atlantic sturgeon interactions in the Northeast bottom trawl fisheries (NMFS 2013).

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

Gear Interaction with Atlantic Salmon

Bottom Otter Trawl

Atlantic salmon interactions (i.e., bycatch) with bottom trawl have been observed since 1989; in many instances, these interactions have resulted in the injury and mortality of Atlantic salmon (NMFS NEFSC FSB 2015, 2016, 2017). According to the Biological Opinion issued by NMFS Greater Atlantic Regional Fisheries Office on December 16, 2013, NMFS Northeast Fisheries Science Center's (NEFSC) Northeast Fisheries Observer and At-Sea Monitoring Programs documented a total of 15 individual salmon incidentally caught on more than 60,000 observed commercial fishing trips from 1989 through August 2013 (NMFS 2013; Kocik *et al*. 2014); of those 15 salmon, four were observed caught in bottom trawl gear (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 bottom trawl gear (NMFS NEFSC FSB 2015, 2016, 2017). Based on the above information, bottom trawl interactions with Atlantic salmon are likely rare (NMFS 2013; Kocik *et al*. 2014).

Gear Interactions with Marine Mammals

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

Large Whales

Bottom Otter

With the exception of one species, there have been no observed interactions with large whales and bottom trawl gear. The one exception is minke whales, which have been observed seriously injured or killed in trawl gear.

To date, bottom trawl interactions have only been observed in the northeast bottom trawl fisheries. From the period of 2008-2012, the estimated annual mortality attributed to this fishery was 7.8 minke whales for 2008 and zero minke whales from 2009-2012; no serious injuries were reported during this time (Waring *et al*. 2015). Based on this information, from 2008-2012, the estimated annual average minke whale mortality and serious injury attributed to the northeast bottom trawl fishery was 1.6 (CV=0.69) whales (Waring *et al*. 2015). Lyssikatos (2015) estimated that from 2008-2013, mean annual serious injuries and mortalities from the northeast bottom trawl fishery were 1.40 (CV=0.58) minke whales. Serious injury and mortality records for minke whales in U.S. waters from 2010-2014 showed zero interactions with bottom trawl (northeast or Mid-Atlantic) gear (Henry *et al*. 2016; Hayes *et al*. 2017).

Based on above information, bottom trawl gear is likely to pose a low interaction risk to any large whale species. Should an interaction occur, serious injury or mortality to any large whale is possible; however, relative to other gear types, such as fixed gear, trawl gear represents a low source serious injury or mortality to any large whale (Henry *et al*. 2016; Hayes *et al*. 2017).

Small Cetaceans and Pinnipeds

Bottom Trawl Gear

Small cetaceans and pinnipeds are vulnerable to interactions with bottom trawl gear (Read *et al*. 2006; Waring *et al*. 2014a; Waring *et al*. 2015; Waring *et al*. 2016; Hayes *et al*. 2017; 82 FR 3655 (January 12, 2017)).15 Based on the most recent five years of observer data (2010-2014), The table below provides a list of species that have been observed (incidentally) seriously injured and/or killed by List of Fisheries Category II bottom trawl fisheries that operate in the affected environment of the small-mesh multispecies fishery(Hayes *et al*. 2017; 82 FR 3655 (January 12, 2017)). Lyssikatos (2015) provided total annual bycatch mortality in Northeast and Mid-Atlantic commercial bottom trawl trips (considers all FMPs) from 2008-2013. The highest annual bycatch mortality in bottom trawl gear (Northeast and Mid-Atlantic combined) was observed for short beaked common dolphins, followed by Atlantic white-sided dolphins, gray seals, risso's dolphins, long-finned pilot whales, bottlenose dolphins, harbor seals, harbor porpoise, and harp seals (Lyssikatos 2015).

15 For additional information on small cetacean and pinniped interactions prior to those provided in Waring et al. 2014a, see: http://www.nmfs.noaa.gov/pr/sars/region.htm

Table 20. Small cetacean and pinniped species observed seriously injured and/or killed by Category trawl fisheries in the affected environment of the small-mesh multispecies fishery.

Fishery	Category	Species Observed or reported Injured/Killed
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
Sources: Hayes *et al*. 2017; MMPA LOF 82 FR 3655 (January 12, 2017).		

In 2006, based on observed mid-water trawl interactions with long-finned pilot whales, short -finned pilot whales, common dolphins, and white sided dolphins, the Atlantic Trawl Gear Take Reduction Team (ATGTRT) was convened to address the incidental mortality and serious injury of these species incidental to bottom and mid-water trawl fisheries operating in both the New England and Mid-Atlantic regions. Because none of the marine mammal stocks of concern to the ATGTRT are classified as a "strategic stock", nor do they currently interact with a Category I fishery,16 it was determined that development of a take reduction plan was not necessary. In lieu of a take reduction plan, the ATGTRT agreed to develop an Atlantic Trawl Gear Take Reduction Strategy (ATGTRS). The ATGTRS identifies informational and research tasks, as well as education and outreach needs the ATGTRT believes are necessary to provide the basis for decreasing mortalities and serious injuries of marine mammals to insignificant levels approaching zero. The ATGTRS also identifies several voluntary measures that can be adopted by certain trawl fishing sectors to potentially reduce the incidental capture of marine mammals.17

5.2.4.1 Observed Protected Species Interactions with the Whiting Fishery

The information provided in Table 21 and Map 3 are based on NEFOP observed protected species interactions with trips targeting or landing whiting, with small-mesh bottom trawl gear, over the last 10

16 Category I fisheries have frequent incidental mortality and serious injury of marine mammals.

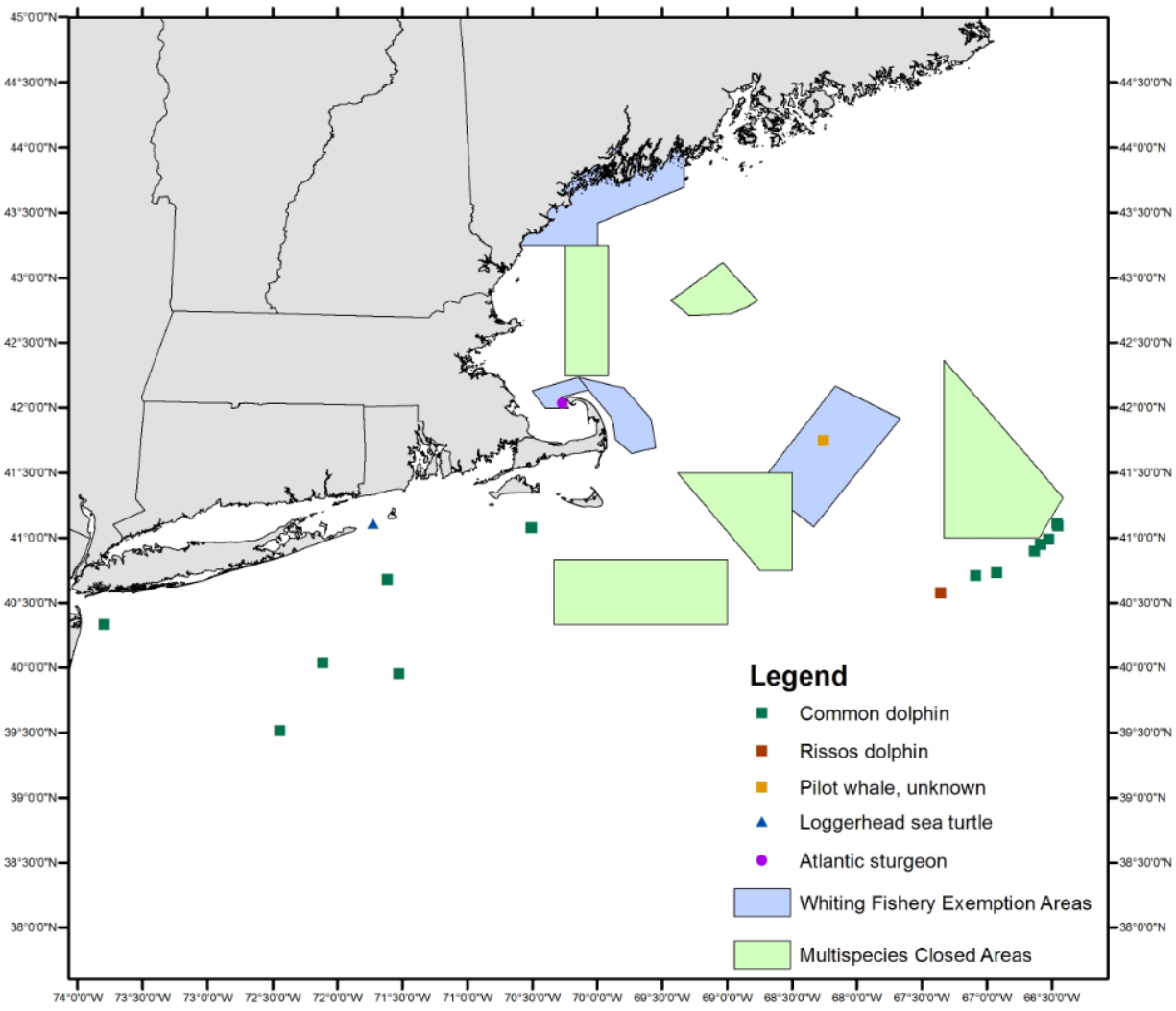
17 For additional details on the ATGTRS, visit: http://www.greateratlantic.fisheries.noaa.gov/Protected/mmp/atgtrp/

years (i.e., 2007-2016). From 2007-2016, a total of 24 protected species interactions were observed in the whiting fishery, with interactions occurring primarily with common dolphins (i.e., 20/24 observed interactions). In addition, over the 10 years of observed interactions with protected species, there was no significant trend in time of year in which interactions were observed (i.e., interactions were observed year-round).

Table 21. Observed Protected Species Interactions with the Whiting Fishery from 2007-2016

Species	Number of Interactions Observed
Common Dolphin	20
Pilot Whale (spp)	1
Risso's Dolphin	1
Atlantic Sturgeon	1
Loggerhead Sea Turtle	1
Total	24

Map 3. Observed takes of protected species in the small-mesh multispecies fishery.



5.3 Physical Environment and EFH

5.3.1 Physical environment of the small-mesh multispecies fishery

The Northeast U.S. Shelf Ecosystem includes 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 to a depth of 2,000 m (Section ???**,** Sherman et al. 1996). Four distinct sub-regions are identified: the Gulf of Maine, Georges Bank, the Mid-Atlantic Bight, and the continental slope. The physical oceanography and biota of these regions were described in Northeast Multispecies Amendment 16, Section 6.1. Much of this information was extracted from Stevenson et al. (2004), and the reader is referred to this document and sources referenced therein for additional information. A complete description of the physical environment in the Gulf of Maine, Georges Bank, and portions of the Continental Shelf south of New England is contained in Section E.6.2.1 the FSEIS for Amendment 5 to the Northeast Multispecies FMP.

The small-mesh multispecies fishery occurs throughout the Mid-Atlantic Bight, the Gulf of Maine, and Georges Bank (Map 4). The following paragraphs contains additional information about the Mid-Atlantic region to Cape Hatteras because whiting and red hake generally tend to be distributed further south than other groundfish species.

The coastal zone of the Mid-Atlantic states varies from a glaciated and rugged coastline from Cape Cod south to the New York Bight; further south the coast is bordered by a 160 km wide plain. Along the coastal plain, the beaches of the outer banks and barrier islands are wide, gently sloped and sandy, with gradually deepening offshore waters. The area is characterized by a series of sounds, broad estuaries, large river basins (e.g. Connecticut, Hudson, Delaware and Susquehanna), and barrier islands. Conspicuous estuarine features are Narragansett Bay, Long Island Sound, the Hudson River, Delaware Bay, Chesapeake Bay, and the nearly continuous band of estuaries behind outer banks and barrier islands along southern Long Island, New Jersey, Delaware, Maryland, Virginia and North Carolina. The complex estuary of Currituck, Albemarle, and Pamlico Sounds behind the Outer Banks on Cape Hatteras (covering an area of 6,500 km2 or 2,500 square miles, with 150,000 acres of salt marsh) is an important feature of the region. Chesapeake Bay is the largest estuary in the U.S., draining 64,000 square miles of land from five states, and includes almost 300,000 acres of salt marsh and 100,000 acres of tidal flats. Coastal marshes border small estuaries in Narragansett Bay and all along the glaciated coast from Cape Cod around Long Island Sound. Nearly continuous marshes occur along the shores of the estuaries behind the outer banks and around Delaware Bay. As a whole, this region contains more than 3,500 square miles of wetlands, one-third of which are in Chesapeake Bay. Atlantic coastal plain estuaries are characteristically shallow and subject to strong tidal circulation, thus creating ideal conditions for biological productivity.

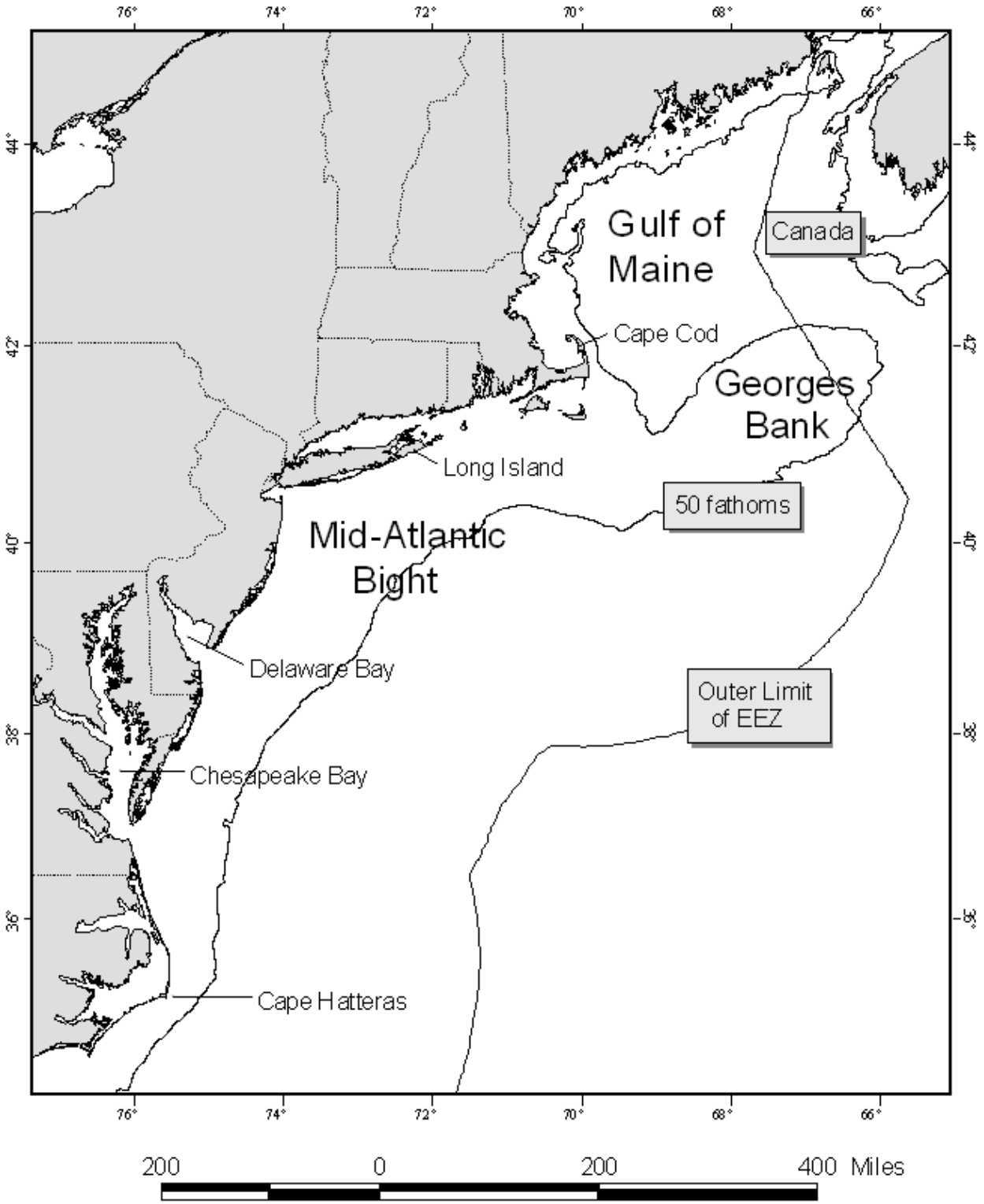
At Cape Hatteras, the shelf extends seaward approximately 33 km, then widens gradually to 113 km off New Jersey and Rhode Island. It is intersected by numerous underwater canyons. Surface circulation north of Cape Hatteras is generally southwesterly during all seasons, although this may be interrupted by coastal in-drafting and some reversal of flow at the northern and southern extremities of the area. Speeds of the drift are on the order of 9 km per day. There may be a shoreward component to this drift during the warm half of the year and an offshore component during the cold half. The Gulf Stream is located about 160 km offshore of Cape Hatteras, but becomes less discrete and veers to the northeast north of the cape. Surface currents, as high as 200 cm per second (4 knots), have been measured in the Gulf Stream off Cape Hatteras.

Hydrographic conditions in the mid-Atlantic region vary seasonally due to river runoff and warming in spring and cooling in winter; the water column becomes increasingly stratified in the summer and homogenous in the winter due to fall-winter cooling of surface waters. In winter, mean minimum and maximum sea surface temperatures are 0°C and 7°C off Cape Cod and 1°C and 14°C off Cape Charles (at the end of the Delmarva Peninsula); in summer, the mean minimums and maximums are 15°C and 21°C off Cape Cod, and 20°C and 27°C off Cape Charles. The tidal range averages slightly over one meter on Cape Cod, decreasing to a meter at the tip of Long Island and on the Connecticut shore. Westward within Long Island tide ranges gradually increase, reaching two meters at the head of the Sound and in the New York Bight. South of the bight, tidal ranges decrease gradually to slightly over a meter at Cape Hatteras.

The waters of the coastal mid-Atlantic region have a complex and seasonally dependent circulation pattern. Seasonally varying winds and irregularities in the coastline result in the formation of a complex system of local eddies and gyres. Surface currents tend to be strongest during the peak river discharge period in late spring and during periods of highest winds in the winter. In late summer, when winds are light and estuarine discharge is minimal, currents tend to be sluggish, and the water column is generally stratified.

One of the most frequently mentioned physical environmental parameters affecting fishing is the weather. High winds, waves, and extremely low temperatures can create extremely hazardous conditions, ranking commercial fishing among the most dangerous occupations in the world. Section E.6.2.2 of the FSEIS for Amendment 5 to the Northeast Multispecies FMP contains a complete description of weather patterns affecting the fisheries in question as well as southern New England and the Northeast region.

Map 4. Northeast U.S. Shelf Ecosystem



5.3.2 Essential fish habitat

The 1998 Omnibus Essential Fish Habitat Amendment 1 (Amendment 11 to the Northeast Multispecies FMP) described and identified the essential fish habitat (EFH) for silver and red hake. EFH includes those waters and substrate necessary for spawning, breeding, feeding, and growth to maturity. EFH Amendment 1 addressed all elements required by the EFH provisions of the 1996 Sustainable Fisheries Act. These include the description and identification EFH, the identification of threats to EFH from fishing and non-fishing activities, and the development of conservation and enhancement measures to protect EFH. EFH for offshore hake was described and identified in Amendment 12 to the Northeast Multispecies FMP in 2000. Amendment 13 to the Northeast Multispecies FMP (2004) updated the EFH conservation measures in the plan, but not the designations themselves.

In 2004, the Council initiated an update to the EFH Amendment, Omnibus EFH Amendment 2 (OHA2). This amendment was approved by the Council in June 2015 and a notice of availability was published in October 2017. A proposed rule anticipated in November 2017 and implementation is expected in the spring of 2018. It includes revised EFH designations, an assessment of fishing and non-fishing impacts, and updated management measures to conserve EFH. The proposed EFH designation maps for silver and red hake are generally based on NEFSC trawl survey data through 2005, with juvenile distributions used as a proxy for the egg and larval lifestages. Offshore hake EFH for eggs and larvae are based on MARMAP survey data, and the combined juvenile and adult designation map includes areas with high catch rates in the trawl survey. Hake EFH designations also include the continental slope to a depth of 400 m (juvenile and adult silver hake) or 750 m (adult red hake, juvenile and adult offshore hake), beyond the depth fished by the survey. Hake EFH includes both inshore and offshore areas, typically with soft sediments and some sort of structure such as biogenic depressions or sand waves. Depending on the lifestage, hakes may occur on the seabed, or in the water column. Interactive maps of EFH for each species and life stage are available on NOAA EFH Mapper http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html. The mapper will be updated to reflect changes proposed in OHA2 once there is a record of decision on the amendment, in early January 2018. Additional details are provided in Volume 2 (designations), Appendix A (designation methods), and Appendix B (supplementary information) of Omnibus Habitat Amendment 2 (http://www.nefmc.org/library/omnibus-habitat-amendment-2).

The area that may potentially be affected by the proposed action has been identified as EFH for various species that are managed under the Northeast Multispecies; Atlantic Sea Scallop; Monkfish; Deep-Sea Red Crab[18]; Northeast Skate Complex; Atlantic Herring; Summer Flounder, Scup, and Black Sea Bass; Tilefish; Atlantic Mackerel, Squid, and Butterfish; and Atlantic Surfclam and Ocean Quahog Fishery Management Plans. EFH for the species managed under these FMPs includes a wide variety of benthic habitats in state and federal waters throughout the Northeast U.S. Shelf Ecosystem. For more information on the geographic area, depth, and EFH description for each applicable life stage of these species, the reader is referred to OHA2 for New England-managed species, and various Mid-Atlantic FMPs for summer flounder/scup/black sea bass, tilefish, mackerel/squid/butterfish, and clams.[19]

5.3.3 Gear impacts from the small-mesh multispecies fishery

[18] The OHA2 designations for red crab have a minimum depth of 320 m, such that red crab EFH is outside the depths typically targeted by the whiting fishery.

[19] Summer Flounder, Scup, and Black Seabass Amendment 12 (1999), Golden Tilefish Amendment 1 (2008), Atlantic Mackerel, Squid and Butterfish Amendment 11 (2011), Atlantic Surfclam and Ocean Quahog Amendment 12 (1998).

The small-mesh multispecies fishery is primarily a trawl fishery (Table 22). Omnibus EFH Amendment 2 and previous Council actions have found that bottom trawls can cause adverse, i.e. more than minimal and not temporary, impacts to EFH. Specifically, Omnibus EFH Amendment 1 (NEFMC 1999) found that "bottom-tending mobile gears (otter trawls, scallop dredges, beam trawls, and hydraulic clam dredges) are most likely to be associated with adverse impacts to habitat". These findings were confirmed by the adverse effects assessment for OHA2.

Table 22 Landings of small-mesh multispecies by gear (2008-2010)

Gear Type	% of Total Small-Mesh Multispecies Landings
Otter Trawl, including Raised Footrope Trawl	97.76%
Sink Gillnets	1.09%
All Other Gear‡	1.15%

‡Includes: Handgear, Pots and Traps, Shrimp Trawl, Dredges, Longline, and all other reported gear

Jones (1992) suggests that beam trawls, otter trawls, and dredges are all essentially similar in impact, and the severity of the impact can be correlated to the weight of the gear that is in contact with the bottom. "Generally, the heavier the gear in contact with the seabed, the greater the damage. The effects vary greatly depending on the amount of gear contact with the bottom, together with the depth, nature of the seabed, and the strengths of the currents or tide" (p. 64).

5.4 Human Environment

Amendment 22 considers and evaluates the effect management alternatives may have on people's economy, way of life, traditions, and community. These social and economic impacts may be driven by changes in fishery flexibility, opportunity, stability, certainty, safety, and/or other factors. While it is possible that 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 presented herein is useful in describing the response of the fishery to past management actions and predicting how the Amendment 8 alternatives may affect human communities. Additionally, this section establishes a descriptive baseline for the fishery with which to compare actual and predicted future changes that result from management actions.

5.4.1 Permits/vessels

To land small-mesh multispecies, an open access Category K permit or limited access (Categories A-F) NE multispecies permits is required. The number of Category K permits issued in a year largely reflects the number of vessels potentially landing small-mesh multispecies. Since 1996, the number of open access (Category K) permits issued each year has ranged between 150 and 1,051, averaging 780 since 2012 (Table 23). Vessels landing small-mesh multispecies consists of all ranges of vessels, e.g., small (<50 GRT), medium (50-100 GRT), and large (>100 GRT).

Table 23. Number of open access (Category K) small-mesh multispecies issued annually, 1996-2017

Fishing year	Permits issued	Fishing year	Permits issued
1996	150	2007	1,022
1997	435	2008	998
1998	537	2009	948
1999	629	2010	904
2000	722	2011	815
2001	761	2012	806
2002	839	2013	777
2003	855	2014	774
2004	913	2015	781
2005	1,051	2016	794
2006	1,022	2017	747
Source: NEFSC VTR data, accessed 2017.			

Fishermen landing small-mesh multispecies hold a range of other federal permits (Table 24).

Table 24. List of permits held by small-mesh multispecies fishermen

Permit Code/Description		Permit Code/Description	
Groundfish Permits		LOA1	AMERICAN LOBSTER-TRAP-AREA1-2001
A	Individual Limited Access	LOA2	AMERICAN LOBSTER-TRAP-AREA2-2001
B	Fleet Limited Access	LOA3	AMERICAN LOBSTER-TRAP-AREA3-2001
C	Small Vessel	LOA4	AMERICAN LOBSTER-TRAP-AREA4-2001
D	Hook	LOA5	AMERICAN LOBSTER-TRAP-AREA5-2001
E	Combination	LOA5W	LOBSTER AREA5 TRAP WAIVER - 2002
F	Individual Large Mesh	LOA6	AMERICAN LOBSTER-TRAP-AREA6-2001
G	Fleet Large Mesh	LOAOC	AMER LOB-TRAP-OUTER CAPE-2001
H	Open Handgear	MNKA	MONKFISH - CATEGORY A - 2000
I	Charter/Party	MNKB	MONKFISH - CATEGORY B - 2002
J	Possion limit for scallop Limited Access Permit	MNKC	MONKFISH - CATEGORY C - 2002
K	Non-regulated	MNKD	MONKFISH - CATEGORY D - 2002
HA	Open Handgear A	MNKE	MONKFISH - INCIDENTAL CAT E-2002
HB	Open Handgear B	MNKF	MONK-OFFSHORE-CAT F-2005
		MNKH	MONK-SO. 38 20' N-CAT H-2005
Other Permits		RCBA	RED CRAB - INCIDENTAL BYCATCH
FLS1	SUMMER FLOUNDER-COMMERCIAL-1996	SCP1	SCUP-COMMERCIAL MORATORIUM-2002
FLS2	SUMMER FLOUNDER-CHART/PARTY-1996	SCP2	SCUP - CHARTER/PARTY - 1999
HRGA	HERRING - ALL AREAS LIMITED ACCESS - 2007	SF1	SURF CLAM/OCEAN QUAHOG-1988
HRGB	HERRING-AREAS 2 AND 3 LIMITED ACCESS-2007	SMB1	SQUID/MACK/BUTT-COMMERCIAL-1995
HRGC	HERRING - LIMITED ACCESS INCIDENTAL -2007	SMB2	SQUID/MACK/BUTT-CHARTER-1988
HRGD	HERRING-OPEN ACCESS POSSESSION LIMIT-2007	SMB3	SQUID/BUTTERFSH-INCIDENTAL-2002
LO1	AMER LOBSTER-COMMERCIAL	SMB4	ATLANTIC MACKEREL - 2003
LO2	AMER LOBSTER-CHARTER/PARTY-1999	SMB5	SQUID/MACK/BUTT-CATCH/PROC-1988

5.4.2 Landings and revenue

5.4.2.1 Silver and offshore hake landings and revenue

Silver and offshore hake (collectively called as whiting) landings peaked in 1996 at 34 mil pounds, but the inflation adjusted real revenue (in 2016$) peaked in 1997 at $21 mil (Table 25). In 2006, the smallest amount of silver hake was landed, about 12 mil pounds, coinciding with the lowest revenue earned from silver hake landings. Since then, silver hake landings and revenues have been generally increasing. However, the recent years (2014-2016) average annual landings have remained around 14 mil pounds (Figure 29).

Table 25. Silver hake and offshore hake landings and inflation adjusted real revenue (1996-2016).

Year	Silver Hake (Pounds)	Offshore Hake (Pounds)	Total Whiting	
			Landings (lbs.)	Revenue (in 2016 US$)
1996	34,067,288	295,919	34,363,207	$20,104,652
1997	32,519,281	144,270	32,663,551	21,098,929
1998	29,032,464	418,409	29,450,873	17,647,988
1999	27,685,398	641,702	28,327,100	18,547,630
2000	25,783,296	339,202	26,122,498	15,417,194
2001	26,867,391	966,048	27,833,439	17,803,292
2002	17,670,148	359,265	18,029,413	10,039,930
2003	18,174,614	198,058	18,372,672	11,416,111
2004	17,326,446	334,321	17,660,767	11,148,088
2005	16,601,525	399,808	17,001,333	9,718,050
2006	11,675,903	220,721	11,896,624	7,467,833
2007	14,354,038	319,769	14,673,807	9,425,244
2008	13,719,542	356,606	14,076,148	8,905,187
2009	16,926,154	290,665	17,216,819	9,502,702
2010	16,997,195	246,054	17,243,249	11,684,081
2011	Masked due to confidential data		16,605,652	11,323,237
2012			15,292,637	10,129,930
2013			13,122,195	8,590,111
2014			15,673,535	11,223,912
2015			13,778,726	10,314,245
2016			13,144,811	10,003,356

Source: NEFSC VTR data, accessed 2017.
Note: Revenues derived using an average price of silver hake in 2016.

Peak landings in the Northern Management Area also occurred in 1996, at 8.9 mil pounds, which earned about $5 mil in real revenue. The lowest silver hake landings in the Northern Area occurred in 2005 with 1.69 mil pounds, earning $1.0 mil in real revenue. In recent years, landings in the Northern Area have averaged around 5 mil pounds, earning real revenue $3.7 to $4.7 mil (Table 26). Landings in the Southern Management Area used to account for two-thirds to nearly all landings until 2015, but the region's share has declined significantly at little over 50 percent in 2016. Southern landings have ranged from 6.8 mil pounds to 25.9 mil pounds. Peak landings in the Southern area in 1997 were 25.9 mil pounds, earning $16.7 mil in real revenue. This was also the year with peak revenue from silver hake. The lowest landings occurred in 2016 and were 6.8 mil lbs, earning $5.2 mil real revenue.

Table 26. Silver hake landings (pounds) and real revenue (in 2016$) by stock area.

Year	Northern Stock		Southern Stock	
	Landings (lbs.)	Real Revenue	Landings (lbs.)	Real Revenue
1996	8,897,537	$5,205,623	25,082,644	$14,674,935
1997	6,597,898	$4,261,894	25,847,569	$16,696,164
1998	4,941,691	$2,961,233	24,062,362	$14,419,005
1999	8,037,088	$5,262,414	19,550,376	$12,800,927
2000	6,899,595	$4,072,061	18,767,737	$11,076,500
2001	8,465,721	$5,414,987	18,301,397	$11,706,247
2002	6,003,694	$3,343,241	11,545,556	$6,429,304
2003	4,862,651	$3,021,475	13,224,516	$8,217,234
2004	2,542,059	$1,604,636	14,724,122	$9,294,376
2005	1,690,508	$966,303	14,890,106	$8,511,262
2006	2,058,312	$1,292,058	9,548,506	$5,993,856
2007	2,604,177	$1,672,709	11,744,654	$7,543,798
2008	1,780,815	$1,126,621	11,898,630	$7,527,594
2009	2,519,793	$1,390,782	14,346,639	$7,918,527
2010	3,664,364	$2,482,985	13,285,648	$9,002,398
2011	3,684,109	$2,512,159	12,760,759	$8,701,441
2012	3,496,552	$2,316,136	11,617,406	$7,695,436
2013	2,818,907	$1,845,326	10,167,854	$6,656,127
2014	5,178,960	$3,708,684	10,309,971	$7,383,032
2015	4,418,084	$3,307,214	9,211,141	$6,895,120
2016	6,262,859	$4,766,110	6,775,078	$5,155,914

Source: **NEFSC VTR data, accessed 2017.**
Note: **Revenues derived using an average price of silver hake in 2016.**

Figure 29. Whiting landings and real revenue (in 2016$), 1996-2016.

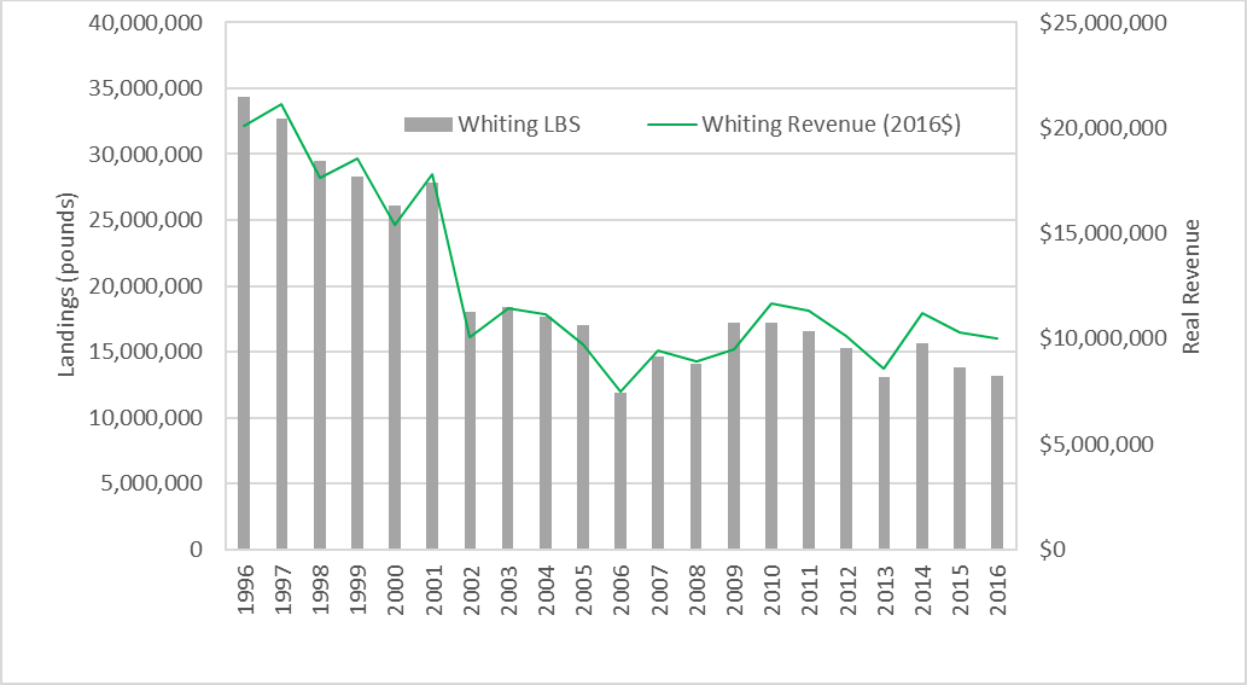


Figure 30 shows silver hake landings and revenues (in 2016$) from the Northern and Southern Areas. Over the past two decades, silver hake landings and revenues in the Southern Area fell substantially and is in a declining trend. Landings and revenues have saddled for the Northern Area, however. Landings in the Northern Area were stable around 6 mil pounds until 2003, but declined during 2004-2013. The recent years, Northern Area landings have been around 5 mil pounds compared to about 9 mil pounds in 1996. In 2016, the Southern and Northern Areas have had similar silver hake landings and revenues.

Figure 30. Silver hake landings and real revenues (in 2016$) by management area (North and South)

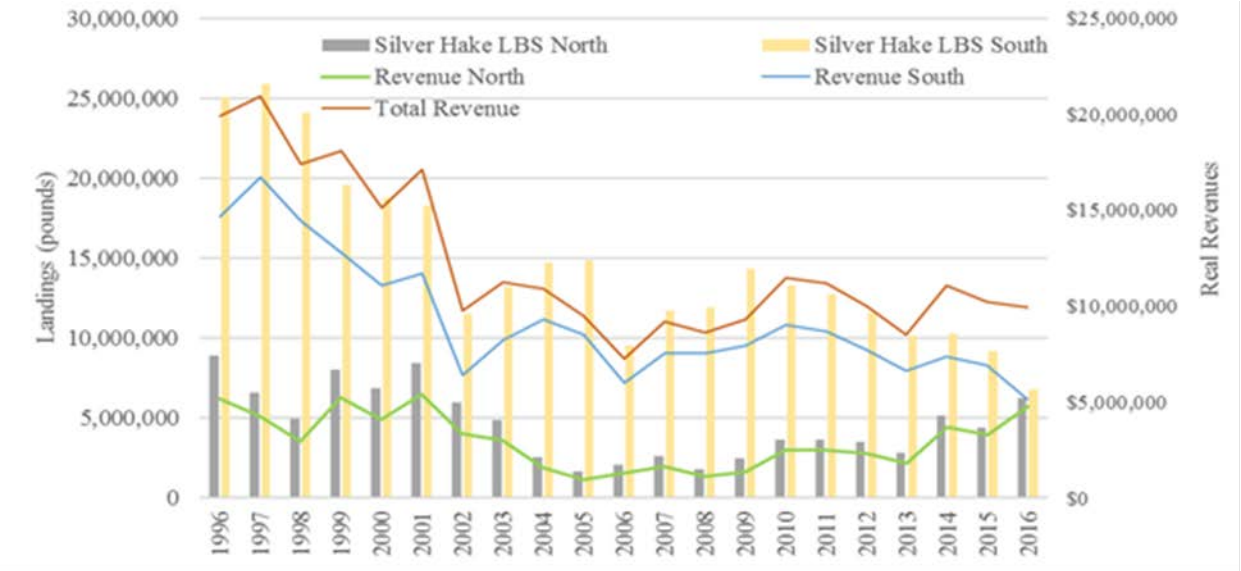


Figure 31 presents silver hake landings by gear types. Nearly all landings were made with trawl gear. Other gears—gillnet, mid-water trawl and other gears landed very nominal amount of silver hake.

Figure 31. Silver hake landings (lbs) by gear type, 1996-2016.

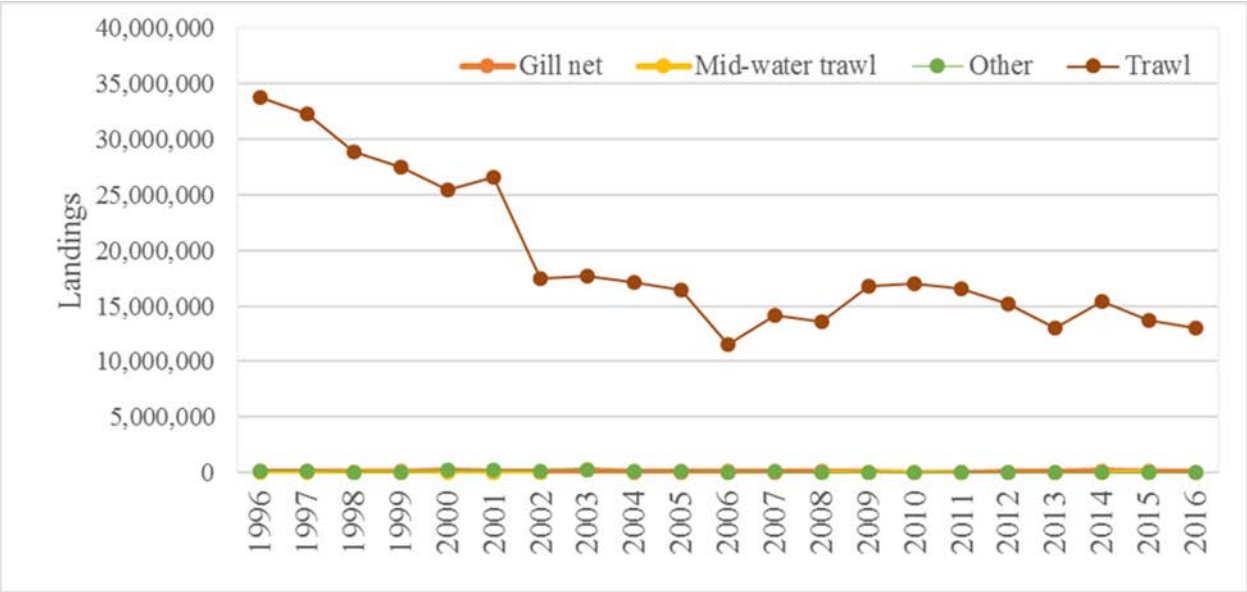
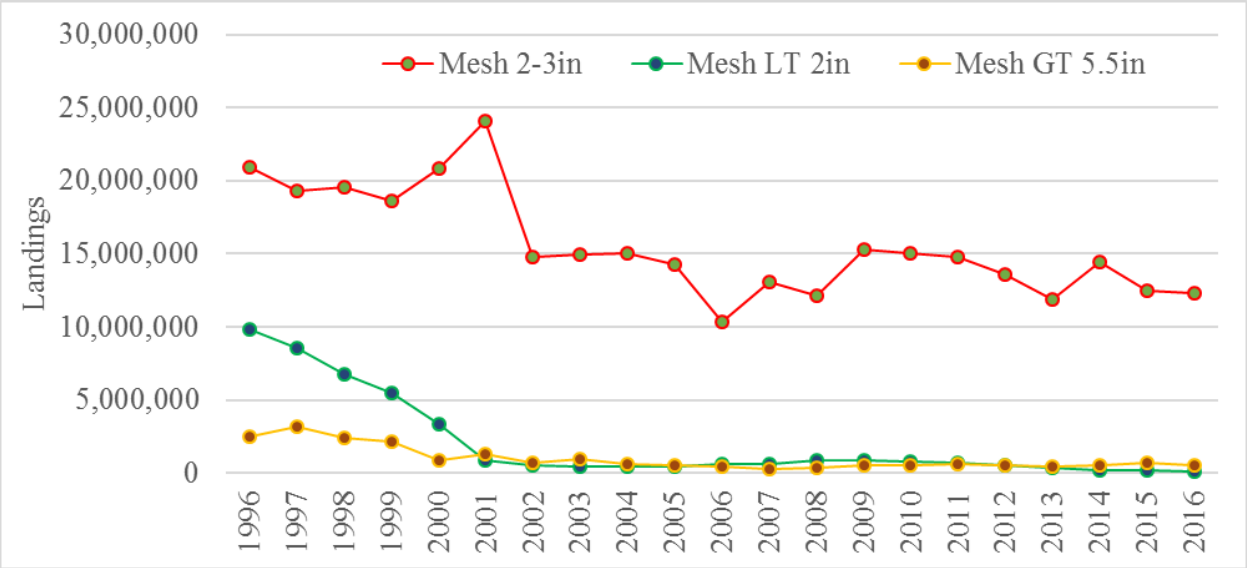


Figure 32 shows trends in silver hake landings for vessels fishing with trawls, by mesh size. The majority of landings were made with mesh size between 2" and 3-inch. Prior to 2001, mesh sizes of less than 2" and greater than 5.5" were used to land a good volume of silver hake, but the landings by these mesh sizes declined sharply since 2001.

Figure 32. Silver hake landing (lbs) by mesh sizes, 1996-2016



Red hake landings and revenue peaked at 4.18 mil pounds and $2.675 mil in 2001 (Figure 33). However, they both declined sharply since 2002. Aggregate volume of red hake landings from the Southern Area is

much higher relative to the landings from the Northern Area. Southern Area landings have ranged from 0.77 mil pounds in 2016 to 3.17 mil in 2002. Northern Area landings have ranged from 0.144 mil pounds in 2014 to 1.375 mil pounds in 1996.

Figure 33. Red hake landings (lbs) by management area and total red hake revenue (in 2016$).

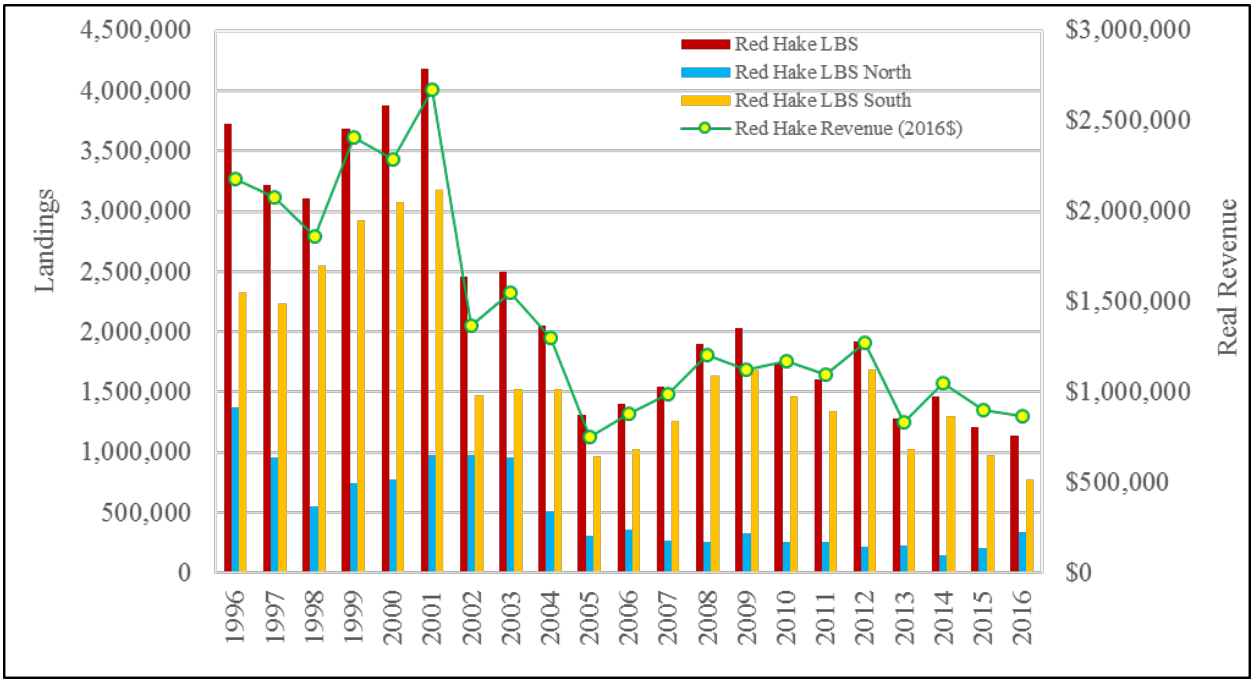


Figure 34. Red hake landing (lbs) by gear type, 1996-2016.

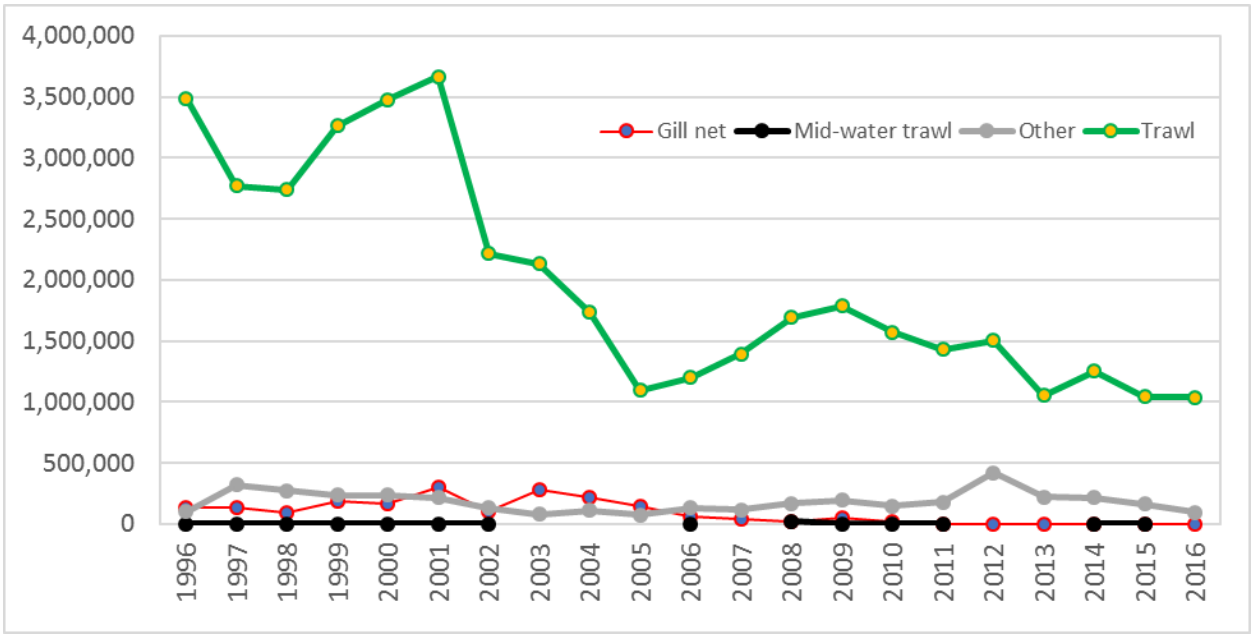


Figure 35 shows the trend in the small-mesh multispecies landings by trips with 2,000 lbs or more whiting. For the high-volume small-mesh multispecies landing trips, major portion of the landings had silver hake. The majority of the hake landings were made by the trips with 2,000 lbs. or more of whiting trips. However, the number of trips with 2,000 lbs. or more have declined precipitously from about 3,100 trips in 1996 to around 800 trips in 2016 (Figure 35). Figure 36 presents small-mesh multispecies landings and effort levels by management area (w/ trips 2,000 lbs. or more whiting). Until 2015, about two thirds of hake landings used to come from the Southern Area, but the proportion of volumes are near equal in 2016. Figure 37 also examines the annual average CPUE levels (lbs./trip) by management area for the trips that landed 2,000 lbs. or more whiting. In recent years, the annual average CPUE has been increasing in both management areas. Figure 38 and Figure 39 show annual silver hake landings and corresponding number of trips (w/ trips 2,000 lbs or more) by mesh sizes in northern and southern area, respectively.

Figure 35. Annual silver hake and small-mesh multispecies landings (w/ trips ≥ 2,000 lbs whiting) and effort levels (no. of trips), 1996-2016.

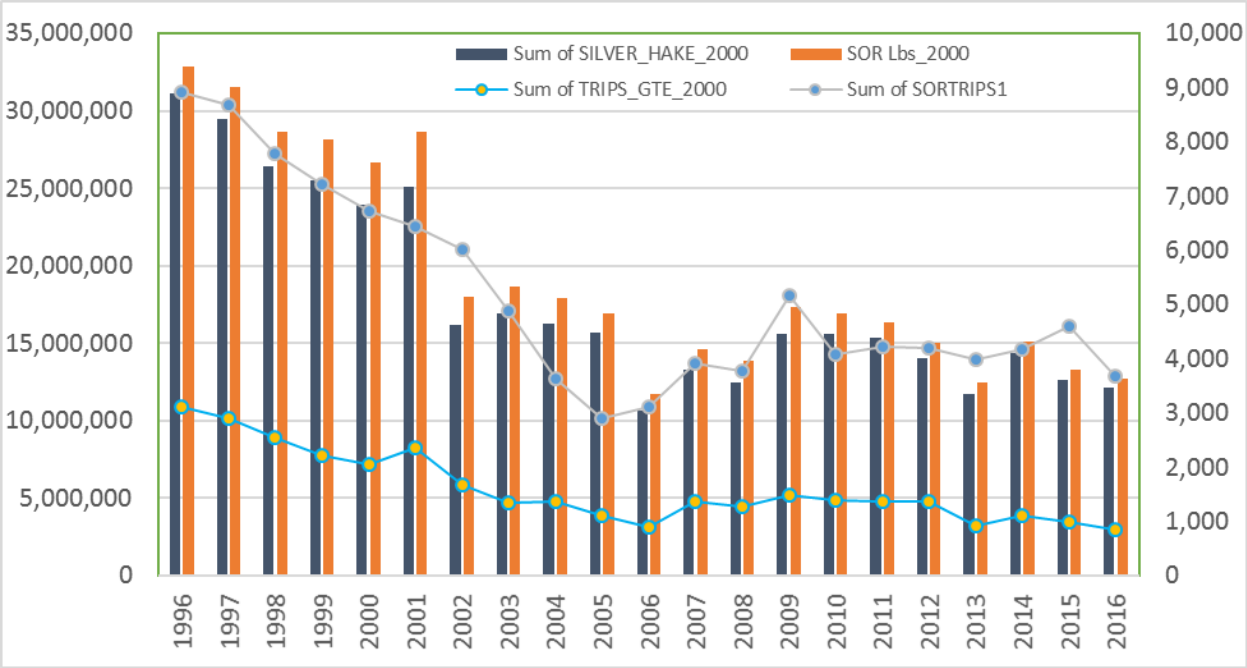


Figure 36. Small-mesh multispecies landings and effort levels by management area (w/ trips ≥ 2,000 lbs whiting), 1996-2016.

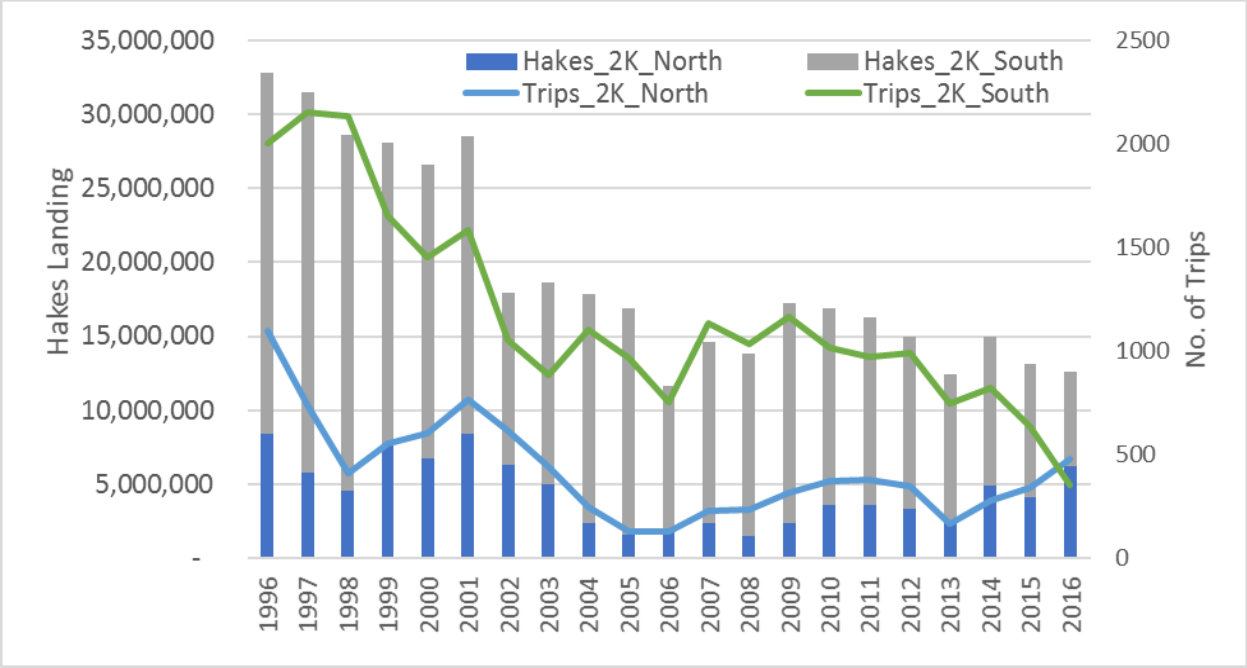


Figure 37. Small-mesh multispecies landings (lbs) and CPUE levels (lbs/trip) by management area (w/ trips ≥ 2,000 lbs.), 1996-2016.

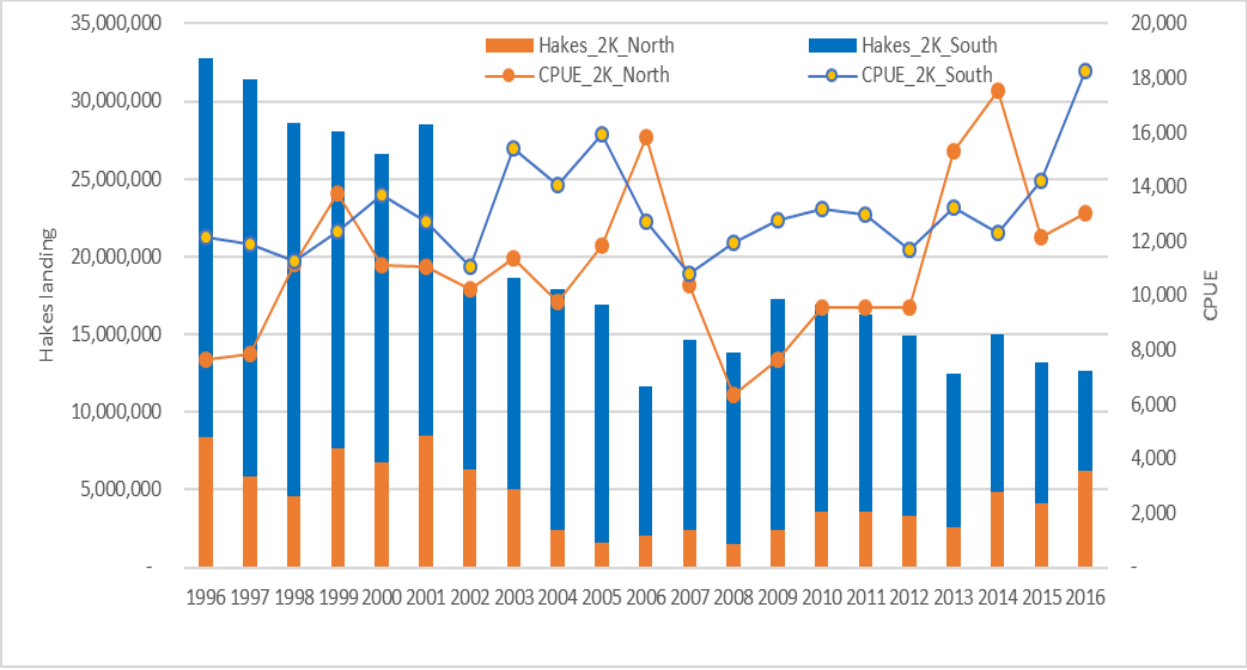


Figure 38. Silver hake landing (lbs) and number of trips (w/ trips ≥ 2,000 lbs whiting) by mesh size in the northern management area, 1996-2016.

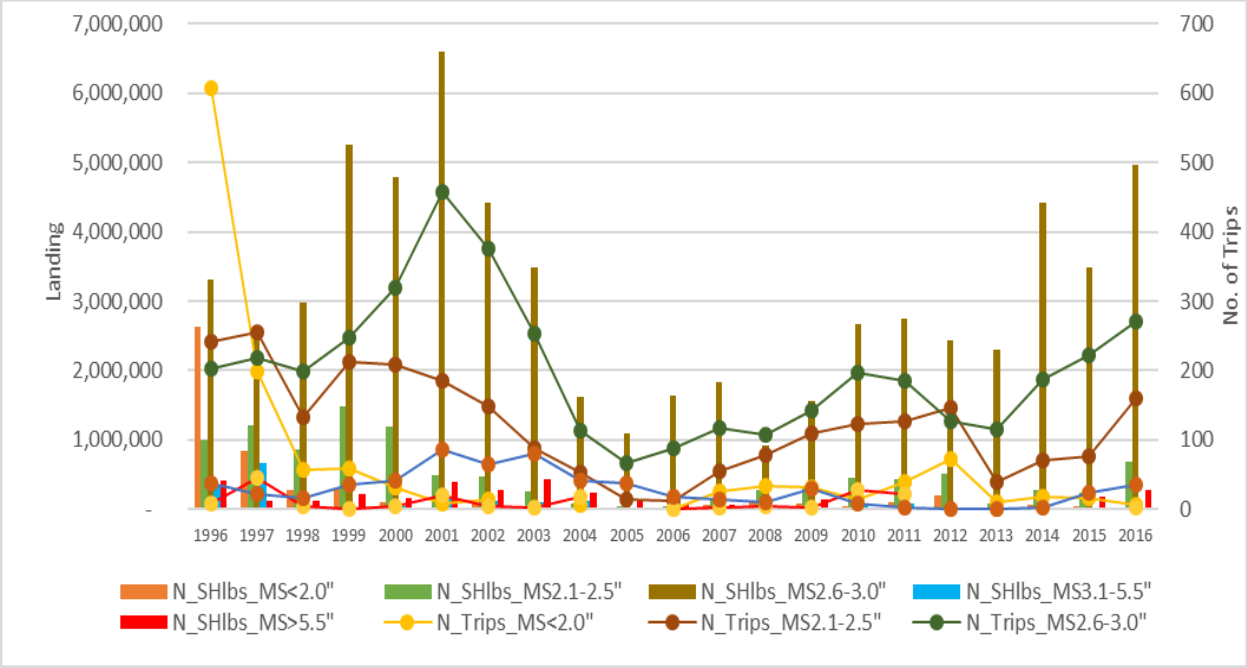
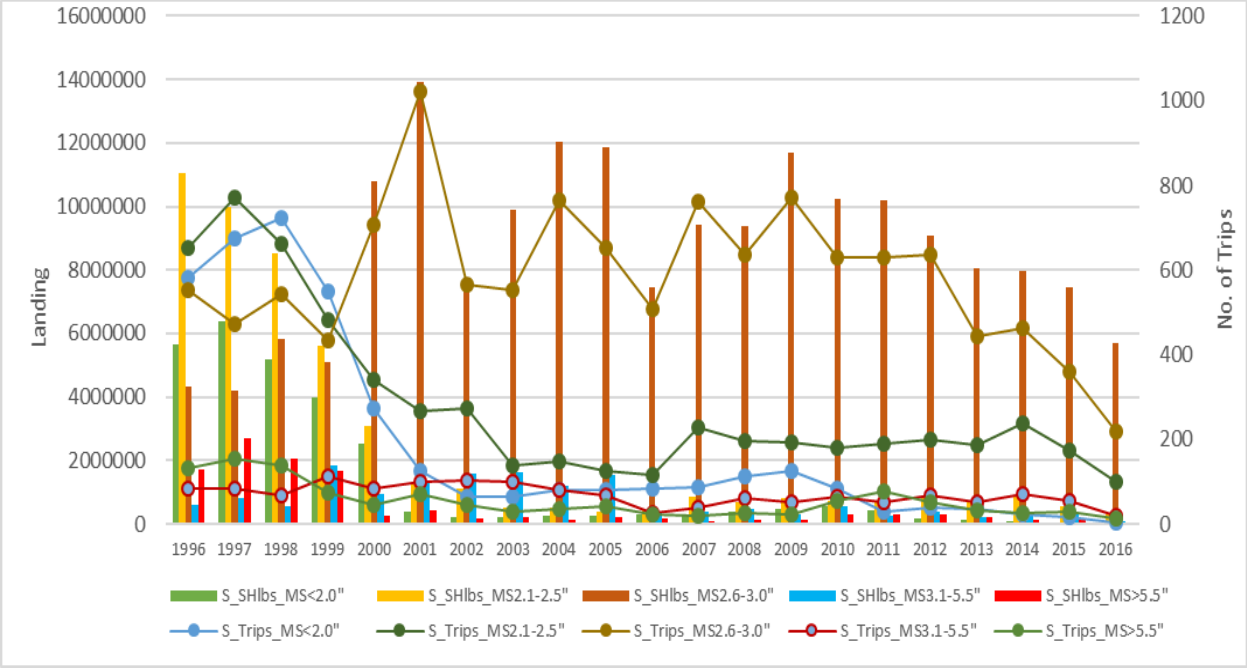


Figure 39. Silver hake landing (lbs) and number of trips (with trips ≥ 2,000 lbs whiting) by mesh sizes in the southern management area, 1996-2016.



Generally, silver hake prices are significantly higher than that of red hake. Both nominal (Figure 40) and real prices (Figure 41) of silver hake have risen since 2010. From 1996 to 2010, the real price of silver hake fluctuated around $0.60 per pound. The nominal price of red hake has also increased over the years,

but has fluctuated less than that of silver hake price. In 2016, the average real price of silver and red hake were $0.76 and $0.48 per pound, respectively.

Figure 40. Nominal prices of silver and red hake, 1996-2016.

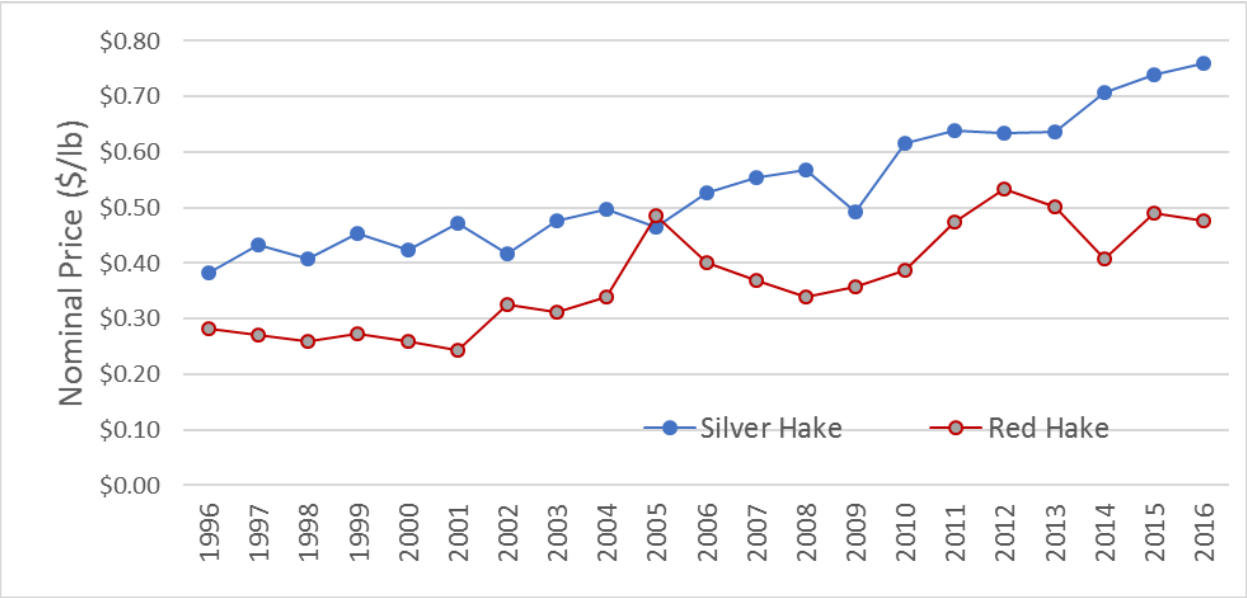
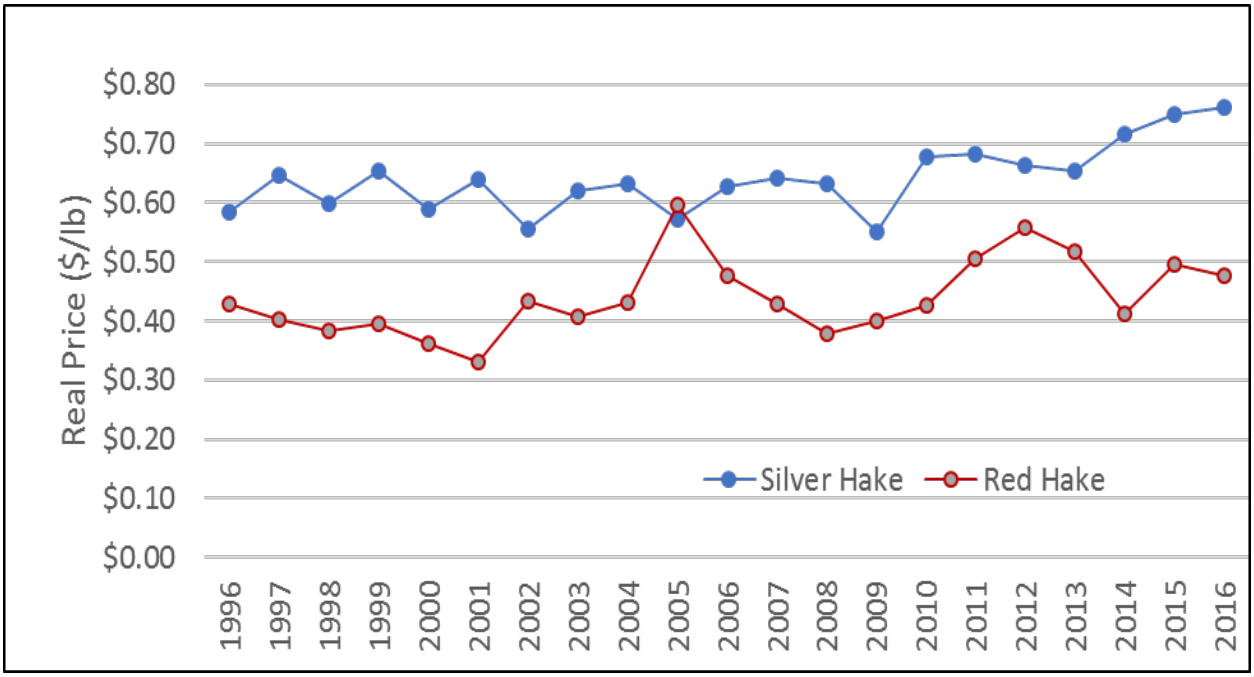
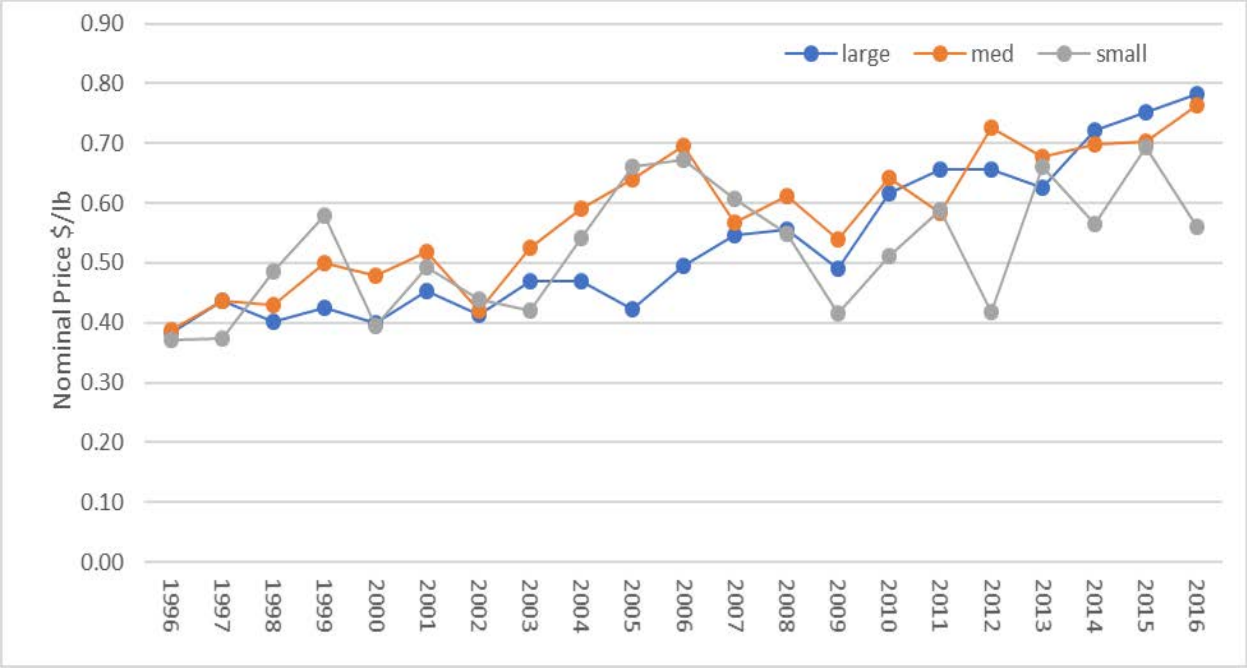


Figure 41. Inflation adjusted real prices (in 2016$) of silver and red hake, 1996-2016.



Nominal prices of silver hake were lowest for the landings of large size vessels (>100 GRT) for 57% of the years from 1996 to 2009. However, the prices have since been comparable with those of medium size vessels (50-100 GRT) and higher than those of small size vessels (<50 GRT). Since 2014, landings by large size vessels fetch highest price (Figure 42).

Figure 42. Nominal price ($/lb) of silver hake by vessel size classes, 1996-2016

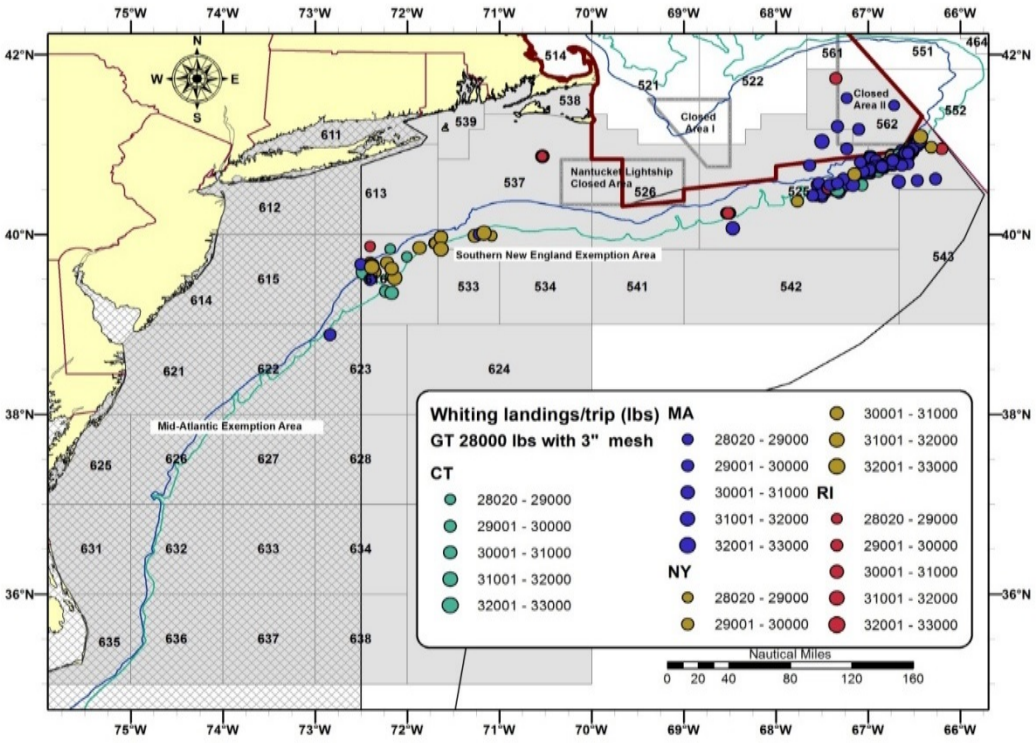


Whiting landings are regulated by possession limits that vary with the trawl mesh size and by stock area. These limits have helped maintain catches at or below sustainable levels since becoming effective in 2003. Since this amendment is considering increasing the Southern whiting possession limit, it is important to characterize the fishery with respect to landings per trip and the geographical distribution of fishing effort in the Southern stock area.

Landings of silver hake come from a variety of fishing activities, including small mesh trawl fishing that targets silver and offshore hake, small mesh trawl fishing that targets other species (e.g. shrimp, squid, herring), and large mesh fishing targeting groundfish, skates, monkfish, and summer flounder. Vessels using trawls with 2.5 inch or smaller mesh may not possess more than 3,500 pounds of silver and offshore hake, while vessels using trawls with 2.5 to 3-inch mesh may not possess more than 7,500 pounds of silver and offshore hake. Vessels using larger mesh may possess up to 30,000 pounds of silver and offshore hake.

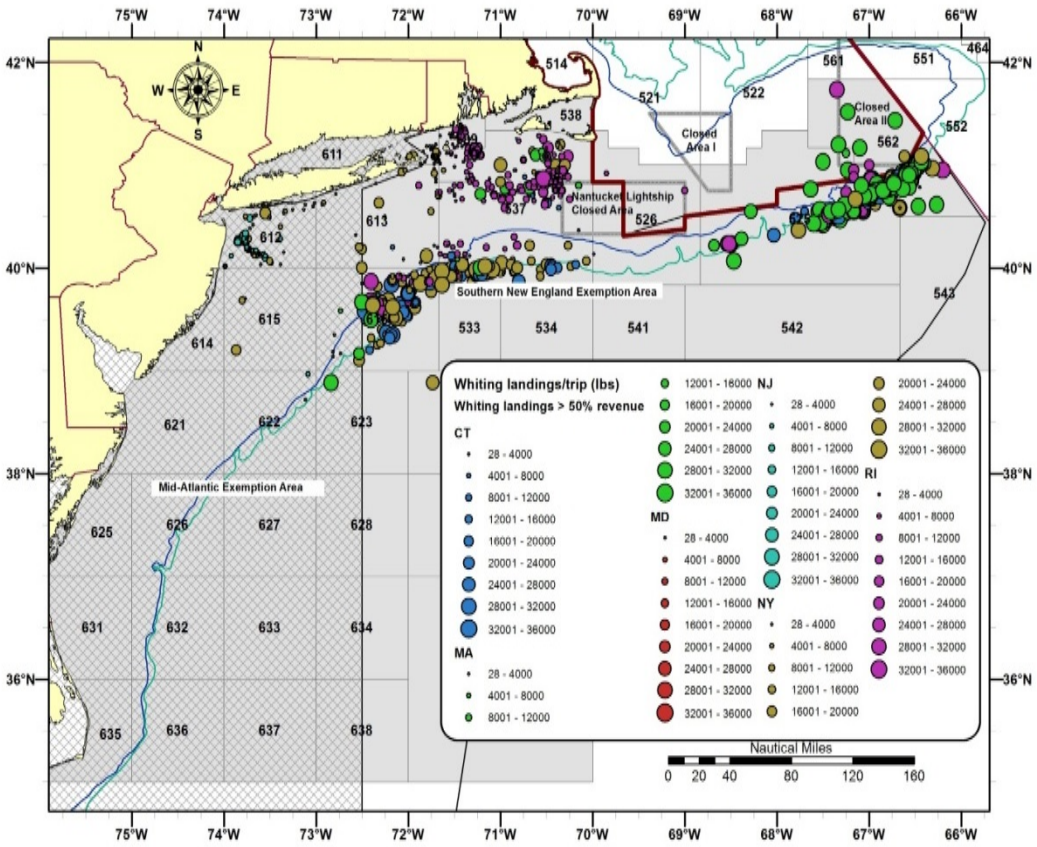
Vessels using 3 inch or larger mesh may possess and land up to 30,000 pounds of whiting. Nearly all of the high landings on trips targeting whiting are made by vessels fishing along the Mid-Atlantic continental shelf edge and along the Southern edge and eastern portion of Georges Bank (Map 5). Almost all trips landing more than 28,000 pounds and targeting whiting fished in the Southern New England Exemption Area, according to VTR data. Trips landed fish in CT (mainly New London), MA (mainly New Bedford), NY (mainly Montauk), and RI (mainly Point Judith). Most trips landing in NY were reported to fish around and just north of Hudson Canyon in statistical areas 537 to 616. Most of the trips landing in MA and RI were reported to fish on Southern Georges Bank, east of Munson Canyon, in statistical areas 525 and 562. According to the data, some trips appear to have ventured into the Gulf of Maine/Georges Bank exemption area (delineated by the red line in Map 5), but the reported positions on the VTRs are probably erroneous and the trip actually fished on the Southern edge of Georges Bank, in the Southern New England Exemption Area.

Map 5. Reported fishing locations and state of landing for 2009-2011 trips targeting whiting while using trawls having 3 inch or larger mesh and landing more than 28,000 pounds. Source: Dealer reported landings data matched to VTR data.



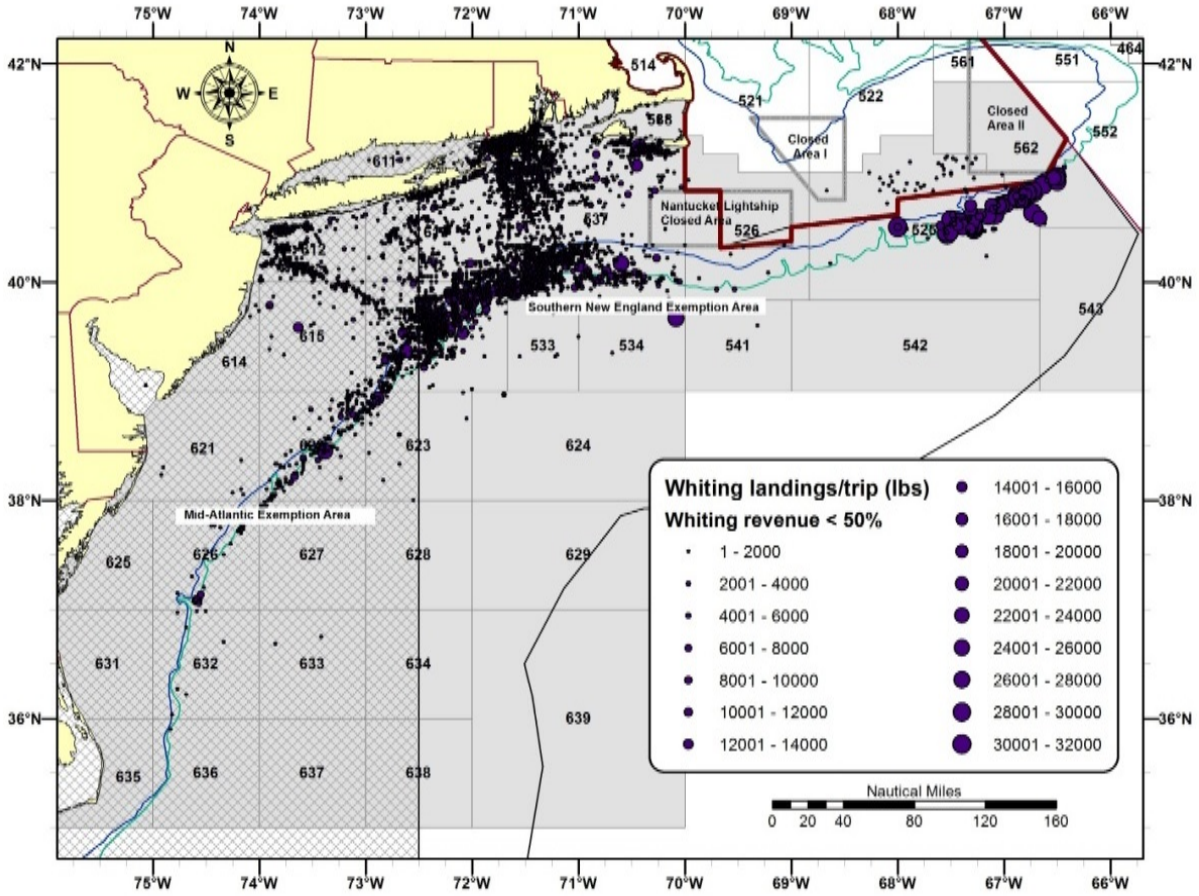
Trips targeting whiting but landings less than 28,000 pounds are more diversified, geographically (Map 6). In addition to the above trips, there are more trips spread out along the Southern New England shelf edge in statistical areas 537 and 616, some trips using 3-inch mesh and other trips using smaller mesh. There is also an inshore whiting fishery using 2.5-inch or smaller mesh inshore in Southern New England, from Block Island to Martha's Vineyard in statistical area 537. There was also a small inshore whiting fishery in statistical area 613, off Ambrose Lightship, landing whiting in NJ (Point Pleasant and Belford) and NY (Southern Long Island).

Map 6. Reported fishing locations and state of landing for 2009-2011 trips targeting whiting while using trawls. Source: Dealer landings data matched to VTR data.



Whiting are also landed by larger mesh fisheries targeting other species, over a wider geographical range (Map 7). These trips range along the shelf edge from VA to MA, many trips targeting squids, summer flounder, and other species with a variety of mesh sizes. More inshore, trips fishing for other species often land whiting when fishing from NJ (Hudson Canyon) to RI and MA (statistical areas 537 and 538).

Map 7. Reported fishing locations for 2009-2011 trips targeting species other than whiting while using trawls. Source: Dealer landings data matched to VTR data.

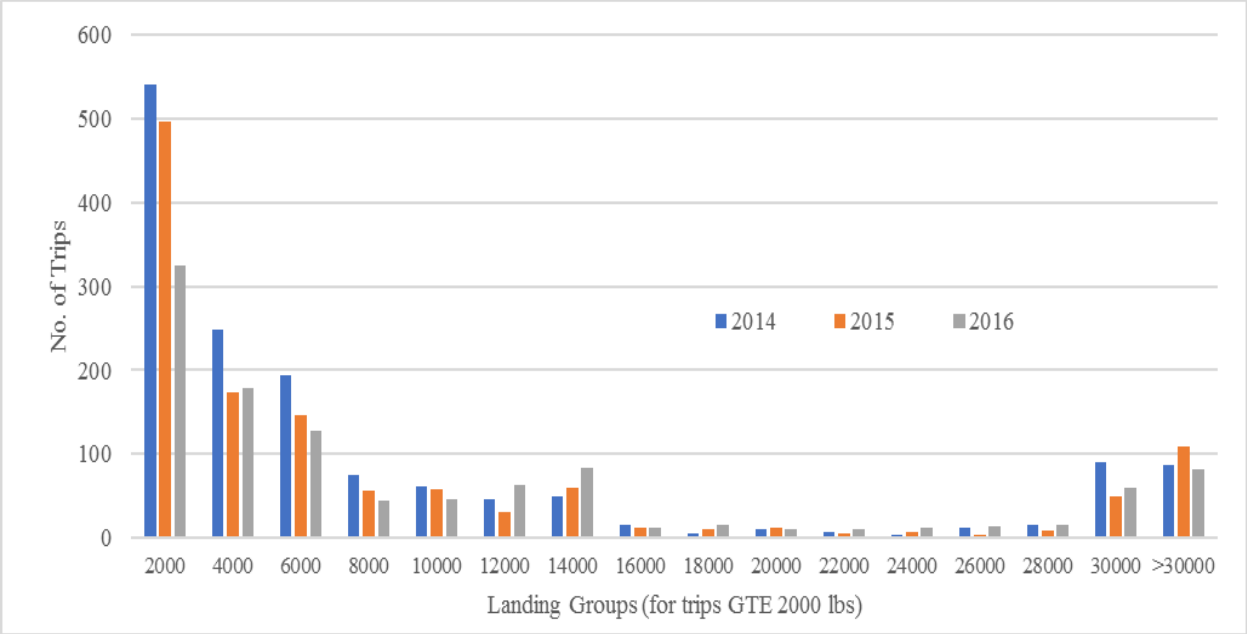


Frequency of trips landing in 2014-2016

For the trips that landed 2,000 or more pounds of silver hake, majority of those trips landings below 8000 pounds in recent years (2014-2016). There were also trips that landed around 30,000 pounds and more. However, the maximum landing in a trip was around 43,000 pounds during the recent years.[20] Figure 43 presents the frequency of trips by landing volume in recent years and Figure 44 presents the cumulative number of trips for the landing volume. The nature of landings and corresponding trip numbers have similar patterns as in during 1999-2001 and 2009-2011.

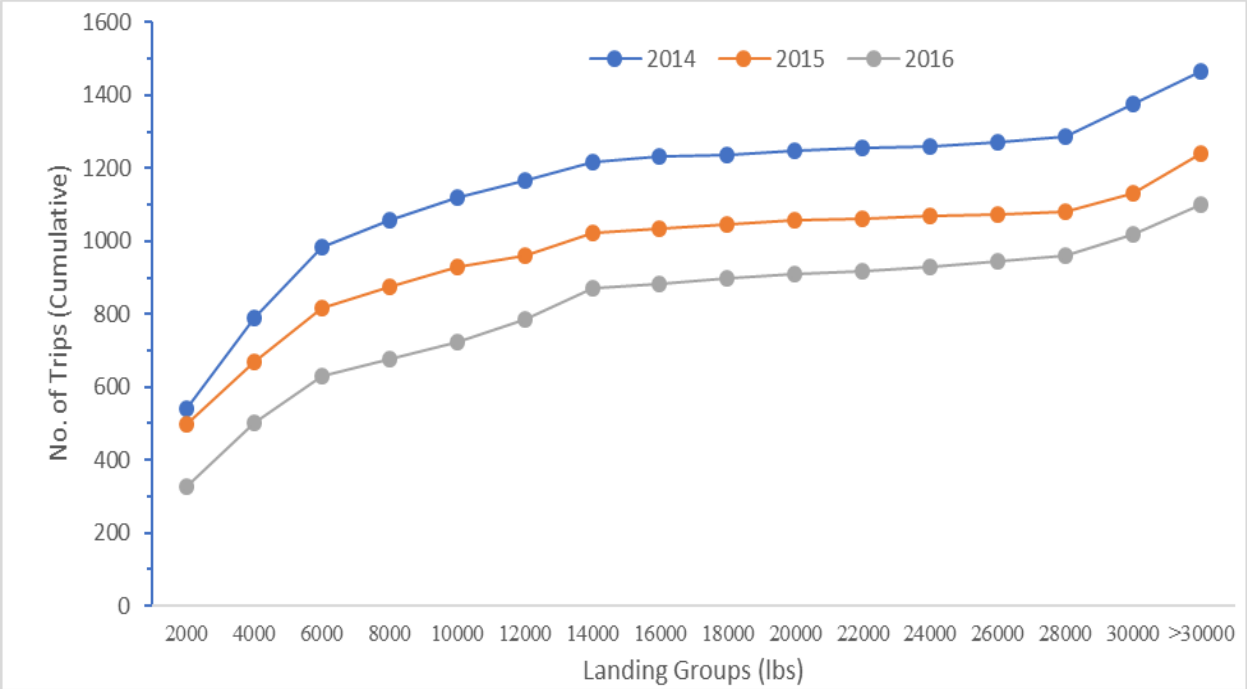
20 There are a few trips in this figure that appear to land more than 30,000 pounds of silver hake, more than the legal limit. This may reflect landings from different trips being reported as being landed in the same day for a permit or reporting mistakes by the dealer. However, the vast majority of trips are reported to land LTE 30,000 pounds.

Figure 43. Frequency of silver hake landings per trip, 2014-2016.



Source: VTR landings with trips landings less than 2,000 pounds are excluded.
Note: Landing group example, i.e., 2,000= 2,000-4,000 pounds, 4,000=4,000-6,000, etc. The last two groups in X-axis is landing volume of 30,000 pounds and greater than 30,000 pounds.

Figure 44. Cumulative frequency of whiting landings per trip, 2014-2016.



Source: VTR landings with trips landings less than 2,000 pounds have been excluded from the figure.
Note: Landing group example, i.e., 2,000= 2,000-4,000 pounds, 4,000=4,000-6,000, etc. The last two groups in X-axis is the group of 30,000 pounds and greater than 30,000 pounds.

5.4.2.2 Red hake landings and revenue

Landings of red hake peaked in 2001 at 4.184 pounds and real revenue (inflation adjusted in 2016 $) was also the greatest ($2.7 mil) in this year (Table 27). The lowest red hake landings occurred in 2016; while in 2005, there was the least amount of revenue earned from red hake ($0.8 mil). Peak landings in the Northern management area were 1.4 mil pounds in 1996, which earned $0.9 mil in real revenue (Table 28). The lowest red hake landings in the Northern area occurred in 2008 with 0.21 mil pounds, earning $0.13 mil in real revenue. Landings in the Northern area have dropped significantly since 2005, earning real revenue ranged from $0.13 mil to $0.26 mil.

Landings of red hake in the Southern area also account for over two-thirds of the total red hake landings (Table 28). Peak landings in the Southern area were in 2001 and were 3.173 mil pounds, earning approximately $1.8 mil in real revenue. The lowest landings occurred in 2016 and were 0.774 mil pounds, earning approximately $0.510 mil (and is also the lowest revenue from red hake in the Southern stock area over the past two decades).

The distribution of trips that landed red hake is skewed in recent years (2014-2016), as considerable number of trips landed less than 400 pounds of red hake in a fishing trip (Figure 45). The cumulative distribution of trips with red hake landings indicate that majority of the trips had landings below 2,000 pounds although few trips had landings up to 11000 pounds (Figure 46).

Table 27. Annual red hake landings (pounds) and real revenue (1996-2016).

Year	Red Hake (lbs.)	Real Revenue	Year	Red Hake (lbs.)	Real Revenue
1996	3,724,557	$2,179,102	**2006**	1,399,139	$878,277
1997	3,218,595	$2,079,042	**2007**	1,539,892	$989,100
1998	3,105,399	$1,860,863	**2008**	1,900,798	$1,202,528
1999	3,680,188	$2,409,663	**2009**	2,033,501	$1,122,377
2000	3,873,913	$2,286,338	**2010**	1,733,795	$1,174,825
2001	4,183,559	$2,675,958	**2011**	1,610,371	$1,098,097
2002	2,454,275	$1,366,697	**2012**	1,919,186	$1,271,280
2003	2,493,860	$1,549,594	**2013**	1,276,089	$835,359
2004	2,055,735	$1,297,651	**2014**	1,463,920	$1,048,322
2005	1,312,231	$750,078	**2015**	1,204,890	$901,936
			2016	1,136,298	$864,736
Source: NEFSC VTR data, accessed 2017.					

Table 28. Annual red hake landings (pounds) and real revenue by Northern and Southern stock area.

Year	Management Area		Real Revenue (in 2016$)	
	Northern	Southern	Northern	Southern
1996	1,375,579	2,328,133	$866,253	$1,466,111
1997	958,034	2,234,905	$460,400	$1,074,024
1998	554,729	2,548,361	$404,636	$1,858,849
1999	738,533	2,924,662	$804,388	$3,185,453
2000	777,783	3,073,408	$644,964	$2,548,575
2001	978,333	3,173,806	$553,603	$1,795,942
2002	972,855	1,470,423	$368,041	$556,275
2003	959,220	1,522,054	$928,486	$1,473,287
2004	512,011	1,523,985	$315,496	$939,063
2005	304,297	962,503	$164,994	$521,882
2006	360,189	1,030,961	$226,499	$648,304
2007	271,366	1,263,629	$130,816	$609,150
2008	254,272	1,639,477	$147,734	$952,550
2009	328,889	1,689,948	$258,457	$1,328,046
2010	253,054	1,467,152	$156,646	$908,198
2011	256,937	1,338,382	$186,801	$973,047
2012	210,717	1,683,686	$262,423	$2,096,830
2013	225,039	1,027,289	$217,011	$990,641
2014	144,304	1,296,283	$140,541	$1,262,478
2015	209,078	972,686	$130,168	$605,576
2016	333,117	774,453	$219,660	$510,681

Source: **NEFSC VTR data, accessed 2017.**

Figure 45. Frequency of red hake landings per trip, 2014-2016.

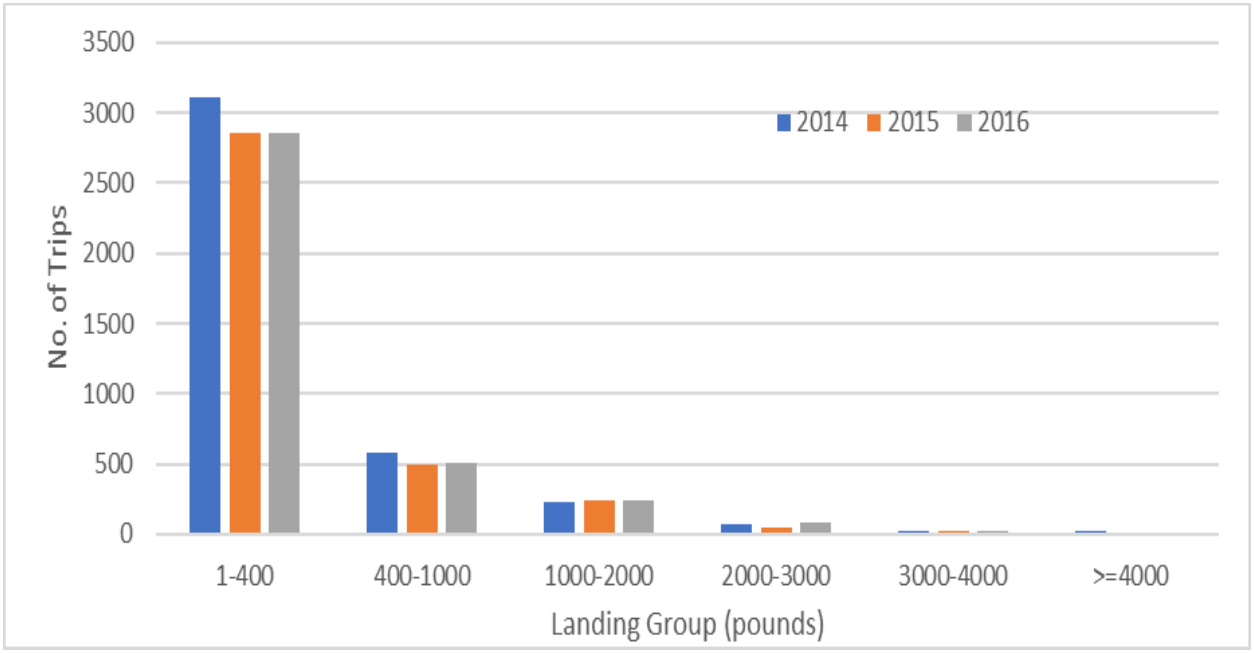
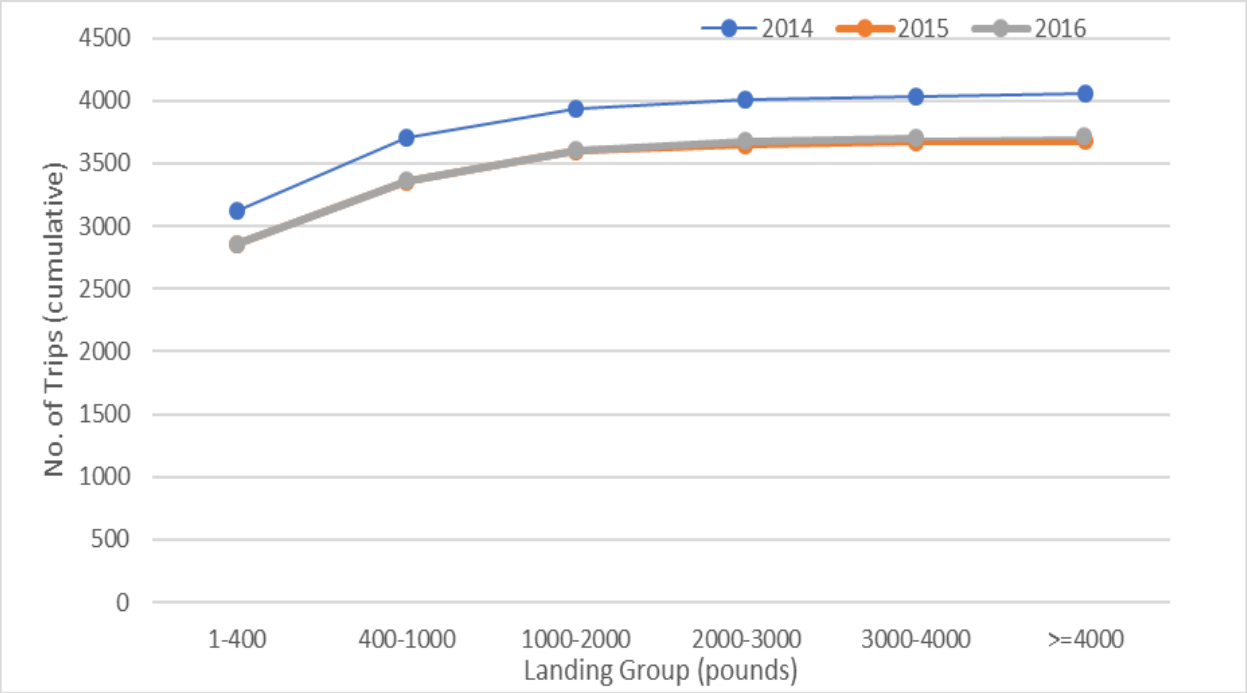


Figure 46. Cumulative frequency of red hake landings per trip, 2014-2016.



5.4.3 Price-Quantity Relationships

Over the past two decades, a simple regression analysis suggests an inverse relationship between the annual landings of small-mesh multispecies and annual average prices. Real price (in 2016$) decreased by about 0.01 cents for an increase in one metric ton of red hake landings. Similarly, real price of whiting decreased by about 0.0007 cents for an increase in a metric ton of whiting landings (Figure 47 and Figure 48).

Figure 47. Price – Quantity relationship for red hake, 1996-2016.

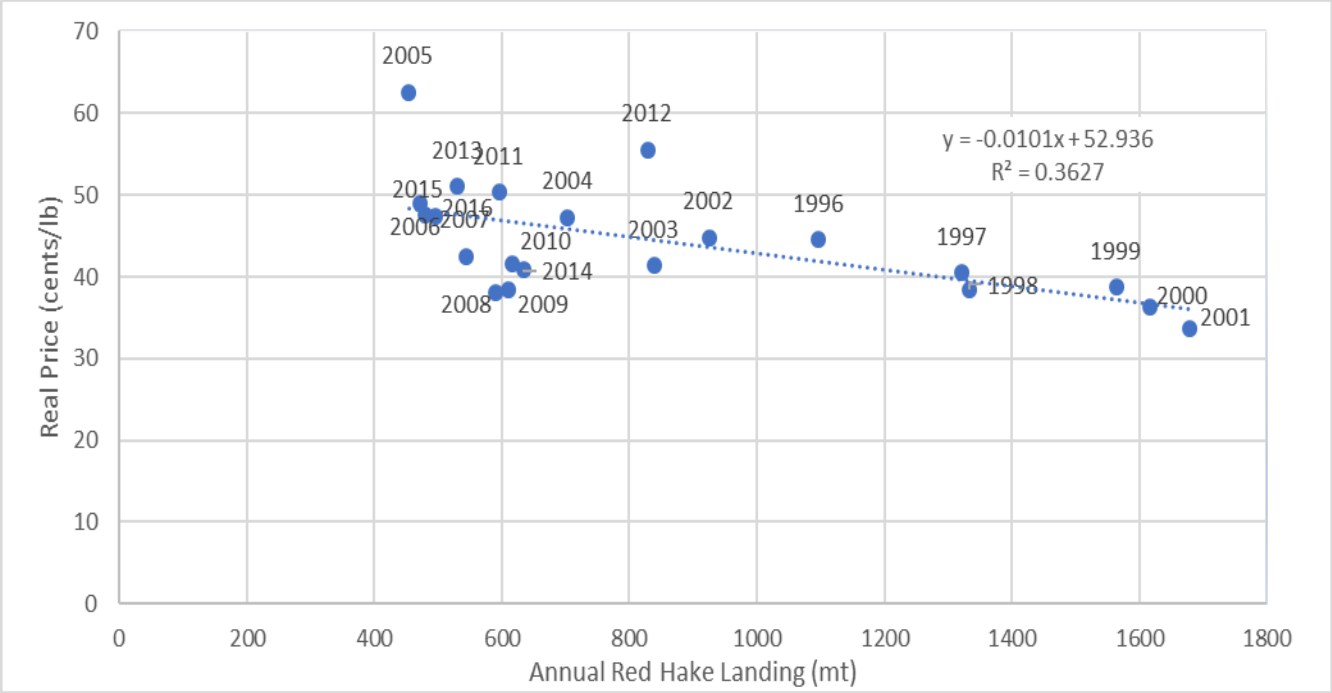
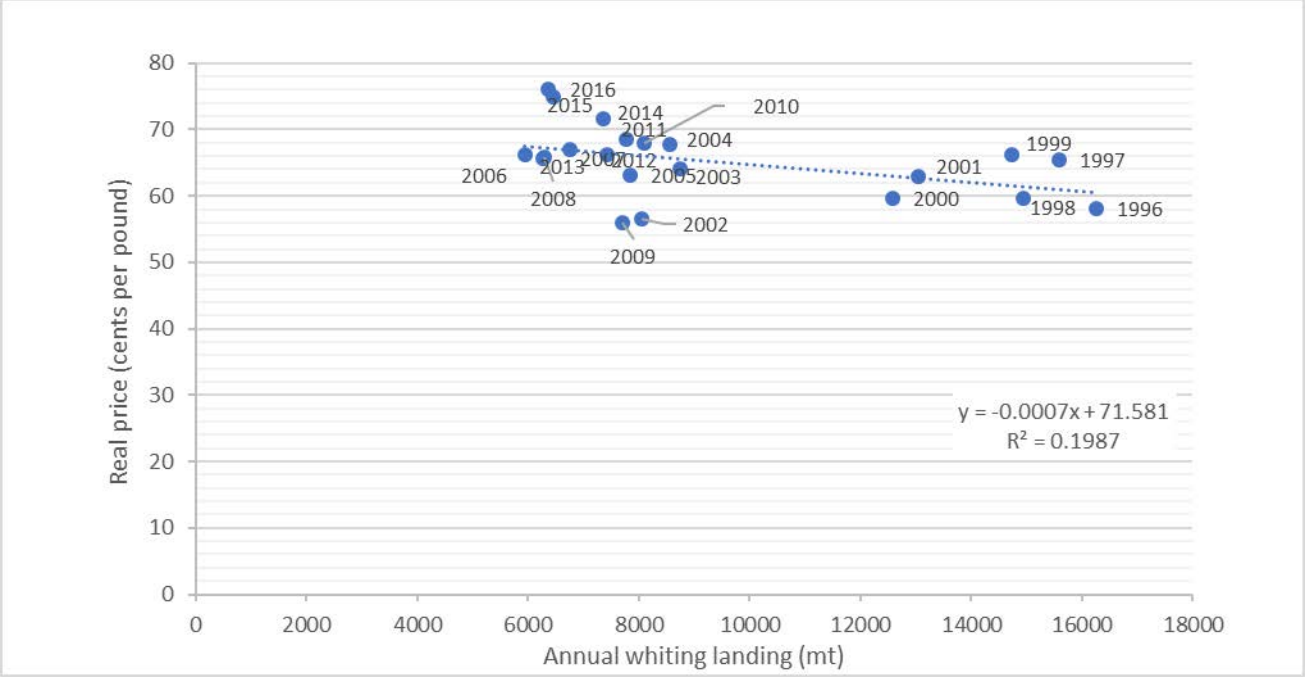


Figure 48. Price-Quantity relationship for whiting, 1996-2016.



5.4.4 Fishing Communities

5.4.4.1 Introduction

Consideration of the economic and social impacts on fishing communities from proposed fishery regulations is required by the National Environmental Policy Act (NEPA 1970) and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA 2007). National Standard 8 of the MSFCMA (16 U.S.C. § 1851(a)(8)) stipulates that:

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

A "fishing community" is defined in the MSFCMA (16 U.S.C. § 1802(17)), 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."*

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

To gain a better perspective on the nature of the small-mesh multispecies fishery and the character of the affected human environment, a broader interpretation of fishing community has been applied to include almost all communities with a substantial involvement in or dependence on the small-mesh multispecies fishery. In terms of National Standard 8 (NS 8), some of the communities identified in this section may not fit the strict interpretation of the criteria for substantial dependence on fishing. The fishing communities that meet the legal definition (as promulgated through NS 8) are likely to be considered a subset of the broader group of communities of interest that are engaged in the herring fishery and identified in this document.

National Standard 8 requires the Council to consider the importance of fishery resources to affected communities and provide those communities with continuing access to fishery resources, but it does not allow the Council to compromise the conservation objectives of the management measures. "Sustained participation" is interpreted as continued access to the fishery within the constraints of the condition of the resource.

5.4.4.2 Communities of Interest

There have been over 238 port communities that have been a homeport or landing port to one or more active small-mesh multispecies vessels since 1996. These ports primarily occur from Maine to New

Jersey. The level of activity in the small-mesh multispecies fishery has varied across time. This section identifies the communities for which whiting and red hake are particularly important. Information in this section is largely based on demographic data collected by the U.S. Census and fishery data collected by NMFS, much of which are available on the NEFSC website (link???). Clay et al. (2007) has a detailed profile of each port, including important social and demographic information. While these data describe a community's dependence on the small-mesh multispecies fishery, it is important to remember that at least some of the individual vessels therein are even more dependent on the fishery. In some cases, groups of communities identified above have been disaggregated so that information specific to certain communities can be provided and so that important details about individual communities are not lost.

Community of Interest Criteria. There are 18 *Communities of Interest* for the small mesh multispecies fishery, which meet at least one of the following criteria (Table 29):

1. Cumulative whiting and red hake landings of at least 5M pounds (2,300 mt) between 1996-2016.

2. Whiting and red hake landings of at least 200,000 pounds (91 mt) in 2016.

Table 29. *Communities of Interest* in the small mesh multispecies fishery.

State	Community	Landings				
		≥5M lbs., 1996-2016	≥200K lbs., 2016	≥500K lbs., 2016	≥1M lbs., 2016	≥3M lbs., 2016
ME	Portland	√				
NH	Seabrook	√	√			
MA	Gloucester	√	√	√	√	√
	Boston		√			
	Provincetown	√	√			
	New Bedford	√	√	√	√	√
RI	Newport	√				
	Point Judith	√	√	√	√	√
CT	Stonington	√				
	New London	√	√	√		
NY	Greenport	√				
	Montauk	√	√	√	√	
	Shinnecock	√				
	Hampton Bay	√				
	Point Lookout	√				
	New York City	√	√			
NJ	Belford	√				
	Point Pleasant	√				

5.4.4.3 Community Characteristics

Table 30 presents some economic characteristics of top nine ports in landing small-mesh multispecies in 2016 – a subset of the *Communities of Interest*. The value of small-mesh multispecies to total value of all fish landed in those ports range between 1 to 90%. Gloucester (MA) had the largest number of trips (n=339 trips) whose revenues were >50% from whiting. The top port for landing whiting, New Bedford (MA) had about 1.1% of total port value of landing from hake species; Point Judith and Gloucester had 4% of fish value from small-mesh multispecies; Montauk had 7.6% of fish value from small-mesh multispecies; and New London had 15% of fish value from small-mesh multispecies.

Table 31 and Table 32 show participation of fishermen in terms of number of trips landing 2,000 lbs. or more small-mesh multispecies at various ports in 1996 and 2016. Many ports had begun to have few trips landed after 2001. Fishermen participation in landing silver hake in major ports have declined significantly over the past two decades, as only three ports in 2016 against nine in 1996 had over 100 trips that landed 2,000 lbs. or more silver hake. While many ports with trips 2,000 pounds or more have declined significantly in trip landings, only New Bedford, MA experienced a rise of trips with landing volumes of 2,000 lbs. or more. While many ports had begun to have few landed small-mesh multispecies trips as early as 1997, about 25% of the ports have maintained relatively stable number of trips landing one or more pounds throughout 1996-2016 due to the port's participation in other fisheries with incidental small-mesh multispecies landings.

Table 30. Top nine ports for landing whiting and their other economic characteristics in 2016.

ST	Top Ports in 2016	Dealers	Whiting Live LB	Red Hake Live LB	Whiting Value	Red Hake Value	Whiting Target Trips	Whiting Trips	Sum of Landing Events, all trips	Landing Live LB (All Fish)	Total Value (All Fish)	Ratio
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(E+F)/ (K)
MA	New Bedford	86	3,789,176	65,357	$3,461,340	$38,829	125	294	10,834	410,820,837	$326,329,306	0.011
RI	Point Judith	50	3,669,765	391,709	$2,065,797	$138,336	117	2,558	23,823	58,789,078	$55,731,437	0.040
MA	Gloucester	74	2,980,214	172,797	$2,028,907	$54,072	339	1,750	21,753	66,414,851	$52,854,591	0.039
NY	Montauk	42	1,186,498	218,359	$1,169,698	$130,414	122	878	10,369	12,601,398	$17,068,995	0.076
CT	New London	19	678,790	81,412	$664,795	$65,422	115	242	1,626	9,072,205	$4,881,024	0.150
NY	New York City	6	483,810	12,425	$310,474	$6,478	36	36	139	534,226	$349,813	0.906
NH	Seabrook	4	302,998	22,248	$250,985	$10,189	118	387	2,871	1,689,660	$2,725,660	0.096
MA	Provincetown	22	217,325	268	$80,425	$116	39	43	3,475	7,587,021	$8,187,669	0.010
MA	Boston	18	216,497	-	$170,223	$0	18	201	2,578	12,810,968	$16,961,715	0.010

Source: NMFS dealer data, accessed 2017.

Table 31. Trips landing ≥ 2,000 pounds of small-mesh multispecies in Communities of Interest, 1996-2016.

Landed Port		1996		2016		Note
		trips	rank	trips	rank	
ME	Portland	453	2	<100	>3	Peak in 1996; generally declined trend since 1996; minimal since 2008.
NH	Seabrook	<100	>9	<100	>3	Fluctuating; peak in 2012.
	Rye	<100	>9	<100	>3	None or minimal until 2009; peak in 2012.
MA	Gloucester	409	3	230	1	Peak in 1996; fluctuated, but generally declining trend.
	Boston	<100	>9	<100	>3	None until 1998; fluctuating since; peak in 2015.
	Provincetown	110	9	<100	>3	Peak in 2001; declining since 2011.
	New Bedford	<100	>9	145	3	Peak in 2003; generally increasing trend.
RI	Newport	<100	>9	<100	>3	Peak in 2001; decreasing trend; zero since 2012.
	Point Judith	801	1	179	2	Peak in 1998; decreasing trend.
CT	Stonington	<100	>9	<100	>3	Peak in 2001; fluctuating trend.
	New London	159	8	<100	>3	Peak in 1996; declining trend.
NY	Greenport	201	6	<100	>3	Peak in 1996; declining trend; zero since 2012.
	Montauk	217	4	<100	>3	Peak in 1998; generally declining trend.
	Shinnecock	205	5	<100	>3	Peak in 1998; generally declining trend.
	Hampton Bay	<100	>9	<100	>3	Peak in 1997; declining trend.
	New York	<100	>9	<100	>3	None or minimal until 2011, then increasing.
NJ	Belford	<100	>9	<100	>3	Peak in 2009; fluctuating trend.
	Point Pleasant	174	7	<100	>3	Peak in 1997; declining trend.
Total		**2,967**		**563**		

Source: NEFSC VTR data, accessed 2017.

Table 32. Trips landing ≥ 1 pounds of small mesh multispecies in landing ports, 1996-2016.

Landed Ports		1996		2016		Notes
		Trips	Rank	Trips	Rank	
ME	Portland	793	3	175	7	Peak in 1996; generally decreasing.
NH	Portsmouth	566	5	<100	>11	Peak in 1996; generally decreasing.
	Rye	201	14	<100	>11	Peak in 1997; fluctuating
	Hampton	287	11	<100	>11	Peak in 1996, generally decreasing
	Seabrook	282	9	311	4	Peak in 2001; fluctuating.
MA	Newburyport	233	12	<100	>11	Peak in 1996, generally decreasing
	Gloucester	1,225	2	807	2	Peak in 1999; generally decreasing.
	Marblehead	164	19	<100	>11	Generally decreasing.
	Boston	<100	>21	150	9	Generally increasing.
	Scituate	195	16	159	8	Peak in 2012; fluctuating.
	Chatham	195	17	<100	>11	Peak in 1997, generally decreasing.
	Provincetown	220	13	<100	>11	Peak in 2001; decreasing since 2011.
	New Bedford	<100	>21	274	6	Increasing trend.
RI	Point Judith	1,736	1	1,735	1	Fluctuating; peak in 2013
	Newport	157	20	<100	>11	Decreasing trend.
CT	Stonington	196	15	277	5	Peak in 1999; fluctuating.
	New London	182	18	<100	>11	Peak in 1996; fluctuating.
NY	Greenport	251	10	<100	>11	Peak in 1996; minimal to none since 2001.
	Montauk	562	6	325	3	Peak in 2012; fluctuating trend.
	Shinnecock	516	7	<100	>11	Peak in 1998; generally decreasing.
	New York City	<100	>21	<100	>11	Fluctuating, generally low.
NJ	Brielle	<100	>21	<100	>11	Peak in 1997; fluctuating.
	Point Pleasant	629	4	109	11	Peak in 1997; generally decreasing.
	Belford	360	8	112	10	Peak in 1997; generally decreasing.
	Cape May	147	21	<100	>11	Peak in 1997, generally decreasing.
Total		10,360		5,498		*Source:* NEFSC VTR data, accessed 2017.

Table 33 presents cumulative landings of silver hake and red hake in major ports along with their share of landings to state's total landing of the species. New London and Stonington land nearly all (>95%) silver and red hake landings in Connecticut. Point Judith lands about 95% of Rhode Island's hake landings. New Bedford and Gloucester (MA) lands about 90% of the state's hake landings.

Table 33. Major landing ports with cumulative silver hake and red hake landings (pounds) and port's share landings to its corresponding state's landings for the species, 1996-2016.

State	Top Ports	Silver Hake (lbs.)	Red Hake (lbs.)	Percent of state landings	
				Silver hake	Red hake
ME	Portland	6,386,607	734,870	88%	79%
NH	Seabrook	4,233,393	1,233,921	73%	57%
MA	Gloucester	30,939,948	5,048,852	25%	54%
	New Bedford	77,886,117	3,071,112	64%	33%
	Provincetown	9,890,996	874,476	8%	9%
RI	Point Judith	91,435,748	11,851,279	95%	94%
	Newport	4,567,301	717,226	5%	6%
CT	New London	47,070,546	5,355,055	77%	78%
	Stonington	14,326,964	1,499,982	23%	22%
NY	Montauk	53,384,130	6,436,360	53%	65%
	Greenport	16,994,122	544,673	17%	6%
	Shinnecock	14,508,418	1,248,954	15%	13%
	Point Lookout	4,421,630	1,002,001	4%	10%
	Hampton Bay	9,119,913	223,728	9%	2%
NJ	Belford	4,776,479	1,076,711	34%	20%
	Point Pleasant	8,416,347	2,778,971	60%	52%
Source: NEFSC VTR data, accessed 2017.					

5.4.4.3.1 Small-mesh multispecies permits by state and port

In Maine, there has been an 81% decrease in the number of permits with landings of small mesh multispecies, from 113 in 1996 to 21 in 2016 (Table 34). There has also been a decrease in the number of ports landing small mesh multispecies, from 14 in 1996 to 3 in 2016. Portland has been the most active port in Maine throughout the time series, though it had a 78% decline in the number of active permits, 86 to 19. Most other ports in Maine landing small mesh multispecies had ≤3 permits landing.

In New Hampshire, there has been a 73% decrease in the number of permits with landings of small mesh multispecies, from 67 in 1996 to 18 in 2016 (Table 34). Portsmouth had the most number of permits landing in 1996, at 36, but that port has had under four permits landing since 2014. Hampton, Seabrook, and Rye, have had active ports through most of the time series, and in 2016, Seabrook had the highest number of active permits landing small mesh multispecies, at 14.

In Massachusetts, there has been a 39% decrease in the number of permits with landings of small mesh multispecies, from 338 in 1996 to 207 in 2016 (Table 34). Apart from a few years in the mid-2000s, Massachusetts has been the state with the highest number of active permits. The number of ports landing small mesh multispecies has fluctuated between 8 and 18 through the time series, and was 14 in 2016.

Provincetown, and Gloucester had declines in the number of permits landing small-mesh multispecies, but that number increased in New Bedford and Boston during the time series.

In Rhode Island, there has been a 36% decrease in the number of permits with landings of small mesh multispecies, from 261 in 1996 to 166 in 2016 (Table 34). The number of ports landing small mesh multispecies has fluctuated between three and ten through the time series, and was three in 2016. The number of permits landing in Point Judith declined by about 25%; while there was a 91% decline in the number of permits reporting landings of these species in Newport that period.

In Connecticut, there has been a steady increase in the number of permits with landings of small mesh multispecies, from 3 in 1996 to 51 in 2016 (Table 34) – in contrast to other states. The number of ports landing small mesh multispecies has fluctuated between two and seven through the time series, and was five in 2016. Stonington (CT) had a near eight-fold increase in the number of permits reporting landing of small-mesh multispecies and the number of active permits in New London increased dramatically as well.

In New York, there has been a 48% decrease in the number of permits with landings of small mesh multispecies, from 235 in 1996 to 123 in 2016 (Table 34). The number of ports landing small mesh multispecies has fluctuated between eight and 18 through the time series, and was twelve in 2016. Montauk has had a stable number of permits landing small-mesh multispecies, but Hampton Bays experienced declines of 64% during 1996-2016.

In New Jersey, there has been a 41% decrease in the number of permits with landings of small mesh multispecies, from 170 in 1996 to 101 in 2016 (Table 34). The number of ports landing small mesh multispecies has fluctuated between four and 14 through the time series, and was nine in 2016. There were declines in permits landing small-mesh multispecies in Belford (40%) and Cape May (64%). However, the number of active permits in Barnegat and Point Pleasant have been fairly steady.

Table 34. Number of unique permits landing silver hake, offshore hake or red hake in each key port and state, 1996-2016

State/Port	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Maine	**113**	**103**	**59**	**65**	**79**	**80**	**58**	**23**	**20**	**10**	**14**	**19**	**12**	**18**	**16**	**23**	**32**	**30**	**27**	**26**	**21**
Portland	86	82	37	46	59	63	42	14	10	5	10	14	12	13	11	14	21	23	21	24	19
New Hampshire	**67**	**74**	**67**	**69**	**84**	**103**	**91**	**64**	**75**	**42**	**37**	**43**	**42**	**68**	**30**	**32**	**40**	**29**	**30**	**22**	**18**
Hampton/Seabrook	17	25	22	18	24	23	33	23	29	17	16	18	21	28	16	13	19	16	25	18	14
Massachusetts	**338**	**326**	**401**	**413**	**406**	**350**	**338**	**299**	**215**	**145**	**110**	**153**	**178**	**218**	**182**	**181**	**200**	**200**	**192**	**190**	**207**
Gloucester	144	139	183	195	190	159	141	122	95	75	49	67	88	101	74	76	85	85	86	75	81
Boston	7	8	3	5	5	7	9	12	7	4	7	5	9	10	4	7	11	9	17	18	20
Provincetown	42	42	41	38	42	42	38	20	11	c	c	10	11	13	14	17	12	12	4	5	4
New Bedford	30	20	42	46	44	42	44	58	49	35	36	28	33	43	52	43	33	39	41	41	67
Rhode Island	**261**	**232**	**295**	**286**	**294**	**253**	**265**	**231**	**192**	**182**	**200**	**180**	**188**	**177**	**168**	**177**	**181**	**182**	**176**	**161**	**166**
Newport	52	37	64	61	78	64	53	49	31	20	24	18	16	16	10	8	7	6	3	6	4
Point Judith	203	186	201	197	183	182	195	179	159	154	167	150	161	154	149	158	156	163	165	152	160
Connecticut	**3**	**9**	**7**	**8**	**8**	**12**	**7**	**10**	**5**	**7**	**7**	**35**	**42**	**45**	**49**	**58**	**61**	**52**	**51**	**52**	**51**
Stonington	c	c	4	4	5	4	c	4	c	c	c	22	31	29	31	30	34	30	27	28	31
New London	c	c	c	c	c	c	c	c	c	c	c	7	4	4	c	8	12	13	13	10	12
New York	**235**	**272**	**250**	**285**	**238**	**238**	**223**	**159**	**150**	**120**	**141**	**159**	**168**	**161**	**156**	**133**	**157**	**151**	**140**	**120**	**123**
Greenport	32	35	28	35	17	16	8	8	3	5	c	4	5	c	5	c	c	c	c	c	c
Montauk	65	71	89	101	98	78	78	59	60	50	54	57	59	59	65	62	75	72	69	63	71
Shinnecock	c	c	c	c	c	c	c	c	c	5	4	8	10	11	6	8	12	14	18	9	6
Hampton Bay	87	111	94	97	94	103	94	65	56	41	54	56	54	49	48	34	42	40	33	29	32
Point Lookout	c	c	c	c	c	c	c	c	5	5	8	11	9	12	11	9	11	9	6	3	c
New York City	c	c	c	c	c	c	c	c	12	6	6	6	4	c	5	c	c	c	c	c	c
New Jersey	**170**	**175**	**168**	**162**	**151**	**149**	**100**	**99**	**82**	**66**	**91**	**87**	**107**	**103**	**98**	**95**	**78**	**93**	**100**	**80**	**101**
Belford	45	39	34	38	35	33	35	23	27	22	34	31	25	23	16	22	21	17	18	15	27
Point Pleasant	35	52	52	50	41	53	35	39	33	32	44	33	51	43	52	44	36	44	48	34	33

Source: NMFS permit data. c = confidential
State totals include other small ports.

5.4.4.3.2 Small-mesh multispecies landings by state and port

Table 35 lists silver hake and red hake landings by state for 1996-2016 and the percentage of those landings compared to the state's entire fish landings. For the most part, silver hake is a small percentage of each state's fish landings. CT, RI and NY are among the states with the largest proportion of silver hake landings when compared to the state's total landings. Silver hake landings in CT and NY have ranged from 2 to 16% of the state's total fish landings. The silver hake landings in RI have been 2-7% of the state's total fish landings. The proportion of silver hake landings to total fish landings in ME/NH/NJ combined has consistently been low. It dropped significantly since 1997 and the proportion has remained very low. The magnitude of silver hake landings is less in recent years than it had been during 1996-97. Red hake comprise an even smaller proportion of the state's landings for these states.

The proportion of silver hake to total fish landings has fluctuated much in all states over the past two decades. While landings in the last ten years have been some of the lowest amount of silver hake landings, this is apparent across all fisheries.

Table 35. Annual red and silver hake landings by state as percentage of total state landings.

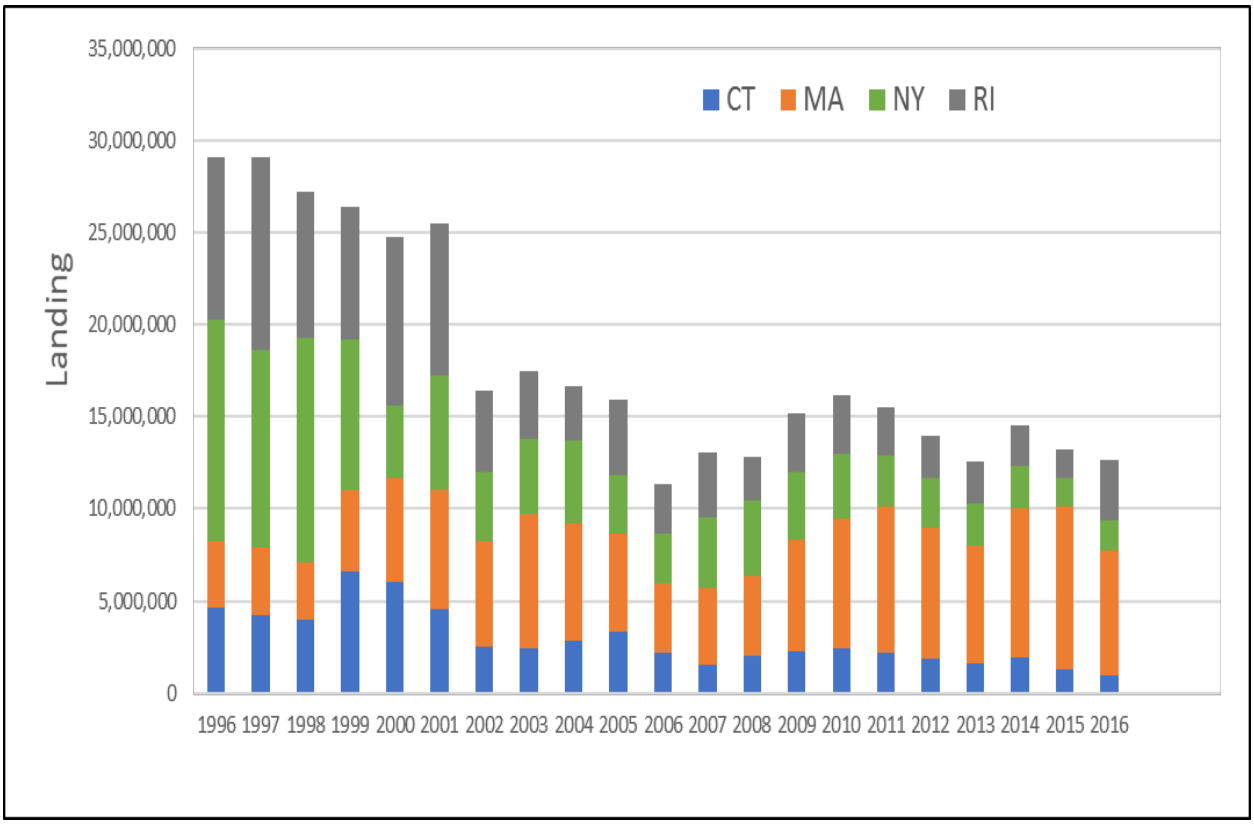
State	Year	Landings (Live Pounds)			Percent of State Total	
		Red Hake	Silver Hake	State Total Fish	Red Hake	Silver Hake
ME, NH, NJ	1996	135,076	5,249,751	874,677,955	0.02%	0.60%
	1997	234,848	3,745,832	859,779,353	0.03%	0.44%
	1998	246,350	1,830,383	795,036,844	0.03%	0.23%
	1999	249,588	1,125,683	837,303,964	0.03%	0.13%
	2000	339,025	1,038,951	895,261,391	0.04%	0.12%
	2001	321,433	1,123,444	940,590,695	0.03%	0.12%
	2002	134,680	1,144,930	903,729,481	0.01%	0.13%
	2003	31,556	329,882	938,699,230	0.00%	0.04%
	2004	40,172	367,538	927,710,553	0.00%	0.04%
	2005	51,397	425,378	785,054,539	0.01%	0.05%
	2006	42,013	280,482	765,114,290	0.01%	0.04%
	2007	116,029	1,207,332	753,321,013	0.02%	0.16%
	2008	104,308	861,589	804,047,717	0.01%	0.11%
	2009	178,427	1,719,911	738,939,031	0.02%	0.23%
	2010	159,716	845,000	724,326,230	0.02%	0.12%
	2011	108,975	1,158,514	816,659,549	0.01%	0.14%
	2012	237,185	1,740,202	817,117,337	0.03%	0.21%
	2013	82,291	622,591	677,975,485	0.01%	0.09%
	2014	115,633	1,149,013	709,632,634	0.02%	0.16%
	2015	94,595	536,251	695,232,826	0.01%	0.08%
	2016	57,744	437,875	712,529,460	0.01%	0.06%
MA	1996	866,296	2,718,402	437,694,432	0.20%	0.62%
	1997	692,388	2,850,467	436,569,212	0.16%	0.65%
	1998	316,177	2,620,755	445,667,453	0.07%	0.59%
	1999	406,408	4,242,107	412,662,329	0.10%	1.03%
	2000	433,028	5,056,069	401,464,250	0.11%	1.26%
	2001	382,844	5,712,744	488,096,446	0.08%	1.17%
	2002	505,862	5,006,098	543,455,839	0.09%	0.92%
	2003	496,829	6,212,761	590,580,698	0.08%	1.05%
	2004	376,522	6,201,313	667,681,141	0.06%	0.93%
	2005	209,881	6,008,479	686,117,675	0.03%	0.88%

State	Year	Landings (Live Pounds)			Percent of State Total	
		Red Hake	Silver Hake	State Total Fish	Red Hake	Silver Hake
	2006	291,271	4,423,374	766,942,263	0.04%	0.58%
	2007	247,470	4,084,017	718,888,598	0.03%	0.57%
	2008	85,983	3,163,937	692,490,083	0.01%	0.46%
	2009	218,855	5,366,663	747,915,509	0.03%	0.72%
	2010	235,327	7,050,482	681,559,004	0.03%	1.03%
	2011	364,798	8,261,589	665,552,010	0.05%	1.24%
	2012	333,412	7,389,038	767,407,139	0.04%	0.96%
	2013	366,448	6,582,898	694,668,266	0.05%	0.95%
	2014	204,376	8,472,619	638,449,479	0.03%	1.33%
	2015	196,747	9,198,240	629,361,765	0.03%	1.46%
	2016	239,619	7,264,092	616,006,485	0.04%	1.18%
RI	1996	744,133	9,329,477	191,244,757	0.39%	4.88%
	1997	959,739	11,565,667	170,785,329	0.56%	6.77%
	1998	1,221,017	10,296,455	155,605,358	0.78%	6.62%
	1999	1,438,523	9,659,665	147,846,035	0.97%	6.53%
	2000	1,506,980	10,507,740	146,530,244	1.03%	7.17%
	2001	1,605,988	9,228,049	139,556,119	1.15%	6.61%
	2002	640,317	5,082,864	125,858,969	0.51%	4.04%
	2003	624,242	5,778,354	120,261,536	0.52%	4.80%
	2004	462,267	4,129,054	128,383,259	0.36%	3.22%
	2005	231,526	4,171,490	130,513,144	0.18%	3.20%
	2006	402,422	3,400,300	152,670,717	0.26%	2.23%
	2007	396,712	4,432,277	104,698,822	0.38%	4.23%
	2008	614,489	3,236,910	91,113,603	0.67%	3.55%
	2009	434,415	3,642,164	103,830,756	0.42%	3.51%
	2010	497,804	3,406,122	120,597,244	0.41%	2.82%
	2011	407,585	2,606,598	100,911,617	0.40%	2.58%
	2012	481,323	2,481,765	99,756,391	0.48%	2.49%
	2013	367,454	2,424,220	110,517,610	0.33%	2.19%
	2014	712,830	2,212,634	105,060,581	0.68%	2.11%
	2015	467,042	1,659,042	86,768,524	0.54%	1.91%
	2016	392,703	3,673,503	94,359,483	0.42%	3.89%
CT	1996	232,126	5,643,448	85,067,279	0.27%	6.63%
	1997	385,297	4,164,057	61,897,420	0.62%	6.73%
	1998	265,713	3,971,948	50,330,151	0.53%	7.89%
	1999	373,721	7,851,123	54,343,035	0.69%	14.45%
	2000	404,612	6,606,446	61,017,170	0.66%	10.83%
	2001	349,622	5,260,402	58,301,355	0.60%	9.02%
	2002	333,601	2,533,091	53,857,239	0.62%	4.70%
	2003	417,843	2,453,756	60,774,902	0.69%	4.04%
	2004	418,881	2,935,966	79,898,571	0.52%	3.67%
	2005	380,358	3,299,686	41,209,999	0.92%	8.01%
	2006	263,810	2,347,952	38,457,651	0.69%	6.11%
	2007	266,201	1,565,724	40,339,168	0.66%	3.88%
	2008	285,490	2,190,464	17,864,505	1.60%	12.26%
	2009	310,643	1,939,943	17,531,952	1.77%	11.07%
	2010	175,778	1,972,970	14,902,918	1.18%	13.24%
	2011	158,253	2,057,084	17,362,506	0.91%	11.85%
	2012	185,253	1,864,659	18,340,626	1.01%	10.17%
	2013	177,810	1,718,854	13,115,071	1.36%	13.11%
	2014	168,323	2,037,547	12,630,240	1.33%	16.13%

State	Year	Landings (Live Pounds)			Percent of State Total	
		Red Hake	Silver Hake	State Total Fish	Red Hake	Silver Hake
	2015	146,018	1,319,823	13,791,691	1.06%	9.57%
	2016	162,038	947,483	16,798,259	0.96%	5.64%
NY	1996	433,037	12,720,370	144,469,529	0.30%	8.80%
	1997	628,466	11,980,906	123,627,785	0.51%	9.69%
	1998	880,759	14,171,904	93,646,869	0.94%	15.13%
	1999	973,566	9,579,998	89,908,773	1.08%	10.66%
	2000	878,327	4,520,382	87,495,947	1.00%	5.17%
	2001	1,016,436	7,391,041	92,246,961	1.10%	8.01%
	2002	422,114	3,966,327	93,193,534	0.45%	4.26%
	2003	278,451	4,478,835	113,447,276	0.25%	3.95%
	2004	251,545	5,166,029	79,147,489	0.32%	6.53%
	2005	126,725	3,344,856	108,785,956	0.12%	3.07%
	2006	53,621	2,557,158	82,776,536	0.06%	3.09%
	2007	169,576	3,580,224	75,444,712	0.22%	4.75%
	2008	204,007	4,150,457	78,704,124	0.26%	5.27%
	2009	203,124	4,279,781	81,915,430	0.25%	5.22%
	2010	288,932	4,540,136	67,197,542	0.43%	6.76%
	2011	273,037	3,038,093	65,468,355	0.42%	4.64%
	2012	589,864	2,819,259	71,267,447	0.83%	3.96%
	2013	172,077	2,390,477	68,336,855	0.25%	3.50%
	2014	189,918	2,311,198	58,571,518	0.32%	3.95%
	2015	132,026	1,501,678	62,274,871	0.21%	2.41%
	2016	239,171	1,719,347	52,336,902	0.46%	3.29%
Source: NMFS dealer data, accessed 2017.						

Figure 49 presents silver hake landings for four major states CT, MA, NY, and RI during 1996-2016. Landings have declined significantly for CT, NY, and RI, but it has increased in MA over the past two decades.

Figure 49. Annual silver hake landing (lbs.) for major states, 1996-2016.



Source: NEFSC VTR data

Table 36 presents cumulative landings of silver hake and red hake as well as landings of all fishes by those who landed small-mesh multispecies. Over the past two decades, the seven major states for small-mesh multispecies had ex-vessel revenue of about $330 M cumulatively from silver and red hakes. They cumulatively landed 404 M lbs. of silver hake and 46 M pounds of red hake during 1996-2016. The states of CT, MA and NY had relatively higher share of silver hake to total volume of all fishes. The share of silver hake to total fish landed ranged between 13 and 59% for silver hake, but it ranged between 3 and 7% for red hake.

Table 36. Small-mesh multispecies landings to total landed fish and real revenues from small-mesh multispecies during 1996-2016.

State Landed	Cumulative total landings (pounds), 1996 to 2016			Silver hake %	Red hake %	Cumulative total small-mesh multispecies revenue (in 2016$), 1996-2016
	Silver hake	Red hake	All Landings			
ME	7,222,442	928,770	36,431,971	20%	3%	$5,938,482
NH	5,785,746	2,173,208	43,283,055	13%	5%	$5,437,524
MA	122,158,823	9,414,785	299,480,845	41%	3%	$97,445,985
RI	96,181,561	12,582,948	380,917,239	25%	3%	$79,185,109
CT	61,400,882	6,887,390	103,385,398	59%	7%	$50,005,370
NY	99,872,171	9,901,463	245,856,488	41%	4%	$80,717,251
NJ	14,120,902	5,344,644	79,484,874	18%	7%	$13,290,361
Source: NEFSC VTR data, accessed 2017.						

Table 37 summarizes real revenue (in 2016$) from silver and red hake, as well as total revenue from all fishes per state. The proportion of total revenue that is made of silver hake and red hake is also displayed. In ME, there was about $1.8 mil in revenue from silver hake. These revenues comprised much less than 0.50 % of total state revenues. In 1996, silver hake landings made up approximately 0.46% of total state revenue. Following 1996, there has been a steady decline in revenue from silver hake landings; the revenue for red hake landings is only nominal. In NH, during the period 1996-2016, revenue from silver hake was less than $266,000 comprising less than 0.29-1.09% of total state fishing revenue. Revenue from red hake landings were $0-$11,000 during the past two decades. The greatest proportion of NH's revenue from silver hake was in 2012, at 1.09%. In 2016, the largest revenue from silver hake landings was about $265,000, representing approximately 0.79% of total state fishing revenues. Revenue from red hake landings are negligible.

Real revenue from silver hake landings in MA was $1.4 mil to $6.6 mil in 1996-2016; this was less than 1.25% of total state fishing revenues over the same time period. Revenue from red hake landings was $37,000 to $293,000, but this was less 0.10% of total MA fishing revenue. The largest revenue from silver hake on record in MA occurred in 2015; while, the greatest revenue from red hake landings occurred in 1996. Real revenue from silver hake landings in CT were $900,000-5.3M, approximately 1-11% of total state fishing revenue. The state has more dependency on silver hake than other states.

Revenue from red hake was less than 1% of total state fishing revenue. Revenue from silver hake was $1.0-6.7 million from 1996-2016 in RI; while revenue from red hake landings was $105,000-409,000 during this same time period. Revenue from silver hake ranged between 0.40% and 1.25% of total state fishing revenue; while revenue from red hake was 0.01-0.08% of total RI revenue for 1996-2016. In 1997, revenue of silver hake were highest in this time period, $6.7 million, representing about 5.74% of total state fishing revenues. In NJ during the period 1996-2016, revenue from silver hake was $58,000-1.3 mil, comprising less than 1 percent of total state fishing revenue. Revenue from red hake landings were $21,000-162,000 comprising less than 0.12% of total state fishing revenues. Revenue from silver hake landings in NY were $1.4– $9.5 mil for 1996-2016, representing approximately 0.14-7.68% of total state fishing revenue. Revenue from red hake landings were $33,000-501,000.

Table 37. Annual red and silver hake revenue by state as percentage of total state revenue from all species landed (in 2016$).

State	Year	Real Revenue$ (in 2016 $)			Percent of State Total	
		Red Hake	Silver Hake	State Total Fish	Red Hake %	Silver Hake %
ME, NH, NJ	1996	$83,579	$2,891,282	$553,053,627	0.02%	0.52%
	1997	114,346	2,001,919	578,689,931	0.02	0.35
	1998	118,869	1,059,039	568,180,403	0.02	0.19
	1999	116,141	666,413	625,570,725	0.02	0.11
	2000	162,950	634,001	657,039,015	0.02	0.10
	2001	123,379	723,669	579,729,866	0.02	0.12
	2002	72,796	664,077	582,620,901	0.01	0.11
	2003	21,062	232,211	588,608,956	0.00	0.04
	2004	30,242	208,576	712,881,191	0.00	0.03
	2005	40,731	249,314	733,522,509	0.01	0.03
	2006	30,620	209,161	616,346,979	0.00	0.03
	2007	68,611	720,453	631,959,574	0.01	0.11
	2008	48,714	539,200	960,811,301	0.01	0.06
	2009	77,813	801,619	559,233,930	0.01	0.14
	2010	76,936	463,688	718,530,582	0.01	0.06
	2011	61,285	682,858	729,203,935	0.01	0.09
	2012	118,760	753,037	787,305,310	0.02	0.10
	2013	49,492	466,987	645,395,862	0.01	0.07
	2014	48,269	686,408	784,781,525	0.01	0.09
	2015	60,977	409,205	839,025,432	0.01	0.05
	2016	33,687	367,246	953,902,085	0.00	0.04
MA	1996	$292,604	$ 1,423,336	$ 354,813,675	0.08%	0.40%
	1997	220,609	1,707,444	335,870,277	0.07	0.51
	1998	137,076	1,945,140	303,207,370	0.05	0.64
	1999	193,229	3,765,538	375,168,871	0.05	1.00
	2000	152,541	3,116,006	406,058,498	0.04	0.77
	2001	162,557	3,672,638	380,555,635	0.04	0.97
	2002	198,408	2,681,924	396,767,537	0.05	0.68
	2003	205,703	3,556,839	382,826,051	0.05	0.93
	2004	181,376	3,226,553	412,397,917	0.04	0.78
	2005	110,865	2,619,618	525,180,701	0.02	0.50
	2006	141,573	2,370,783	521,560,874	0.03	0.45
	2007	102,029	2,771,533	495,378,984	0.02	0.56
	2008	37,486	1,817,248	456,842,430	0.01	0.40
	2009	95,994	2,947,858	454,895,884	0.02	0.65
	2010	106,418	4,655,476	524,253,644	0.02	0.89
	2011	217,700	5,350,126	608,540,187	0.04	0.88
	2012	154,805	4,720,973	641,075,482	0.02	0.74
	2013	177,458	3,977,374	577,994,011	0.03	0.69
	2014	96,261	5,950,126	532,276,472	0.02	1.12

State	Year	Real Revenue$ (in 2016 $)			Percent of State Total	
		Red Hake	Silver Hake	State Total Fish	Red Hake %	Silver Hake %
	2015	80,641	6,641,748	531,934,004	0.02	1.25
	2016	93,606	5,789,679	551,682,865	0.02	1.05
CT	1996	$116,635	$2,972,749	$74,062,957	0.16%	4.01%
	1997	143,908	2,601,921	49,469,812	0.29	5.26
	1998	101,002	2,203,375	50,673,560	0.20	4.35
	1999	124,807	5,333,610	55,735,732	0.22	9.57
	2000	152,852	4,112,245	43,869,735	0.35	9.37
	2001	127,800	3,034,987	42,315,180	0.30	7.17
	2002	173,493	1,556,305	37,060,444	0.47	4.20
	2003	181,440	1,904,723	38,903,959	0.47	4.90
	2004	244,601	2,576,816	42,453,554	0.58	6.07
	2005	257,722	2,682,740	46,170,692	0.56	5.81
	2006	123,251	1,803,293	43,920,616	0.28	4.11
	2007	115,390	1,337,347	113,831,627	0.10	1.17
	2008	143,281	1,631,360	19,849,400	0.72	8.22
	2009	149,402	1,185,177	18,101,243	0.83	6.55
	2010	83,487	1,475,543	17,621,509	0.47	8.37
	2011	93,776	1,775,359	21,489,480	0.44	8.26
	2012	93,483	1,458,559	22,314,891	0.42	6.54
	2013	119,859	1,384,493	15,772,953	0.76	8.78
	2014	105,623	1,608,181	14,777,207	0.71	10.88
	2015	113,212	1,178,550	15,885,776	0.71	7.42
	2016	108,280	916,271	17,552,807	0.62	5.22
RI	1996	$290,002	$4,925,297	$107,737,784	0.27%	4.57%
	1997	351,074	6,705,025	116,771,745	0.30	5.74
	1998	322,893	5,134,234	106,001,668	0.30	4.84
	1999	409,229	5,009,342	123,953,123	0.33	4.04
	2000	374,198	5,072,685	112,847,004	0.33	4.50
	2001	356,784	4,888,249	93,044,759	0.38	5.25
	2002	217,938	2,271,329	86,341,056	0.25	2.63
	2003	199,315	2,656,768	86,204,277	0.23	3.08
	2004	133,489	2,335,531	90,365,851	0.15	2.58
	2005	123,411	2,277,910	112,524,612	0.11	2.02
	2006	172,630	2,021,788	116,499,501	0.15	1.74
	2007	131,258	2,485,517	89,120,387	0.15	2.79
	2008	170,525	2,057,383	94,725,109	0.18	2.17
	2009	105,341	1,734,468	73,005,442	0.14	2.38
	2010	155,479	2,149,914	66,480,286	0.23	3.23
	2011	153,475	1,539,593	87,788,026	0.17	1.75
	2012	145,889	1,502,363	92,577,343	0.16	1.62
	2013	125,140	1,172,182	89,087,625	0.14	1.32
	2014	201,379	1,401,353	87,571,112	0.23	1.60
	2015	167,116	1,035,256	83,079,048	0.20	1.25

State	Year	Real Revenue$ (in 2016 $)			Percent of State Total	
		Red Hake	Silver Hake	State Total Fish	Red Hake %	Silver Hake %
	2016	138,747	2,066,775	93,869,978	0.15	2.20
NY	1996	$ 290,356	$8,533,867	$132,577,474	0.22%	6.44%
	1997	347,708	9,476,900	134,007,315	0.26	7.07
	1998	447,511	9,261,065	120,519,848	0.37	7.68
	1999	490,463	6,714,212	107,883,701	0.45	6.22
	2000	449,489	3,610,342	85,190,382	0.53	4.24
	2001	455,536	5,716,788	74,634,612	0.61	7.66
	2002	251,495	2,838,853	68,392,698	0.37	4.15
	2003	155,935	3,985,483	67,310,567	0.23	5.92
	2004	142,469	4,374,076	58,898,394	0.24	7.43
	2005	92,543	3,048,590	69,332,543	0.13	4.40
	2006	33,214	2,209,247	68,798,442	0.05	3.21
	2007	90,815	2,631,610	178,768,749	0.05	1.47
	2008	91,741	2,902,670	163,776,138	0.06	1.77
	2009	88,098	2,813,426	92,720,876	0.10	3.03
	2010	141,561	3,377,231	54,741,356	0.26	6.17
	2011	134,017	2,380,544	73,728,506	0.18	3.23
	2012	501,343	2,350,640	981,627,657	0.05	0.24
	2013	122,804	1,981,182	273,397,523	0.04	0.72
	2014	118,963	1,953,728	111,758,203	0.11	1.75
	2015	84,951	1,386,133	1,021,745,226	0.01	0.14
	2016	142,356	1,522,726	171,153,810	0.08	0.89

Point Judith (RI) led all other ports in New England and the Mid-Atlantic in silver hake landings (cumulative) during 1996-2016 (Table 38). It ranked number one port for silver hake landing in 1996, but drops to the second in 2016. New Bedford (MA) has risen to number one port for silver hake landings in 2016. It also ranked 2nd for cumulative silver hake landings during 1996-2016. Gloucester (MA) ranked 3rd for silver hake landing in 2016 against 7th in 1996. New London (CT) was the second highest silver hake landings port in 1996, but it dropped to 5th rank in 2016. Hampton Bays (NY) used to be 3rd highest silver hake landing port in 1996, but the landings have significantly dropped over the recent past decade. Montauk (NY) had 6th in position in 1996 and it has risen to 4th in 2016. Portland (ME) was 5th in terms of silver hake landings in 1996, but now lands very nominal amount of silver hake. Over the past two decades, many ports declined significantly or had roller coaster landings of silver hake, but only few ports have risen such as New Bedford (MA).

Table 38. Silver hake landings (in metric tons) for major ports in a state and their rankings in 1996 and 2016.

State	CT		MA				ME	NH	NJ			NY						RI	
Port	New London	Stonington	New Bedford	Gloucester	Provincetown	Boston	Portland	Seabrook	Point Pleasant	Belford	Cape May	Montauk	Hampton Bays	Greenport	Freeport	New York City	Point Lookout	Point Judith	Newport
1996		N/A	53	862	265		1436				62	943	2310	2274	223	N/A	N/A	4010	
1997			10	805	424		561		617		144	1653	1721	1792	269	N/A	N/A	4913	
1998			28	836		0.28	75		418		75	1703	2232	2263	231	N/A	N/A	4417	237
1999			78	1004	759		63		239		24	1266	1187	1602	280		N/A	4172	163
2000			486	1081	633	0.58		89	223		8.86	1060	696	167	128	N/A	N/A	4296	381
2001			1182	619	711		13		297		33	2343	908	14	80	N/A		3609	577
2002			1196	489	564				289		7.46	1165	455	12	144	N/A		2149	156
2003			2417	232	71				32		1.98	1424	495	25	82	N/A	N/A	2372	249
2004			2536	227	22				57		5.14	1522	464		13	332.33	4.82	1724	
2005			2267	453					94		1.62	1216	200		N/A	26.68	49.39	1814	
2006			1875	126	N/A				45		4.69	736	212				94.74	1486	51
2007	254		1475	320	20		0.16		224		1.59	934	268	4.86			113.97	1937	49
2008	401	110	1142	123	134				162		10	1487	180	10			105.51	1418	
2009	321		1872	313	217				358		21	1590	189				52.96	1634	
2010	300	361	2542	293	240				181		6.80	1549	179	1.34			174.41	1530	
2011	315	276	2980	442	264	49			194		14	980	163				210.57	1163	
2012	513		2656	602	29				191		3.37	1044	111	N/A	N/A	N/A	99.07	1109	
2013	610	113	2456	444	41				104			1032	36		N/A	N/A	12.91	1093	2.84
2014			3120	687					153	152		919	86		N/A		14.60	1003	
2015	536		3000	863	142				57			614	43		N/A		13.87	752	0.35
2016	333	36	1719	1352					17	13	1.12	538	16	N/A	N/A			1665	
1996-2016	20286	6941	35093	12173	4943	492	2291	2020		2250	438	25717	12150	8201	1453	1271	956	48266	2687
Rank 1996	2			7	9		5		8			6	3	4	10			1	10
Rank 2016	5	10	1	3	8	9		7				4				6		2	
Rank 96-16	4	8	2	5	9				10			3	6	7				1	

Source: NMFS Dealer data

Note: Reporting by less than three dealers are masked in black for data confidentiality requirement.

6.0 ENVIRONMENTAL CONSEQUENCES (EIS)

6.1 Introduction and Methods; Analytic Approach and Limitations

6.1.1 Valued Ecosystem Components

To evaluate the estimated effects (direct, indirect, and cumulative) of the alternatives on the individual elements of the environment, expected changes in the fishery were evaluated with respect to:

- Biological impacts on the target species (red, silver, and offshore hakes)

  The amendment focuses on the small-mesh multispecies fishery, which uses trawl gears to fish seasonally in exemption areas. Most non-target fishing will not be affected by this amendment, because of a proposed 2,000 lbs. whiting and 400 lbs. red hake incidental limit.

- Biological impacts of the directed fishery on non-target species

  This analysis focuses only on fish bycatch while fishing with small-mesh trawls for small-mesh multispecies. It does not include fisheries using large-mesh trawls, other gears, or small-mesh trawls that target other species (e.g. squids and herring). These fisheries are not directly affected by the proposed alternatives, although some of them may absorb some fishing effort by non-qualifying small-mesh multispecies limited access permits (Category I or II). We discuss indirect effects by effort shifts, but predicting any quantitative effects is beyond our capability.

- Biological impacts on protected species

  The same considerations and approach as used for non-target species are applied here.

- Impacts on physical habitat and EFH

  Effects of alternatives on the magnitude and distribution of fishing effort by gear type, and thus on physical habitat and EFH, are qualitatively evaluated.

- Impacts on human communities

  Effects of possession limit alternatives on landings and revenue by qualifying vessels as well as impacts by vessels not qualifying for a Category I or II limited access permit are estimated. Effects on top ports as well as ports with a substantial reliance on the small-mesh multispecies fishery are estimated.

6.1.2 Methods and Evaluation Criteria

Evaluation of effects

In most cases, the evaluation of limited access alternatives focuses on balancing fleet capacity with sustainable yield from the target species. Evaluation of economic efficiency and capacity of qualifying vessels is of paramount concern. During an evaluation of limited access alternatives for the Pacific groundfish fishery, Huppart (1987) identified the following objectives and found that "No single system of regulation could address all 9 of these objectives simultaneously and with equal success. A limited access system must be tailored to the specific objectives sought.":

1. Promote economic efficiency in harvesting
2. Establish stable and secure tenure to the fishery for licensed fishermen
3. Enhance the value of fishery products delivered to consumers
4. Increase and stabilize profitability of fishing fleet
5. Reduce the burden of management regulations on the industry
6. Reduce the cost of fisheries management born by public
7. Secure an equitable distribution of benefits from the fishery
8. Protect various segments of the fishing industry from other fishermen and non-commercial interests
9. Help restrain fishing effort and conserve fish stock

The purpose and need of this amendment, however, differs from that usually associated with limited access. The primary target species of the small-mesh multispecies fishery is silver hake. Red and offshore hakes are targeted only occasionally. ACLs for northern silver hake and southern whiting have been and are likely to continue to be much higher than catches have been (see figure below). Thus, from this perspective, there is room for additional fishing capacity in the small-mesh multispecies fishery.

Figure 50. Annual specifications and estimated catches for silver hake.

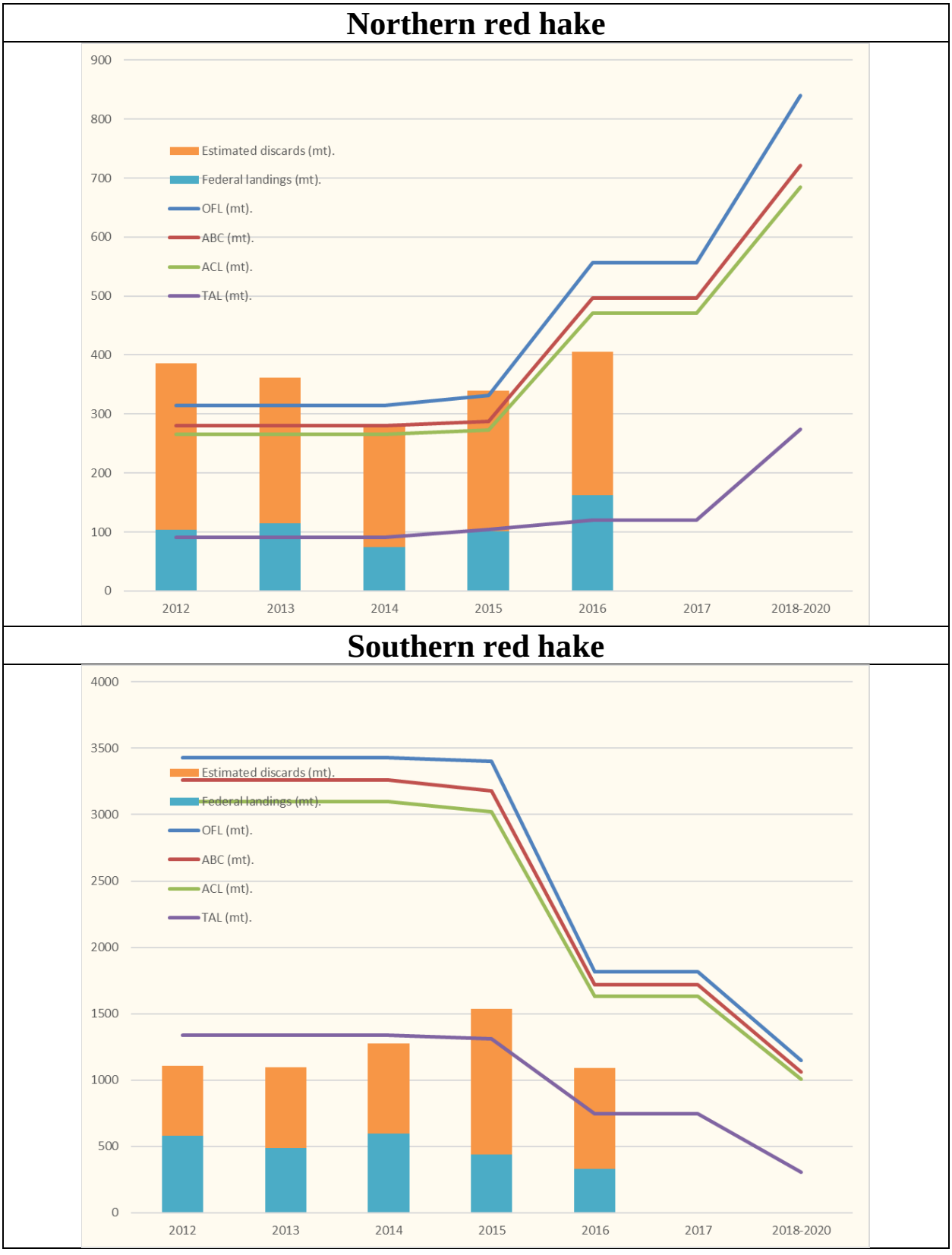
Instead, the primary focus of this amendment is on managing catches of non-target species, such as red hake, yellowtail flounder, and potentially haddock. Most catch of these species are discarded, either due to regulation (landings by the small-mesh multispecies fishery are strictly limited by species) or due to poor market demand for red hake. Current measures to manage non-target catch focus on seasonal restrictions (i.e. small-mesh exemption areas) and possession limits. While possession limits may influence whether the species, in this case red hake, are targeted or avoided, they have limited effect on bycatch. There is a sub-ACL for yellowtail flounder (primarily caught on Georges Bank by the small-mesh multispecies fishery) which triggers a requirement to use more selective gear.

Table ??? of annual yellowtail flounder ACL and estimated catches from groundfish monitoring

Fishermen in the small-mesh fishery are concerned that excessive catches of these "choke" species could trigger more restrictive measures which would curtail access to whiting, limiting revenue and profitability of existing vessels in the fishery. New vessels entering the fishery would make existing measures to manage catch less effective and more restrictive measures more likely.

Catches of non-target species are however closer to their current and probably future biological limits. Catches of northern red hake have exceeded the ACL and overfishing has occurred for several years since 2012, triggering both in-season and post-season accountability measures (see figure below). Catches of southern red hake have been well below the annual ACLs, but biomass has been declining and the recommended 2018-2020 specifications are less than the 2016 estimated catch. Thus it is likely that at least in-season AMs will be triggered beginning in 2018 unless commercial catch also declines.

Figure 51. Annual specifications and estimated catches for red hake.



Because the primary concern is managing the fleet to control catches of choke species, the main benefit of limited access will be for regulatory and economic efficiency. With a fixed fleet size, more restrictive regulations will not be mitigated by new vessels targeting small-mesh multispecies and the economic efficiency of the current fleet will not be diluted. On the other hand, it would reduce the opportunity for additional vessels to enter or re-enter (in the case of a vessel that fished for small-mesh multispecies before the qualification period) to fish.

Out of the potential limited access objectives listed above, #2, #4, #5, #6, and especially #8 are most relevant to the purpose and need.

In other words, the major benefit of a small-mesh multispecies fishery limited access program is therefore regulatory and economic efficiency, balanced against potential opportunity to increase fishing for whiting. There is no evidence that qualifying vessels that fished for small-mesh multispecies in 2014-2016 cannot increase whiting fishing by themselves if there is sufficient market demand and opportunity. Choice of one of the Action 1 alternatives pivots on consideration of equitable access vs. the amount of latent fishing effort to allow.

Evaluation of qualification status

Potential qualification for a Category I and II limited access permit (See Action 1) was determined by compiling the landings history for each vessel that landed one or more pounds of whiting or red hake during calendar years 1996-2016. Some Action 1 alternatives use a qualification period that ends with the November 28, 2012 ??? control date, but for simplification of the analysis the qualification period was rounded to December 31, 2012. The highest total landings of whiting and red hake for a qualification period were considered to be the 'best' source of data to qualify a vessel from the three sources listed below.

Table 39. Source data used to evaluate limited access qualification and data qualities.

Source	Attribute
Dealer/SAFIS (1996-2016)	• Considered most complete, but lack sales for bait • Price data are available • Landings are often split between dealers and mixed between trips • Area fished is not reported
Vessel trip reports (VTR) (1996-2016)	• Trips are identifiable • Includes landings sold over the rail for bait • Fishing area reported by statistical area • No price data
Data Matching Imputation System (DMIS) (2007-2015)	• Statistical combination of the above two sources • Includes price • Estimates or assigns area fished to all landings data • Landings are often split between dealers and mixed between trips • Includes over the side sales for bait

Also, for vessels that had another limited access permit and had been assigned a Moratorium Right ID (MRI) by NMFS, we assumed that the history stayed with the vessel upon sale or transfer, throughout the qualification period. Thus, in our analysis a vessel could qualify based on only one series of MRI-associated landings data. In some cases, this process omitted prior history if an MRI was applied to a vessel that had previous small-mesh multispecies fishery history.

During the automatic qualification and appeal process, NMFS may use only one source of data for automatic qualification and vessels may have made different arrangements for a vessel's history in their sale and transfer documents. Vessel owners are expected to be able to bring in additional documentation during an appeals period to justify their qualification.

As a result, in some cases, our analysis overestimates the number of automatically qualifying vessels (assuming that NMFS uses only dealer data for this purpose) and underestimates the number of vessels that may eventually qualify after the appeal process. Overall, we believe that the process to determine probable qualifiers was the most accurate and fair possible.

Fishing activity baseline

The baseline for evaluating effects of alternatives on the fishery was 2014-2016, a relatively stable period that included in-season accountability measures for northern red hake. Three years of data were used to smooth out some inter-annual variation.

Regardless of the alternative and qualification period, the effects of the alternatives were evaluated using ALL 2014-2016 landings data reported, usually on Vessel Trip Reports (VTR). Because dealer data for this fishery often contain split and partial trips, we feel that the VTR data was the most appropriate source. VTR data can also be accurately used to evaluate whether a trip exceeded the proposed incidental permit possession limits, 2,000 lbs. of whiting and 400 lbs. of red hake. None of the alternatives will directly affect fishing activity on trips that land less than these amounts, which are insufficient to target small-mesh multispecies.

VTR data do not however include price information. To fill this information gap, VTR landings were first associated with the dealer reported prices for trips with matching VTR serial and permit numbers. For trips that did not match dealer-reported landing data, dealer prices were associated with the VTR data by year, month, gear, and species/market category. If there was no match at this level, dealer prices were associated by year, month, and species/market category. This procedure was applied to landings of ALL species, not just whiting and red hake, and allowed for pricing of 99.8% of VTR-reported landings data.

Qualification effects (Action 1)

The effects of qualification on the 2014-2016 small-mesh multispecies fishery were estimated based on the qualification status of each vessel under each alternative. Trips by vessels that were expected to qualify for a Category I or II permit were expected to be unaffected, but no increases in fishing effort by qualifying vessels were estimated or projected. On the other hand, trips that exceeded the proposed incidental possession limit by non-qualifying vessels using small-mesh trawls were expected to not occur. Trips using other gears or targeting herrings or squids were expected to continue, discarding the excess whiting and red hake if the vessel did not qualify. Very few trips that were not targeting small-mesh multispecies exceeded the proposed incidental possession limits (Action 2).

Latent effort (Action 1)

Latent effort is generally considered to be associated with vessels having a permit and potential to increase fishing trips for the target species. With the qualification alternatives in Action 1, only vessels that had no 2014-2016 trips landings over 2,000 lbs. of whiting or 400 lbs. of red hake were considered to be latent effort in the fishery. It should be recognized however that vessels with trips not exceeding these amounts could increase fishing effort to target small-mesh multispecies, either by taking longer or more trips. This would be another form of latent effort, but it is beyond the scope of analysis to estimate this additional form of latent effort.

Presently, there are ??? vessels with a Category K groundfish permit, which allows them to target and/or land small-mesh multispecies. Although these permits were issued, only ??? vessels had one or more trips with over 2,000 lbs. of whiting or 400 lbs. of red hake and ??? vessels landed at least one pound of small-mesh multispecies during 2014-2016. Under No Action, any vessel with a Category K permit can either begin targeting small-mesh multispecies or increase fishing effort targeting small-mesh multispecies. Moreover, the existing Category K permit is open access and anyone with a commercial fishing boat may obtain one.

Possession limit effects (Action 2)

The number of trips, as well as landings and revenue from fish that exceed 2,000 lbs. (on non-qualifying vessels), 15,000 and 30,000 lbs. per trip were summarized to evaluate the effects of reducing possession limits. These data were evaluated by management area (N vs. S), because they could be applied differentially by area. For those alternatives that would reduce the whiting possession limit, it was assumed that the excess landings would not occur and the trip would be shorter. No attempt was made to estimate mitigating changes in fishing behavior (e.g. taking more trips). In addition, quantification of increasing the whiting possession limit to 50,000 is an out-of-data problem, because the possession limit has not been above 40,000 lbs. for over 20 years.

Permit allowance effects (Action 3)

Most of the alternatives in this action are administrative and would not affect the prosecution of the fishery. There may however be some administrative cost differentials between the alternatives, particularly when a vessel has permits with conflicting conditions and allowances. The vessel may be able to upgrade in one fishery, but not the other, for example. The analysis in this document evaluates and discusses these potential costs, but cannot quantify them due to insufficient information (about opportunity costs of upgrading a vessel or effort consolidation, for example).

Analytical limitations

It is very difficult to project future changes in fishing behavior. None were quantified, but qualitative evaluation was attempted where appropriate. Non-qualifying vessels would be unable to target small-mesh multispecies given the relatively low price for these species and regulatory constraints on fishing. These vessels could take fewer trips than they did in 2014-2016, or shift effort into other fisheries. It is most likely that the non-qualifying vessels would shift into familiar fisheries for which they have permits. We have quantified how much these vessels fish in other fisheries and the permits that they currently hold, but no attempt was made to reasonably forecast how much they would increase their effort in other fisheries. These potential changes have a bearing on the potential impact on non-target and protected species.

Missing landings data could contribute to additional qualifiers, when vessel owners are allowed to submit additional data to support their history in the fishery and qualification claim.

6.1.3 Constraints on fishing by market demand and regulation

The current small-mesh multispecies fishery lands a small fraction of the annual ACL. Landings and fishing effort are relatively constrained by regulation, primarily to minimize the fishery's impact on large-mesh groundfish species which are themselves under conservative management of the groundfish fleet. The small-mesh multispecies fishery is restricted to fishing in exemption areas during specific seasons, when data have shown that interactions with large-mesh groundfish are acceptably low. This situation is not expected to change anytime in the near future, although there has been a limited experiential fishery to open some areas early in response to gradually warming water temperatures and changing fish distributions.

Furthermore, the domestic market for whiting and red hake is limited, mostly due to relatively low demand (particularly for high volume landings) and short shelf-life. Fishermen report short-term effects on price when large quantities of whiting are landed in a short period, although previous analysis has been unable to detect this effect. Some fishermen have been reluctant to raise possession limits for this reason.

To land large quantities of whiting, a fisherman usually needs to have some sort of working relationship with dealers, both locally and in NY's Fulton Fish Market. Often dealers will indicate that they could use a quantity of whiting and a fisherman will make a trip, landing 10s of thousands of pounds of fish. If the fish from a new source reach the market at the wrong time, it often results in an unfavorable price, or the fish may even be refused.

Fishing is also specialized and requires fishermen to know where and especially when to set nets. Sufficient quantities of whiting are often localized in time and space.

Thus, it is not easy for a new vessel to successfully enter the fishery without the market connections and fishing knowledge. New fishermen can also be less knowledgeable about where and when to fish to avoid catching something else as bycatch, a key concern of existing fishermen in the small-mesh multispecies fishery. The bycatch analysis (Appendix ???) did not reliably detect, however, statistical differences in the catch rates of qualifying and non-qualifying vessels, but this may be due to the relatively low number of observed hauls on the few number of non-qualifying vessels. Most differences in catch rates arose from differences between Category I and II vessels.

6.1.4 Qualification and 2014-2016 fishing overview

Much of the analysis of impacts in this section is reliant on our assessment of the vessels that are expected to qualify under one of the five Action 1 alternatives. Rather than repeat this information in the sub-sections for each VEC, the results of the qualification analysis are presented here.

For all the alternatives, potential qualification was determined by whether a vessel's reported landings were above each alternative's Category I or II thresholds, using the source of data with the highest landings. History was tracked by the assigned Moratorium Right ID (MRI) for vessels holding a limited access permit for the NE region that were sold or transferred. The history of a vessel was applied to qualify only one vessel. This analysis indicated that 20 (Alternative 2) to 84 (Alternative 5) vessels would qualify for a Category I permit, while 74 (Alternative 1) to 203 (Alternative 2) vessels would qualify for a Category II permit (Table 43). While there is a core set of vessels that would qualify for Category I or II (i.e. their history exceeds the highest threshold, considering amount and qualification period), vessels that qualify for Category I in one alternative may be in Category II in another, and vice versa.

From the total of 344 qualifiers for ANY alternative, there were 188 vessels that made no trips with landings more than 2,000 lbs. of whiting or 400 lbs. of red hake during 2014-2016 (Table 40). Of these vessels, there were 148 that qualified for a Category II permit, but no Category I permit, plus 14 that qualified for a Category I permit, but no Category II permits. One vessel qualified for a Category I permit and 11 vessels qualified for a Category II permit in all five alternatives. Some of these vessels may be active in another fishery, associated with a confirmation of history permit, or retired.

Table 40. Cross tabulation of the number of alternatives that vessels would qualify for Category I and II permits. These vessels made no trips with more than 2,000 lbs. of whiting landings on any trip during 2014-2016.

	Category II						
Category I	0	1	2	3	4	5	Total
0		87	38	10	2	11	148
1	11	11	1		2		25
2	2	3		7			12
3			1				1
4		1					1
5	1						1
Total	14	102	40	17	4	11	188

From the total of 344 qualifiers for ANY alternative, there were 156 vessels that made one or more trips with landings more than 2,000 lbs. of whiting or 400 lbs. of red hake during 2014-2016 (Table 41). Of these vessels, there were 98 that qualified for a Category II permit, but no Category I permit, plus 21 that qualified for a Category I permit, but no Category II permits. Nineteen vessels qualified for a Category I permit and 26 vessels qualified for a Category II permit in all five alternatives. These vessels qualify for each Category across ALL action alternatives. Thus there are 111 vessels that fished for whiting during 2014-2016 whose qualification status would be different under the five alternatives.

Table 41. Cross tabulation of the number of alternatives that vessels would qualify for Category I and II permits. These vessels made one or more trips with more than 2,000 lbs. of whiting landings during 2014-2016.

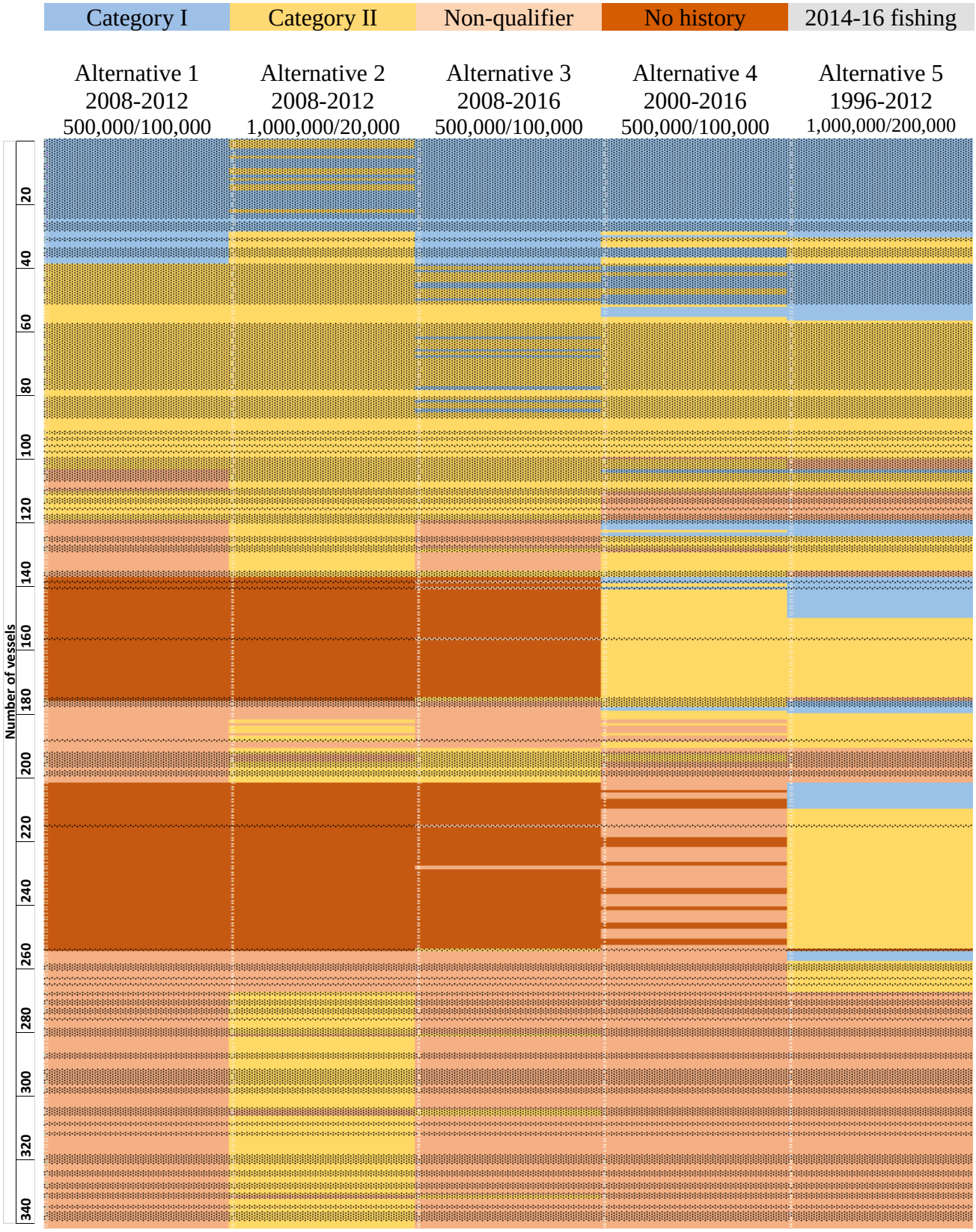
	Category II						
Category I	0	1	2	3	4	5	Total
0		42	10	12	8	26	98
1		2			9		11
2	2	1	1	7			11
3			7				7
4		10					10
5	19						19
Total	21	55	18	19	17	26	156

Figure 52 shows the potential limited access qualification status for all 344 vessels that would qualify for a limited access permit in ANY alternative. Each line represents a unique MRI or permit number and the figure is sorted by the number of alternatives that a vessel qualifies for a limited access permit (ones qualifying for a Category I or II permit in all five alternatives at the top). Category I qualifiers have a baby blue fill, Category II qualifiers have a yellow fill, vessels with whiting landings during the

qualification period that do not exceed the Category II threshold are non-qualifiers have a pink fill, while vessels with no history during an alternative's qualification period have a red fill. Vessels that had one or more trips exceeding 2,000 lbs. of whiting or 400 lbs. of red hake would be affected by the Amendment 22 alternatives and are shaded.

Alternative 2 has the fewest Category I qualifiers (baby blue fill), but the most Category II qualifiers (yellow fill). Category I qualifiers are similar for Alternatives 1, 3, 4, and 5, but Alternatives 4 and particularly 5 qualify more vessels for Category I that were not fishing for whiting during 2014-2016 (unshaded). Some vessels would qualify for a Category II permit in Alternatives 4 and 5, but had no history in the fishery (red fill) during the qualification periods for Alternatives 1 to 3. Many of these vessels were not fishing for whiting during 2014-2016. There are a number of vessels toward the bottom of Figure 52 that fished for whiting in 2014-2016, but only qualify for a Category II permit for Alternative 2.

Figure 52. Qualification by vessel and alternative, coded by color. Each line is a unique MRI or permit number (N=344) and the gray shading represents vessels that had one or more trips landing more than 2,000 lbs. of whiting during 2014-2016.



To determine effects, the 2014-2016 whiting and red hake landings on trips that exceeded the proposed incidental possession limits were summarized. This fishing activity table (Table 42) focuses on the whiting fishery, as the primary target species. The data in represents fishing activity by vessels that had one or more trips landing ≥2,000 lbs. of whiting. There would be additional vessels classified as 'fishing' if the filter also included vessels that also had one or more trips landing ≥400 lbs. of red hake (for comparison see table below).

Table 42. Number of qualifying histories and the number fishing for whiting or whiting & red hake during 2014-2016, by alternative and qualification category.

	Category I			Category II			Non-qualifier	
Alternative	Qualifying histories	2,000 lbs. whiting or 400 lbs. red hake	2,000 lbs. whiting	Qualifying histories	2,000 lbs. whiting or 400 lbs. red hake	2,000 lbs. whiting	2,000 lbs. whiting or 400 lbs. red hake	2,000 lbs. whiting
1	40	33	33	74	44	38	35	26
2	20	19	19	203	83	68	10	10
3	51	44	44	90	53	46	15	7
4	55	42	42	124	44	39	26	17
5	84	43	43	159	36	31	33	23

The most recent three years was chosen to smooth inter-annual effects during a period when possession limits were relatively constant, since ABC management became effective. Only trips landing more than the proposed incidental possession limit were included, because trips having landings of lower amounts would not be affected by any alternative in this amendment.

For vessels that potentially would qualify for a Category I permit, the vessels generated between $23.3 and $25.6 million in revenue from landings of whiting (Table 43). This is equivalent to between $208 thousand (Alternative 3) to $423 thousand (Alternative 2) per vessel per year. These vessels also participate in other fisheries when they are not targeting small-mesh multispecies, but whiting and red hake landings are a significant source of the vessel's revenue, between 25 (Alternatives 4 and 5) and 32 percent (Alternative 2) (Table 44). During 2014-2016, these vessels made between 1,336 (Alternative 2) and 1,752 (Alternative 4) trips landing more than 2,000 lbs. of whiting (Table 43). Out of these trips targeting whiting, between 30 (657/1913 for Alternative 3) and 34 percent (618/1336 for Alternative 2) had landings exceeding 15,000 lbs., while between 7% (270/1913 for Alternative 3) and 8% (270/1336 for Alternative 2) exceeded 30,000 lbs. (Table 44). The latter trips occur in the southern management area, where the possession limit is 40,000 lbs. and the averages were 38,660 lbs. regardless of alternative (in other words the five alternatives qualified the same number of Category I vessels when those vessels landed more than 30,000 lbs. of whiting during 2014-2016).

For vessels that potentially would qualify for a Category II permit, the vessels generated between $1.7 and $4.4 million in revenue from landings of small-mesh multispecies (Table 43). This is equivalent to between $16 thousand (Alternative 3) to $24 thousand (Alternative 1) per vessel per year. Category II vessels do not participate as frequently in the small-mesh multispecies fishery as Category I vessels and on average whiting revenue contribute to a much lower percent of the vessel's annual revenue. Whiting revenue contributes between 6 (Alternative 5) and 9 percent (Alternative 1) (Table 44). During 2014-2016, these vessels made between 2,054 (Alternative 5) and 4,126 (Alternative 2) trips landing more than 2,000 lbs. of whiting (Table 43). Out of these trips targeting whiting, between 1 (Alternative 3) and 2 percent (Alternative 1) had landings exceeding 15,000 lbs., but only two trips by Category II vessels exceeded 30,000 lbs. (Table 44). For vessels fishing in the southern management area, there were between 5 (Alternative 5) and 8 (Alternative 3) trips that exceeded 15,000 lbs. of whiting landings, averaging 30,000 and 25,813 lbs. per trip, respectively.

For vessels that potentially do not qualify for small-mesh multispecies limited access, 4 (Alternative 3) to 26 (Alternative 5) vessels had trips that landed more than 2,000 lbs. of whiting (Table 43). Some vessels had no history during the qualifying period (entering the fishery after the control date) and/or had insufficient landings of small-mesh multispecies to qualify. About 30-71% (Alternatives 3 and 5, respectively) of trips landing more than 2,000 lbs. of whiting and 0-78% (Alternative 4 and Alternatives 1, 2, and 5, respectively) of trips landing more than 15,000 lbs. of whiting occur in the northern management area. About 6-59% (Alternatives 3 and 2, respectively) of whiting landings from trips by non-qualifying vessels landing more than 2,000 lbs. of whiting fished in the northern management area. Red hake trips exceeding 400 lbs. by non-qualifying vessels were 161 (42% from the northern management area, see Table ??? and ???) for Alternative 1, 93 (38%) for Alternative 2, 2 (0%) for Alternative 3, 91 (51%) for Alternative 4, and 138 (56%) for Alternative 5.

During 2014-2016, whiting landings by non-qualifying vessels that exceeded 2,000 lbs. ranged between 10 thousand (Alternative 3) to 927 thousand lbs. (Alternative 5) (landings on trips > 2,000 lbs. less the number of trips X 2,000 in (Table 43). The excess whiting landings for non-qualifying vessels accounted for 15 (Alternative 3) and 60 percent (Alternative 2) of the total whiting landings by non-qualifying vessels.

Table 43. Expected number of qualifiers for a proposed Category I and II permit with 2014-2016 fishing activity for vessels with trips landing more than 2,000 lbs. of whiting. All whiting and red hake landings (> 1 lb.) were considered to determine qualification. Vessels with no history or insufficient landings were grouped as "non-qualifiers". "Whiting lbs. on Trips" includes only whiting landings that exceeded the applicable limit: 2,000; 15,000; or 30,000 lbs. and does not include landings of red hake.

Limited access category	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Category I					
Criteria, lbs.	500,000	1,000,000	500,000	500,000	1,000,000
Qualifying period	2008-2012	2008-2012	2008-2016	2000-2016	1996-2012
Permits	40	20	51	55	84
Vessels fishing (>2000 lbs. whiting)	33	19	44	41	42
Latent effort	7	1	7	14	42
Trip value, all species	$ 93,692,579	$ 73,927,609	$ 103,577,578	$ 103,582,157	$ 100,636,337
Whiting value	$ 24,791,261	$ 23,325,208	$ 26,431,598	$ 25,685,305	$ 25,572,585
Whiting, lbs.	33,196,804	30,934,696	35,688,153	34,347,037	34,141,420
Whiting, lbs. on Trips > 2,000 lbs.	26,744,851	25,717,715	28,458,419	27,539,234	27,460,294
Whiting, lbs. on Trips > 15,000 lbs.	10,488,651	10,483,651	10,732,551	10,617,331	10,617,331
Whiting, lbs. on Trips > 30,000 lbs.	2,339,868	2,339,868	2,339,868	2,339,868	2,339,868
Red hake value	$ 1,001,798	$ 787,398	$ 1,089,689	$ 1,028,693	$ 1,004,925
Red hake, lbs.	2,087,313	1,451,525	2,321,464	2,141,222	2,071,937
Red hake, lbs. on Trips > 400 lbs.	1,107,625	716,255	1,236,436	1,125,406	1,084,276
Red hake, lbs. on Trips > 1,500 lbs	311,185	159,280	356,285	318,285	310,285
Red hake, lbs. on Trips > 3,000 lbs	82,523	34,428	88,323	82,523	81,523
Red hake trips > 400 lbs.	1,149	755	1,278	1,177	1,125
All trips	6,622	3,830	8,330	7,235	6,763
Whiting trips	4,067	2,672	4,891	4,406	4,268
Trips > 2000 lbs. (hake trips)	1,658	1,336	1,913	1,752	1,735
Trips > 15,000 lbs.	619	618	656	640	640
Trips > 30,000 lbs.	270	270	270	270	270
Category II					
Criteria, lbs.	100,000	20,000	100,000	100,000	200,000
Permits	74	69	90	124	159
Vessels fishing (>2000 lbs. whiting)	38	68	46	39	31
Latent effort	36	1	44	85	128
Trip value, all species	$ 29,640,257	57,972,485	30,609,634	28,757,665	26,802,736
Whiting value	$ 2,559,993	4,426,151	2,053,833	2,370,756	1,735,719
Whiting, lbs.	3,944,874	6,857,865	3,129,410	3,717,712	2,948,810
Whiting, lbs. on Trips > 2,000 lbs.	2,336,187	3,555,867	1,463,212	2,045,265	1,544,691
Whiting, lbs. on Trips > 15,000 lbs.	322,900	327,900	134,500	247,220	194,220
Whiting, lbs. on Trips > 30,000 lbs.	20,000	20,000	20,000	20,000	20,000
Red hake value	$ 183,338.00	437,670	173,146	190,530	195,496
Red hake, lbs.	492,132	1,243,094	484,027	544,330	555,925
Red hake, lbs. on Trips > 400 lbs.	244,334	691,028	228,452	280,394	298,634
Red hake, lbs. on Trips > 1,500 lbs	76,375	238,181	50,686	78,476	84,176
Red hake, lbs. on Trips > 3,000 lbs	13,000	61,095	9,660	13,000	14,000
Red hake trips > 400 lbs.	305	767	335	347	352
All trips	4,687	9,054	5,151	4,878	4,627
Whiting trips	2,159	4,126	2,169	2,281	2,054
Trips > 2000 lbs.	454	890	463	488	377
Trips > 15,000 lbs.	43	44	15	30	22
Trips > 30,000 lbs.	Confidential	Confidential	Confidential	Confidential	Confidential
Non-qualifiers					
Permits	2,552	2489	1099	2035	2345
Vessels fishing (>2000 lbs. whiting)	26	10	7	17	24
Trip value, all species	$ 14,088,581	5521323	3234205	5081595	9982344
Whiting value	$ 1,182,831	782726.99	48654.04	478025	1225782.05
Whiting, lbs.	1,743,461	1,092,578	67,576	820,390	1,794,909
Whiting, lbs. on Trips > 2,000 lbs.	850,631	658,087	10,038	347,170	926,684
Whiting, lbs. on Trips > 15K lbs.	55,500	55,500	-	2,500	55,500
Whiting, lbs. on Trips > 30k lbs.	-	-	-	-	-
Red hake value	$ 79,973	$ 40,042	$ 2,274	$ 45,886	$ 64,689
Red hake, lbs.	231,227	116,053	5,181	125,120	182,810
Red hake, lbs. on Trips > 400 lbs.	113,779	58,455	850	59,938	82,828
Red hake, lbs. on Trips > 1,500 lbs	19,411	9,510	-	10,210	12,510
Red hake, lbs. on Trips > 3000 lbs.	2,460	2,460	-	2,460	2,460
Red hake trips > 400 lbs.	161	93	2	91	138
All trips	2,535	960	363	1,731	2,454
Whiting trips	943	371	109	482	847
Trips > 2000 lbs.	274	160	10	146	274
Trips > 15,000 lbs.	9	9	-	1	9
Trips > 30,000 lbs.	-	-	-	-	-

Table 44. Qualification summaries with 2014-2016 fishing activity data presented as a proportion of the total for vessels with trips landing more than 2,000 lbs. of whiting.

Limited access category	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Category I					
Criteria, lbs.	**500,000**	**1,000,000**	**500,000**	**500,000**	**1,000,000**
Qualifying period	**2008-2012**	**2008-2012**	**2008-2016**	**2000-2016**	**1996-2012**
Permits	**40**	**20**	**51**	**55**	**84**
Vessels fishing (>2000 lbs. whiting)	**33**	**19**	**44**	**41**	**42**
Latent effort	**7**	**1**	**7**	**14**	**42**
Trip value, all species	$93,692,579	$73,927,609	$103,577,578	$103,582,157	$100,636,337
Whiting value	26%	32%	26%	25%	25%
Whiting, lbs.	33,196,804	30,934,696	35,688,153	34,347,037	34,141,420
Whiting, lbs. on Trips > 2,000 lbs.	81%	83%	80%	80%	80%
Whiting, lbs. on Trips > 15,000 lbs.	32%	34%	30%	31%	31%
Whiting, lbs. on Trips > 30,000 lbs.					
Red hake value	$1,001,798	$787,398	$1,089,689	$1,028,693	$1,004,925
Red hake, lbs.	2,087,313	1,451,525	2,321,464	2,141,222	2,071,937
Red hake, lbs. on Trips > 400 lbs.	53%	49%	53%	53%	52%
Red hake, lbs. on Trips > 1,500 lbs.	15%	11%	15%	15%	15%
Red hake, lbs. on Trips > 3,000 lbs.	4%	2%	4%	4%	4%
Red hake trips > 400 lbs.	1,149	755	1,278	1,177	1,125
All trips	6,622	3,830	8,330	7,235	6,763
Whiting trips	61%	70%	59%	61%	63%
Trips > 2000 lbs. (hake trips)	41%	50%	39%	40%	41%
Trips > 15,000 lbs.	15%	23%	13%	15%	15%
Trips > 30,000 lbs.	7%	10%	6%	6%	6%
Category II					
Criteria, lbs.	**100,000**	**20,000**	**100,000**	**100,000**	**200,000**
Permits	**74**	**69**	**90**	**124**	**159**
Vessels fishing (>2000 lbs. whiting)	**38**	**68**	**46**	**39**	**31**
Latent effort	**36**	**1**	**44**	**85**	**128**
Trip value, all species	$29,640,257	$57,972,485	$30,609,634	$28,757,665	$26,802,736
Whiting value	9%	8%	7%	8%	6%
Whiting, lbs.	3,944,874	6,857,865	3,129,410	3,717,712	2,948,810
Whiting, lbs. on Trips > 2,000 lbs.	59%	52%	47%	55%	52%
Whiting, lbs. on Trips > 15,000 lbs.	8%	5%	4%	7%	7%
Whiting, lbs. on Trips > 30,000 lbs.					
Red hake value	$183,338	$437,670	$173,146	$190,530	$195,496
Red hake, lbs.	492,132	1,243,094	484,027	544,330	555,925
Red hake, lbs. on Trips > 400 lbs.	50%	56%	47%	52%	54%
Red hake, lbs. on Trips > 1,500 lbs.	16%	19%	10%	14%	15%
Red hake, lbs. on Trips > 3,000 lbs.	3%	5%	2%	2%	3%
Red hake trips > 400 lbs.	305	767	335	347	352
All trips	4,687	9,054	5,151	4,878	4,627
Whiting trips	46%	46%	42%	47%	44%
Trips > 2000 lbs.	21%	22%	21%	21%	18%
Trips > 15,000 lbs.	2%	1%	1%	1%	1%
Trips > 30,000 lbs.					
Non-qualifiers					
Permits	**$2,552**	**$2,489**	**$1,099**	**$2,035**	**$2,345**
Vessels fishing (>2000 lbs. whiting)	**26**	**10**	**7**	**17**	**24**
Trip value, all species	$14,088,581	$5,521,323	$3,234,205	$5,081,595	$9,982,344
Whiting value	8%	14%	2%	9%	12%
Whiting, lbs.	1,743,461	1,092,578	67,576	820,390	1,794,909
Whiting, lbs. on Trips > 2,000 lbs.	49%	60%	15%	42%	52%
Whiting, lbs. on Trips > 15K lbs.	3%	5%	0%	0%	3%
Whiting, lbs. on Trips > 30k lbs.					
Red hake value	$79,973	$40,042	$2,274	$45,886	$64,689
Red hake, lbs.	231,227	116,053	5,181	125,120	182,810
Red hake, lbs. on Trips > 400 lbs.	49%	50%	16%	48%	45%
Red hake, lbs. on Trips > 1,500 lbs.	8%	8%	0%	8%	7%
Red hake, lbs. on Trips > 3000 lbs.	1%	2%	0%	2%	1%
Red hake trips > 400 lbs.	161	93	2	91	138
All trips	2,535	960	363	1,731	2,454
Whiting trips	37%	39%	30%	28%	35%
Trips > 2000 lbs.	29%	43%	9%	30%	32%
Trips > 15,000 lbs.	1%	2%	0%	0%	1%
Trips > 30,000 lbs.					

Table 45 to Table 48 summarize the 2014-2016 fishing activity by qualification category for the northern and southern areas, respectively. In general, the Category I and II vessels fishing in the northern area rely more heavily on landings of small-mesh multispecies than do qualifying vessels fishing in the southern area.

More Category I vessels fish for small-mesh multispecies in the southern area, regardless of the alternative. The percent of active Category I vessels fishing in the northern area ranges from 27 to 42%, with Alternatives 2 and 3 being the highest. In the southern area, the proportion of Category I vessels ranges from 94-98%, with Alternative 4 being the highest proportion of total active Category I vessels.

The higher proportion of Category II qualifiers also fish in the southern area. The proportion of active Category II vessels fishing in the northern area ranges from 5-46%, with Alternative 4 having the highest proportion. The proportion of Category II qualifiers in the southern area ranges from 77-87%, with Alternative 2 having the highest number of Category II qualifiers and the highest proportion fishing in the southern area.

Table 45. Expected number of qualifiers for a proposed Category I and II permit with 2014-2016 fishing activity for **NORTHERN AREA** vessels with trips landing more than 2,000 lbs. of whiting. All whiting and red hake landings (> 1 lb.) were considered to determine qualification. Vessels with no history or insufficient landings were grouped as "non-qualifiers". "Whiting lbs. on Trips" includes only whiting landings that exceeded the applicable limit: 2,000; 15,000; or 30,000 lbs. and does not include landings of red hake.

Limited access category	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Category I					
Criteria, lbs.	**500,000**	**1,000,000**	**500,000**	**500,000**	**1,000,000**
Qualifying period	**2008-2012**	**2008-2012**	**2008-2016**	**2000-2016**	**1996-2012**
Permits	**40**	**20**	**51**	**55**	**84**
Vessels fishing (>2000 lbs. whiting)	**9**	**8**	**16**	**12**	**13**
Latent effort	NA	NA	NA	NA	NA
Trip value, all species	$ 14,044,030	$ 13,487,819	$ 16,780,533	$ 15,262,396	$ 16,072,211
Whiting value	$ 7,807,137	$ 7,684,849	$ 9,129,519	$ 8,399,117	$ 8,409,963
Whiting, lbs.	10,935,537	10,598,992	12,945,718	11,624,319	11,637,625
Whiting, lbs. on Trips > 2,000 lbs.	9,376,715	9,171,985	10,922,931	9,992,469	9,995,684
Whiting, lbs. on Trips > 15,000 lbs.	3,168,745	3,168,745	3,412,645	3,293,425	3,293,425
Whiting, lbs. on Trips > 30,000 lbs.	Confidential	19,000	19,000	19,000	19,000
Red hake value	$ 171,066	$ 160,277	$ 205,863	$ 171,633	$ 171,633
Red hake, lbs.	399,358	350,153	474,373	384,858	384,858
Red hake, lbs. on Trips > 400 lbs.	183,965	153,185	221,605	175,385	175,385
Red hake, lbs. on Trips > 1,500 lbs	29,800	24,100	42,500	32,900	32,900
Red hake, lbs. on Trips > 3,000 lbs	1,000	1,000	1,000	1,000	1,000
Red hake trips > 400 lbs.	195	160	227	173	173
All trips	1,064	836	1,484	996	1,030
Whiting trips	880	786	1,119	897	918
Trips > 2000 lbs. (hake trips)	517	460	697	539	540
Trips > 15,000 lbs.	232	232	269	252	252
Trips > 30,000 lbs.	Confidential	Confidential	Confidential	Confidential	Confidential
Category II					
Criteria, lbs.	**100,000**	**20,000**	**100,000**	**100,000**	**200,000**
Permits					
Vessels fishing (>2000 lbs. whiting)	**16**	**24**	**19**	**18**	**12**
Latent effort	NA	NA	NA	NA	NA
Trip value, all species	$ 3,935,622	5,716,819	4,403,859	5,985,967	3,024,196
Whiting value	$ 1,594,025	1,841,688	953,394	1,458,012	801,727
Whiting, lbs.	2,400,216	2,990,324	1,402,085	2,261,815	1,457,553
Whiting, lbs. on Trips > 2,000 lbs.	1,706,695	2,004,650	751,216	1,464,721	966,432
Whiting, lbs. on Trips > 15,000 lbs.	243,900	243,900	48,000	167,220	119,220
Whiting, lbs. on Trips > 30,000 lbs.	-	-	-	-	-
Red hake value	$ 44,247.61	65,753	34,629	48,704	41,079
Red hake, lbs.	97,576	201,296	121,661	143,661	124,711
Red hake, lbs. on Trips > 400 lbs.	43,230	108,660	61,085	74,160	68,770
Red hake, lbs. on Trips > 1,500 lbs	12,700	24,800	8,500	13,500	13,500
Red hake, lbs. on Trips > 3,000 lbs	-	-	-	-	-
Red hake trips > 400 lbs.	51	119	87	95	78
All trips	943	1,607	1,326	1,073	783
Whiting trips	451	730	534	568	376
Trips > 2000 lbs.	237	344	216	284	182
Trips > 15,000 lbs.	37	37	7	24	17
Trips > 30,000 lbs.	-	-	-	-	-
Non-qualifiers					
Permits					
Vessels fishing (>2000 lbs. whiting)	**14**	**7**	**4**	**9**	**14**
Trip value, all species	$ 4,943,465	3718479	1738725	1674754	3826710
Whiting value	$ 699,994	574619.16	18243.61	244026.59	889465.95
Whiting, lbs.	1,037,364	783,801	25,314	486,983	1,277,939
Whiting, lbs. on Trips > 2,000 lbs.	595,312	502,087	4,575	221,532	716,606
Whiting, lbs. on Trips > 15K lbs.	48,000	48,000	-	-	48,000
Whiting, lbs. on Trips > 30k lbs.	-	-	-	-	-
Red hake value	$ 25,263	$ 14,547	$ 84	$ 20,239	$ 27,864
Red hake, lbs.	99,405	44,890	305	67,820	86,770
Red hake, lbs. on Trips > 400 lbs.	55,495	20,845	-	33,145	38,535
Red hake, lbs. on Trips > 1,500 lbs	8,500	2,100	-	4,600	4,600
Red hake, lbs. on Trips > 3000 lbs.	-	-	-	-	-
Red hake trips > 400 lbs.	68	35	-	46	63
All trips	918	482	115	856	1,112
Whiting trips	375	190	53	241	412
Trips > 2000 lbs.	162	112	3	93	194
Trips > 15,000 lbs.	7	7	-	-	7
Trips > 30,000 lbs.	-	-	-	-	-

Table 46. Qualification summaries with 2014-2016 **NORTHERN AREA** fishing activity data presented as a proportion of the total for vessels with trips landing more than 2,000 lbs. of whiting.

Limited access category	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Category I					
Criteria, lbs.	**500,000**	**1,000,000**	**500,000**	**500,000**	**1,000,000**
Qualifying period	**2008-2012**	**2008-2012**	**2008-2016**	**2000-2016**	**1996-2012**
Permits	**40**	**20**	**51**	**55**	**84**
Vessels fishing (>2000 lbs. whiting)	**9**	**8**	**16**	**12**	**13**
Latent effort	NA	NA	NA	NA	NA
Trip value, all species	$14,044,030	$13,487,819	$16,780,533	$15,262,396	$16,072,211
Whiting value	56%	57%	54%	55%	52%
Whiting, lbs.	10,935,537	10,598,992	12,945,718	11,624,319	11,637,625
Whiting, lbs. on Trips > 2,000 lbs.	86%	87%	84%	86%	86%
Whiting, lbs. on Trips > 15,000 lbs.	29%	30%	26%	28%	28%
Whiting, lbs. on Trips > 30,000 lbs.					
Red hake value	$171,066	$160,277	$205,863	$171,633	$171,633
Red hake, lbs.	399,358	350,153	474,373	384,858	384,858
Red hake, lbs. on Trips > 400 lbs.	46%	44%	47%	46%	46%
Red hake, lbs. on Trips > 1,500 lbs.	7%	7%	9%	9%	9%
Red hake, lbs. on Trips > 3,000 lbs.	0%	0%	0%	0%	0%
Red hake trips > 400 lbs.	195	160	227	173	173
All trips	1,064	836	1,484	996	1,030
Whiting trips	83%	94%	75%	90%	89%
Trips > 2000 lbs. (hake trips)	59%	59%	62%	60%	59%
Trips > 15,000 lbs.	26%	30%	24%	28%	27%
Trips > 30,000 lbs.					
Category II					
Criteria, lbs.	**100,000**	**20,000**	**100,000**	**100,000**	**200,000**
Permits					
Vessels fishing (>2000 lbs. whiting)	**16**	**24**	**19**	**18**	**12**
Latent effort	NA	NA	NA	NA	NA
Trip value, all species	$3,935,622	$5,716,819	$4,403,859	$5,985,967	$3,024,196
Whiting value	41%	32%	22%	24%	27%
Whiting, lbs.	2,400,216	2,990,324	1,402,085	2,261,815	1,457,553
Whiting, lbs. on Trips > 2,000 lbs.	71%	67%	54%	65%	66%
Whiting, lbs. on Trips > 15,000 lbs.	10%	8%	3%	7%	8%
Whiting, lbs. on Trips > 30,000 lbs.					
Red hake value	$44,248	$65,753	$34,629	$48,704	$41,079
Red hake, lbs.	97,576	201,296	121,661	143,661	124,711
Red hake, lbs. on Trips > 400 lbs.	44%	54%	50%	52%	55%
Red hake, lbs. on Trips > 1,500 lbs.	13%	12%	7%	9%	11%
Red hake, lbs. on Trips > 3,000 lbs.	0%	0%	0%	0%	0%
Red hake trips > 400 lbs.	51	119	87	95	78
All trips	943	1,607	1,326	1,073	783
Whiting trips	48%	45%	40%	53%	48%
Trips > 2000 lbs.	53%	47%	40%	50%	48%
Trips > 15,000 lbs.	8%	5%	1%	4%	5%
Trips > 30,000 lbs.					
Non-qualifiers					
Permits					
Vessels fishing (>2000 lbs. whiting)	**14**	**7**	**4**	**9**	**14**
Trip value, all species	$4,943,465	$3,718,479	$1,738,725	$1,674,754	$3,826,710
Whiting value	14%	15%	1%	15%	23%
Whiting, lbs.	1,037,364	783,801	25,314	486,983	1,277,939
Whiting, lbs. on Trips > 2,000 lbs.	57%	64%	18%	45%	56%
Whiting, lbs. on Trips > 15K lbs.	5%	6%	0%	0%	4%
Whiting, lbs. on Trips > 30k lbs.					
Red hake value	$25,263	$14,547	$84	$20,239	$27,864
Red hake, lbs.	99,405	44,890	305	67,820	86,770
Red hake, lbs. on Trips > 400 lbs.	56%	46%	0%	49%	44%
Red hake, lbs. on Trips > 1,500 lbs.	9%	5%	0%	7%	5%
Red hake, lbs. on Trips > 3000 lbs.	0%	0%	0%	0%	0%
Red hake trips > 400 lbs.	68	35	0	46	63
All trips	918	482	115	856	1,112
Whiting trips	41%	39%	46%	28%	37%
Trips > 2000 lbs.	43%	59%	6%	39%	47%
Trips > 15,000 lbs.	2%	4%	0%	0%	2%
Trips > 30,000 lbs.					

Table 47. Expected number of qualifiers for a proposed Category I and II permit with 2014-2016 fishing activity for **SOUTHERN AREA** vessels with trips landing more than 2,000 lbs. of whiting. All whiting and red hake landings (> 1 lb.) were considered to determine qualification. Vessels with no history or insufficient landings were grouped as "non-qualifiers". "Whiting lbs. on Trips" includes only whiting landings that exceeded the applicable limit: 2,000; 15,000; or 30,000 lbs. and does not include landings of red hake.

Limited access category	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Category I					
Criteria, lbs.	**500,000**	**1,000,000**	**500,000**	**500,000**	**1,000,000**
Qualifying period	**2008-2012**	**2008-2012**	**2008-2016**	**2000-2016**	**1996-2012**
Permits	**40**	**20**	**51**	**55**	**84**
Vessels fishing (>2000 lbs. whiting)	**31**	**18**	**41**	**40**	**40**
Latent effort	**NA**	**NA**	**NA**	**NA**	**NA**
Trip value, all species	$ 79,648,549	$ 60,439,790	$ 86,797,045	$ 88,319,761	$ 84,564,126
Whiting value	$ 16,984,125	$ 15,640,359	$ 17,302,080	$ 17,286,188	$ 17,162,621
Whiting, lbs.	22,261,267	20,335,704	22,742,435	22,722,718	22,503,795
Whiting, lbs. on Trips > 2,000 lbs.	17,368,136	16,545,730	17,535,488	17,546,765	17,464,610
Whiting, lbs. on Trips > 15,000 lbs.	7,319,906	7,314,906	7,319,906	7,323,906	7,323,906
Whiting, lbs. on Trips > 30,000 lbs.	2,320,868	2,320,868	2,320,868	2,320,868	2,320,868
Red hake value	$ 830,733	$ 627,122	$ 883,826	$ 857,060	$ 833,291
Red hake, lbs.	1,687,955	1,101,372	1,847,091	1,756,364	1,687,079
Red hake, lbs. on Trips > 400 lbs.	923,660	563,070	1,014,831	950,021	908,891
Red hake, lbs. on Trips > 1,500 lbs	281,385	135,180	313,785	285,385	277,385
Red hake, lbs. on Trips > 3,000 lbs	81,523	33,428	87,323	81,523	80,523
Red hake trips > 400 lbs.	954	595	1,051	1,004	952
All trips	5,558	2,994	6,846	6,239	5,733
Whiting trips	3,187	1,886	3,772	3,509	3,350
Trips > 2000 lbs. (hake trips)	1,141	876	1,216	1,213	1,195
Trips > 15,000 lbs.	387	386	387	388	388
Trips > 30,000 lbs.	268	268	268	268	268
Category II					
Criteria, lbs.	**100,000**	**20,000**	**100,000**	**100,000**	**200,000**
Permits					
Vessels fishing (>2000 lbs. whiting)	**32**	**59**	**37**	**30**	**25**
Latent effort	**NA**	**NA**	**NA**	**NA**	**NA**
Trip value, all species	$ 25,704,635	52,255,666	26,205,775	22,771,698	23,778,540
Whiting value	$ 965,968	2,584,463	1,100,440	912,744	933,992
Whiting, lbs.	1,544,658	3,867,541	1,727,325	1,455,897	1,491,257
Whiting, lbs. on Trips > 2,000 lbs.	629,492	1,551,217	711,996	580,544	578,259
Whiting, lbs. on Trips > 15,000 lbs.	79,000	84,000	86,500	80,000	75,000
Whiting, lbs. on Trips > 30,000 lbs.	20,000	20,000	20,000	20,000	20,000
Red hake value	$ 139,090.39	371,917	138,518	141,826	154,417
Red hake, lbs.	394,556	1,041,798	362,366	400,669	431,214
Red hake, lbs. on Trips > 400 lbs.	201,104	582,368	167,367	206,234	229,864
Red hake, lbs. on Trips > 1,500 lbs	63,675	213,381	42,186	64,976	70,676
Red hake, lbs. on Trips > 3,000 lbs	13,000	61,095	9,660	13,000	14,000
Red hake trips > 400 lbs.	254	648	248	252	274
All trips	3,744	7,447	3,825	3,805	3,844
Whiting trips	1,708	3,396	1,635	1,713	1,678
Trips > 2000 lbs.	217	546	247	204	195
Trips > 15,000 lbs.	6	7	8	6	5
Trips > 30,000 lbs.	Confidential	Confidential	Confidential	Confidential	Confidential
Non-qualifiers					
Permits					
Vessels fishing (>2000 lbs. whiting)	**19**	**5**	**4**	**12**	**17**
Trip value, all species	$ 9,145,116	1802844	1495480	3406841	6155634
Whiting value	$ 482,837	208107.83	30410.43	233998.41	336316.1
Whiting, lbs.	706,097	308,777	42,262	333,407	516,970
Whiting, lbs. on Trips > 2,000 lbs.	255,319	156,000	5,463	125,638	210,078
Whiting, lbs. on Trips > 15K lbs.	7,500	7,500	-	2,500	7,500
Whiting, lbs. on Trips > 30k lbs.	-	-	-	-	-
Red hake value	$ 54,710	$ 25,495	$ 2,190	$ 25,647	$ 36,825
Red hake, lbs.	131,822	71,163	4,876	57,300	96,040
Red hake, lbs. on Trips > 400 lbs.	58,284	37,610	850	26,793	44,293
Red hake, lbs. on Trips > 1,500 lbs	10,911	7,410	-	5,610	7,910
Red hake, lbs. on Trips > 3000 lbs.	2,460	2,460	-	2,460	2,460
Red hake trips > 400 lbs.	93	58	2	45	75
All trips	1,617	478	248	875	1,342
Whiting trips	568	181	56	241	435
Trips > 2000 lbs.	112	48	7	53	80
Trips > 15,000 lbs.	2	2	-	1	2
Trips > 30,000 lbs.	-	-	-	-	-

Table 48. Qualification summaries with 2014-2016 **SOUTHERN AREA** fishing activity data presented as a proportion of the total for vessels with trips landing more than 2,000 lbs. of whiting.

Limited access category	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Category I					
Criteria, lbs.	**500,000**	**1,000,000**	**500,000**	**500,000**	**1,000,000**
Qualifying period	**2008-2012**	**2008-2012**	**2008-2016**	**2000-2016**	**1996-2012**
Permits	**40**	**20**	**51**	**55**	**84**
Vessels fishing (>2000 lbs. whiting)	**31**	**18**	**41**	**40**	**40**
Latent effort	**NA**	**NA**	**NA**	**NA**	**NA**
Trip value, all species	$79,648,549	$60,439,790	$86,797,045	$88,319,761	$84,564,126
Whiting value	21%	26%	20%	20%	20%
Whiting, lbs.	22,261,267	20,335,704	22,742,435	22,722,718	22,503,795
Whiting, lbs. on Trips > 2,000 lbs.	78%	81%	77%	77%	78%
Whiting, lbs. on Trips > 15,000 lbs.	33%	36%	32%	32%	33%
Whiting, lbs. on Trips > 30,000 lbs.					
Red hake value	$830,733	$627,122	$883,826	$857,060	$833,291
Red hake, lbs.	1,687,955	1,101,372	1,847,091	1,756,364	1,687,079
Red hake, lbs. on Trips > 400 lbs.	55%	51%	55%	54%	54%
Red hake, lbs. on Trips > 1,500 lbs.	17%	12%	17%	16%	16%
Red hake, lbs. on Trips > 3,000 lbs.	5%	3%	5%	5%	5%
Red hake trips > 400 lbs.	954	595	1,051	1,004	952
All trips	5,558	2,994	6,846	6,239	5,733
Whiting trips	57%	63%	55%	56%	58%
Trips > 2000 lbs. (hake trips)	36%	46%	32%	35%	36%
Trips > 15,000 lbs.	12%	20%	10%	11%	12%
Trips > 30,000 lbs.	8%	14%	7%	8%	8%
Category II					
Criteria, lbs.	**100,000**	**20,000**	**100,000**	**100,000**	**200,000**
Permits					
Vessels fishing (>2000 lbs. whiting)	**32**	**59**	**37**	**30**	**25**
Latent effort	**NA**	**NA**	**NA**	**NA**	**NA**
Trip value, all species	$25,704,635	$52,255,666	$26,205,775	$22,771,698	$23,778,540
Whiting value	4%	5%	4%	4%	4%
Whiting, lbs.	1,544,658	3,867,541	1,727,325	1,455,897	1,491,257
Whiting, lbs. on Trips > 2,000 lbs.	41%	40%	41%	40%	39%
Whiting, lbs. on Trips > 15,000 lbs.	5%	2%	5%	5%	5%
Whiting, lbs. on Trips > 30,000 lbs.					
Red hake value	$139,090	$371,917	$138,518	$141,826	$154,417
Red hake, lbs.	394,556	1,041,798	362,366	400,669	431,214
Red hake, lbs. on Trips > 400 lbs.	51%	56%	46%	51%	53%
Red hake, lbs. on Trips > 1,500 lbs.	16%	20%	12%	16%	16%
Red hake, lbs. on Trips > 3,000 lbs.	3%	6%	3%	3%	3%
Red hake trips > 400 lbs.	254	648	248	252	274
All trips	3,744	7,447	3,825	3,805	3,844
Whiting trips	46%	46%	43%	45%	44%
Trips > 2000 lbs.	13%	16%	15%	12%	12%
Trips > 15,000 lbs.	0%	0%	0%	0%	0%
Trips > 30,000 lbs.					
Non-qualifiers					
Permits					
Vessels fishing (>2000 lbs. whiting)	**19**	**5**	**4**	**12**	**17**
Trip value, all species	$9,145,116	$1,802,844	$1,495,480	$3,406,841	$6,155,634
Whiting value	5%	12%	2%	7%	5%
Whiting, lbs.	706,097	308,777	42,262	333,407	516,970
Whiting, lbs. on Trips > 2,000 lbs.	36%	51%	13%	38%	41%
Whiting, lbs. on Trips > 15K lbs.	1%	2%	0%	1%	1%
Whiting, lbs. on Trips > 30k lbs.					
Red hake value	$54,710	$25,495	$2,190	$25,647	$36,825
Red hake, lbs.	131,822	71,163	4,876	57,300	96,040
Red hake, lbs. on Trips > 400 lbs.	44%	53%	17%	47%	46%
Red hake, lbs. on Trips > 1,500 lbs.	8%	10%	0%	10%	8%
Red hake, lbs. on Trips > 3000 lbs.	2%	3%	0%	4%	3%
Red hake trips > 400 lbs.	93	58	2	45	75
All trips	1,617	478	248	875	1,342
Whiting trips	35%	38%	23%	28%	32%
Trips > 2000 lbs.	20%	27%	13%	22%	18%
Trips > 15,000 lbs.	0%	1%	0%	0%	0%
Trips > 30,000 lbs.					

Vessels that would qualify for a Category I permit tend to be larger vessels (132 to 190 GRT), taking a greater proportion of trips targeting small-mesh multispecies (26-39%), and have a greater economic

dependence on the small-mesh multispecies fishery (29.2-42.3%) during 2014-2016 than Category II or non-qualifying vessels (Table 49). The annual revenue from small-mesh multispecies ranges from $207 (Alternative 5) to $419 thousand (Alternative 2) per year. Alternative 2 with the highest qualification threshold qualifies the lowest number of vessels, but these vessels are more focused on the small-mesh multispecies fishery than the Category I vessels in the other four alternatives. Dependence on small-mesh multispecies revenue ranged from 29.2% (Alternative 5) to 42.3% (Alternative 2). Many of these vessels also use small-mesh trawls to target squids. The whiting revenue when more than 2,000 lbs. of whiting are landed averaged $12,455 (Alternative 3) to $15,997 per trip (Alternative 2).

Vessels that would qualify for a Category II permit tend to be smaller vessels (65-71 GRT) than those that qualify for Category I, taking a smaller proportion of trips targeting small-mesh multispecies (10-12%), and have a lower economic dependence on the small-mesh multispecies fishery (5.2-7.3%) during 2014-2016 than Category II or non-qualifying vessels (Table 49). The annual revenue from small-mesh multispecies ranges from $19 (Alternative 3) to $29 thousand (Alternative 2) per year. Alternative 2 with the lowest qualification threshold qualifies the most number of vessels, many of which were making small-mesh multispecies trips in 2014-2016, but would not qualify with the other alternatives. Dependence on small-mesh multispecies revenue ranged from 5.2% (Alternative 3) to 7.3% (Alternative 1). Many of these vessels also use small-mesh trawls to target squids, large-mesh trawls targeting groundfish, monkfish, and skates, or gillnets targeting groundfish. The whiting revenue when more than 2,000 lbs. of whiting are landed averaged $6,501 (Alternative 1) to $5,020 per trip (Alternative 2).

Many more vessels that landed one or more lbs. of small-mesh multispecies had no history during an alternative's qualification period, or did not have landings exceeding the threshold. The number of MRI/permits that did not qualify varied with the different qualification periods for each alternative (Table 49), but the number of non-qualifying vessels having one or more trips above the incidental whiting and red hake limits ranged from 25 (Alternative 2) to 48 (Alternative 4), almost the same number of vessels that would qualify for a Category II permit. Non-qualifying vessels tend to be somewhat smaller (33-49 GRT) than vessels that would qualify for a Category II permit, but have much higher total revenue derived from other fisheries targeting other species (99.1-99.8%). The average whiting landings per trip ranged from 234 (Alternative 3) to 324 (Alternative 2) lbs./trip, contributing revenue of $170 (Alternative 3) to $235 (Alternative 2) per trip. If we only consider trips that landed over 2,000 lbs. of whiting or 400 lbs. of red hake, the revenue from whiting landings jumps to $4,682 (Alternative 1) to $5,777 (Alternative 3) per trip, actually a little higher than the average revenue per trip for vessels that would qualify for a Category II permit ($3,435-$4,675).

Table 49. Economic characteristics of small-mesh multispecies and other 2014-2016 fishing activity, by qualification category and alternative. Notable high or low values are highlighted in yellow.

Alternative	Category	Qualifying fleet (w/ trips ≥ 1 lb hakes)	Currently active fleet (w/ trips ≥ 2000 lbs hakes)	Latent Effort	Hakes Trips/yr (2014-2016)	Share of hakes trips (%)	Hakes/Fish trips ratio	Annual Average Hakes landing (lbs)	Share of hakes landings (%)	Hakes/Fish landed ratio	Ave GRT	Annual CPUE lbs/GRT	Annual fish revenue per boat (nominal $)	Annual hakes revenue per boat (in 2016$)	Revenue Ratio Hakes/Fish	Whiting lbs. per trip	Whiting revenue per trip	Whiting revenue per trip (trips > inc limits)	Annual total fleet hakes revenue (2016$)
1	I	40	33	17%	1780	66	30%	11,712,196	0.83	0.39	151	2343	$754,879	$262,637	34.8%	16,062	$5,624	$13,495	$8.67 mil
2	I	20	19	5%	1413	52	39%	10,763,803	77	0.44	190	2979	$991,505	$419,222	42.3%	19,210	$7,921	$15,997	$7.97 mil
3	I	51	44	14%	2054	76	26%	12,628,196	90	0.38	132	2181	$635,486	$212,383	33.4%	14,807	$4,878	$12,455	$9.34 mil
4	I	55	42	24%	1887	70	29%	12,109,019	86	0.37	143	2015	$698,415	$213,349	30.6%	15,656	$5,298	$13,209	$8.96 mil
5	I	84	43	49%	1860	69	30%	12,034,712	86	0.38	187	1495	$708,479	$207,109	29.2%	15,763	$5,219	$13,315	$8.91 mil
1	II	74	38	49%	505	19	11%	1,478,780	11	0.15	66	590	$393,040	$28,797	7.3%	5,112	$580	$4,675	$1.09 mil
2	II	203	69	66%	1016	38	12%	2,692,883	19	0.14	71	553	$430,525	$28,880	6.7%	3,972	$526	$3,896	$1.99 mil
3	II	90	46	49%	532	20	11%	1,202,882	9	0.12	65	401	$371,506	$19,351	5.2%	3,149	$456	$3,435	$0.89 mil
4	II	124	38	69%	535	20	11%	1,422,681	10	0.14	65	577	$401,221	$27,705	6.9%	4,166	$527	$3,997	$1.05 mil
5	II	159	30	81%	427	16	10%	1,154,175	8	0.14	68	562	$422,330	$28,470	6.7%	4,065	$426	$3,622	$0.85 mil
1	NQ	971	42	NA	345	13	14%	670,184	5	0.13	43	370	$1,382,931	$11,808	0.9%	319	$ 227	$ 4,682	$0.50 mil
2	NQ	908	25	NA	201	7	17%	404,474	3	0.16	33	488	$1,753,219	$11,972	0.7%	324	$ 235	$ 5,355	$0.30 mil
3	NQ	1,099	38	NA	119	4	9%	235,964	2	0.12	49	127	$1,937,445	$4,595	0.2%	234	$ 170	$ 5,777	$0.17 mil
4	NQ	2,035	48	NA	283	10	11%	535,341	4	0.14	45	247	$1,543,620	$8,253	0.5%	271	$ 190	$ 4,749	$0.40 mil
5	NQ	2,341	45	NA	367	14	14%	760,729	5	0.14	40	421	$1,373,438	$12,510	0.9%	323	$ 231	$ 4,796	$0.56 mil

6.2 Biological Impacts of Fishing on Target Species

Small-mesh multispecies fishing currently is managed by a mix of seasons, area restrictions, mesh, and possession limits. Landings and catches are constrained by these regulations, plus market factors. As discussed in Section 6.1.3, catches of northern silver hake and southern whiting have been a small percent of the ABC and have been well below the overfishing threshold. Most of the catch is landed. More details about trends in small-mesh multispecies catches is given in Section 5.1.3.

Northern stock hake stock biomass has been increasing and catch specifications have been raised. More older and larger silver hake are appearing in the survey and commercial catches. Southern silver hake biomass however has been declining and the recommended catch specifications for 2018-2020 are likewise lower, about double the 2016 catch estimate. Section 5.1.2 provides more details about stock status and the recommended whiting specifications.

Catches of northern red hake have often exceeded the ABC and overfishing has occurred, but the update assessment estimates that the 2016 catches did not exceed the ABC (which was raised in 2016) and overfishing was not occurring. In contrast, the catches of southern red hake have remained relatively stable while stock biomass has been declining. The assessment update estimates that the southern red hake stock status has changed, the stock has become overfished and overfishing occurred in 2016. With lower 2018-2020 specifications and catch limits, it is likely that at least in-season AMs will be triggered in 2018 unless landings decline and overfishing could continue. Unlike whiting, the majority of the red hake catches are discarded. Most discards in the southern management area occur in the small-mesh fishery, while discards in the northern management area are split evenly between the small- and large-mesh fisheries.

It is important to keep in mind that whiting fishing is relatively concentrated, restricted either by exemption area regulations and/or by availability of commercial concentrations of fish. It is likely that any changes in fishing effort will occur in the same areas that are currently fished. Increases in fishing effort are likely to occur in areas currently fished and the intensity of fishing will change, but would not expand into new areas.

6.2.1 No Action (Preferred)

This alternative, described in Section 4.1, would continue the existing open access small-mesh multispecies fishery. Any vessel would be able to obtain a Category K multispecies permit and target small-mesh multispecies in exemption areas.

This alternative would allow more vessels to enter the fishery to target whiting and red hake using small-mesh trawls. It could make existing regulations less effective to manage small-mesh multispecies catches, than they would otherwise be with limited access in effect. Moderate increases in whiting catches would not cause overfishing, but increases in red hake catches could cause overfishing in the northern management area and exacerbate overfishing in the southern management area.

If the Council does not implement limited access through this amendment, it will need to take more drastic actions later to respond when overfishing occurs, or catches exceed specifications. Several general measures could be applied, depending on the type and severity of the problem. Measures that could reduce non-target catches include requiring more selective gears (although no gear has yet been identified to separate red hake and whiting catch), closed seasons (e.g. when the bycatch rate relative to the target species is highest), and closed areas (e.g. where the bycatch rate relative to the target species is highest).

It is difficult to assess the severity of impacts on red hake, because we cannot forecast the effectiveness of these measures (which are currently unknown). It does however take time to identify the problem (at least during the next annual monitoring report) and prepare a framework action or amendment to address it. Furthermore, increases in small-mesh multispecies fishing effort by new entrants could dilute the effectiveness of technical measures to limit catches of red hake. Also, if the catches of whiting increase or if future specifications decline, the Council would be forced to cut small-mesh multispecies fishing effort, either by reducing whiting possession limits, shortening seasons, or by initiating other measures. Again, these other measures would be less effective if new entrants enter the fishery.

Therefore, relative to any limited access alternative in Action 1, this alternative would have a neutral to small negative impact on whiting and a negative impact on red hake and other incidental species (see Section 5.1.4 for a list of species that are frequently observed as bycatch).

6.2.2 Whiting Possession Limit for Vessels Using 3-inch and larger Cod-End Mesh Trawls

The possession limits in this set of three alternatives would apply to any vessel Using 3-inch and larger mesh to target small-mesh multispecies in all areas, including areas that are exempt from the large-mesh NE Multispecies regulations.

6.2.2.1 Alternative 1 (Preferred; No Action) – Existing small-mesh multispecies possession limits apply

This alternative would retain the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the current whiting possession limits are 30,000 lbs. in the northern area and 40,000 lbs. in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species. Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area.

In season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger

The current limits and other measures have prevented overfishing of whiting, but overfishing of northern red hake has occurred for a few recent years and for southern red hake began in 2016. Since these occurrences, the specifications have been adjusted to account for changes in stock biomass and accountability measures have been adjusted to prevent future overfishing. New specifications for southern red hake are expected to take effect in fishing year 2018 and current landings are likely to trigger the in-season accountably measure, reducing the red hake possession limit to 400 lbs.

Thus, the status quo/No Action alternative is likely to have a neutral impact on whiting stocks and a small negative impact on red hake stocks.

6.2.2.2 Alternative 2 – Raise the Whiting possession limit from 40,000 to 50,000 lbs., January 1 to June 14 in the Southern New England and Mid-Atlantic exemption areas

This alternative would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. during the winter/spring season, only in the southern management area. Because the whiting possession limit has not been more than 40,000 lbs. in almost two decades, there is little quantitative information about the potential effects.

Because the Alternative 2 possession limits exceed No Action, vessels could land similar amounts of whiting as they do now. Vessels might also land the higher possession limit, up to 50,000 lbs., lengthening their fishing trips and increasing effort per trip. Vessels may take the same number of trips of longer duration than they would with a 40,000 lbs. possession limit, or they might take fewer trips, and keep total landings the same. This alternative could provide an incentive to fish in the southern area during January 1-June 14.

Vessels in the southern management area could, as a result of the higher possession limit, land more whiting and red hake (at least that is the intent). Northern red hake and southern whiting are not overfished and overfishing is not occurring. In the past several years, landings have been well below the TAL and catch well below the ABC. Although the higher catch would increase mortality compared to Alternative 1 and Alternative 3, but is not expected to have a negative impact on northern red hake and southern whiting. With respect to whiting, this alternative is therefore expected to have a neutral effect.

For red hake, increases in catch associated with more fishing effort (but without a change in the red hake possession limits) could also happen. Northern red hake biomass is above the target and overfishing is not occurring. Landings have however exceeded the TAL, triggering in-season accountability measures. According to the assessment update for 2016, southern red hake is overfished and overfishing is occurring. The proposed 2018-2020 specifications are close to current landings and catch. Any increases in catch associated with this alternative would have a negative impact on red hake (target species).

6.2.2.3 Alternative 3 – Lower the Whiting possession limit from 40,000 to 30,000 lbs., June 15 to December 31 in the Southern New England and Mid-Atlantic exemption areas

Alternative 3 would decrease the whiting possession limit for about half of the year in the southern management area. During the summer and fall, a 30,000 lbs. whiting possession limit would be in effect in both management areas. It is intended to reduce the effect of southern area landings on market prices for whiting in all areas.

This alternative has several types of potential impacts, changing the number of trips taken or changing the location or season when small-mesh multispecies trips are taken. It may induce more vessels to fish additional trips to catch and land the same amount as they do under the existing limit. In this case, total fishing effort would probably remain the same as it is now.

Trips during the summer and fall would be less profitable than they are presently, thus potentially causing vessels to take more trips during the winter when a higher possession limit applies or shift some fishing activity to the northern area, if it is advantageous for the vessel to do so. The most likely impact of a seasonal whiting possession limit reduction is to change the distribution of trips, either seasonally within the southern management area or spatially, to the northern area.

This alternative would could decrease effort and catches of the target species to have a lower impact on price during the summer and fall. This alternative is unlikely to have a negative effect on whiting in either area, and would therefore have a neutral impact. Due to potential changes in the distribution of fishing effort, catches of northern red hake would probably increase having a small negative impact and catches of southern red hake would probably decrease, having a small positive impact.

6.2.3 Limited Access Alternatives

6.2.3.1 Action 1 – Qualification criteria

All limited access action alternatives are unlikely to substantially reduce capacity, but could reduce the potential for rapid increases in fishing effort by vessels entering the fishery. The primary tool to manage catches of target species in the small-mesh multispecies fishery are possession limits, which have been and can be adjusted to achieve biological objectives. Limited access will make management tools more effective, because new vessels would be unable to enter the fishery mitigating the effect of the regulations.

The discussion in this section mainly focuses on whiting, which is the primary target of the fishery. Most of red hake catch is discarded due to poor market demand. Thus the potential effect on red hake is discussed in Section 6.3 (Biological Impacts of the Directed Fishery on Non-target Species), where differences in bycatch by vessels qualifying for limited access are evaluated. Nonetheless, changes in a red hake possession limit would be more effective with limited access than it would with open access to the fishery (i.e. No Action).

It is important to keep in mind that whiting fishing is relatively concentrated, restricted either by exemption area regulations and/or by availability of commercial concentrations of fish. It is likely that any changes in fishing effort will occur in the same areas that are currently fished. Increases in fishing effort are likely to occur in areas currently fished and the intensity of fishing will change, but would not expand into new areas.

The alternatives in Action 1 consider establishing a limited access program for the small-mesh multispecies fishery, targeting whiting and red hake using 3-inch or smaller mesh in areas that are exempt from the large-mesh groundfish regulations. In addition to No Action, there are five alternatives with different qualification criteria and periods. In addition to a core set of vessels that would qualify for all alternatives (20 Category I and 37 Category II), each alternative qualifies a different set of vessels that landed whiting or red hake at various times. The qualification period for Alternatives 1, 2, and 5 ends at the control date, but the qualification period for Alternative 3 and 4 extend to the end of calendar year 2016. For all alternatives, qualifiers would be able to fish in the small mesh multispecies exemption areas, subject to the possession limits specified in Section 4.3.2 and the permit allowances specified in Section 4.3.3. Depending on the alternatives selected in Action 3 (Section 4.3.3), the vessels may not be able to use small mesh in the exemption areas, unless they are permitted to fish for other small-mesh species, such as squid and herring. Non-qualifying vessels would no longer be allowed to land more than 2,000 lbs. of whiting and 400 lbs. of red hake.

6.2.3.1.1 Alternative 1

There are 40 Category I and 74 Category II vessels that are expected to qualify under Alternative 1, 33 and 38 are currently fishing for whiting. Thus, there would be 7 Category I and 36 Category II permits that would be latent and could later enter the fishery. Additionally, there were 42 non-qualifying vessels and 15 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016. For non-qualifying vessels, whiting landings that exceed the 2,000 lbs. incidental possession limit contribute to 3.2% of total whiting landings. Red hake landings proportions are similar, because whiting is usually the main target.

Compared to No Action, Alternative 1 is expected to have a positive impact on target species, because regulations to control catch would be more effective. Alternative 1 has the least amount of latent effort compared to the other action alternatives and therefore would have a positive impact on the target species, compared to Alternatives 1-4.

6.2.3.1.2 Alternative 2

There are 20 Category I and 203 Category II vessels that are expected to qualify under Alternative 2, 19 and 69 are currently fishing for whiting. Thus, there would be one Category I and 134 Category II permits that would be latent and could later enter the fishery. Additionally, there were 25 non-qualifying vessels and 15 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016. For non-qualifying vessels, whiting landings that exceed the 2,000 lbs. incidental possession limit contribute to 3.2% of total whiting landings. Red hake landings proportions are similar, because whiting is usually the main target.

Compared to No Action, Alternative 2 is expected to have a positive impact on target species, because regulations to control catch would be more effective. Alternative 2 ranks second behind Alternative 5 in the amount of latent effort, but would qualify more Category II vessels and include more that are currently fishing. With a 30,000/40,000 lbs. whiting possession limit, there probably isn't much difference with Alternative 5 in this regard, but with a proposed alternative with a 15,000 lbs. whiting possession limit that is a closer fit to the status quo for these vessels, latent effort would be less than for Alternative 5.

Because of the above considerations, Alternative 2 would have a positive impact on the target species compared to No Action and Alternative 5, but a negative impact compared with Alternatives 1, 3, and 4.

6.2.3.1.3 Alternative 3

There are 51 Category I and 90 Category II vessels that are expected to qualify under Alternative 3, 44 and 44 are currently fishing for whiting. Thus, there would be 7 Category I and 134 Category II permits that would be latent and could later enter the fishery. Additionally, there were 38 non-qualifying vessels that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016. For non-qualifying vessels, whiting landings that exceed the 2,000 lbs. incidental possession limit contribute to 2.4% of total whiting landings. Red hake landings proportions are similar, because whiting is the main target.

Compared to No Action, Alternative 3 is expected to have a positive impact on target species, because regulations to control catch would be more effective. Alternative 3 appears to have more latent effort than Alternative 1, but less than the other action alternatives. Thus Alternative 3 would have a positive impact on the target species compared to Alternatives 2, 4, and 5, but a negative impact compared to Alternative 1.

6.2.3.1.4 Alternative 4

There are 55 Category I and 124 Category II vessels that are expected to qualify under Alternative 4, 42 and 38 are currently fishing for whiting. Thus, there would be 13 Category I and 86 Category II permits that would be latent and could later enter the fishery. Additionally, there were 48 non-qualifying vessels that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016. For non-qualifying vessels, whiting landings that exceed the 2,000 lbs. incidental possession limit contribute to 2.6% of total whiting landings. Red hake landings proportions are similar, because whiting is the main target.

Compared to No Action, Alternative 4 is expected to have a positive impact on target species, because regulations to control catch would be more effective. Alternative 4 appears to have less latent effort than Alternatives 2 and 5, but more than Alternatives 1 and 3. Thus Alternative 4 would have a positive impact on target species compared to Alternatives 2 and 5, but a negative impact compared to Alternatives 1 and 3.

6.2.3.1.5 Alternative 5

There are 84 Category I and 159 Category II vessels that are expected to qualify under Alternative 2, 43 and 30 are currently fishing for whiting. Thus, there would be 41 Category I and 129 Category II permits that would be latent and could later enter the fishery. Additionally, there were 55 non-qualifying vessels that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016. For non-qualifying vessels, whiting landings that exceed the 2,000 lbs. incidental possession limit contribute to 2.6% of total whiting landings. Red hake landings proportions are similar, because whiting is the main target.

Compared to No Action, Alternative 5 is expected to have a positive impact on target species, because regulations to control catch would be more effective. Alternative 5 would qualify more vessels than any other action alternative and has the most latent effort (vessels with limited access qualification that did not land more than 2,000 lbs. during 2014-2016). Thus, Alternative 5 has a negative impact on target species compared to Alternatives 1 to 4.

6.2.3.2 Action 2 - Possession limit alternatives

The alternatives in Action 2 propose adjustments to the whiting possession limits, primarily to adjust the capacity of the small-mesh multispecies fleet to land whiting and to minimize negative effects on price. These possession limits would apply to either vessels qualifying for a Category I or II permit, or to both (i.e. the same possession limit would apply to both permit categories.

In addition, Action 2 includes an alternative that would establish an incidental possession limit for whiting and an incidental limit for red hake. These incidental possession limits would apply to all fishing activity by vessels that do not have a Category I or II permit, regardless of mesh or gear in use. Depending on the final alternatives selected in Action 3 (Section 4.3.3), vessels with an incidental permit may be able to exceed the incidental possession limits if they are participating in another limited access small-mesh fishery, such as herring or squid.

6.2.3.2.1 Whiting[21] Possession Limit for Vessels with a Category I Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category I limited access permit.

6.2.3.2.1.1 Alternative 1 (Status quo)

For vessels holding a Category I limited access permit, this alternative would not change the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the current whiting possession limits are 30,000 lbs. in the northern area and 40,000 lbs. in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species. Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area.

In season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger

[21] Whiting includes silver and offshore hakes.

Applying to a smaller fleet of vessels than might exist without limited access, this alternative is likely to have a neutral impact on whiting (catches are currently well below specifications) and a low positive impact on red hake.

6.2.3.2.1.2 Alternative 2

For vessels holding a Category I limited access permit, this alternative would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. during the winter/spring season, only in the southern management area. Because the whiting possession limit has not been more than 40,000 lbs. in almost two decades, there is little quantitative information about the potential effects.

Because the Alternative 2 possession limits exceed No Action, vessels could land similar amounts of whiting as they do currently. Vessels might land the higher possession limit, up to 50,000 lbs., lengthening their fishing trips and increasing effort per trip. Vessels may take the same number of trips of longer duration than they would with a 40,000 lbs. possession limit, or they might take fewer trips, and keep total landings the same. This alternative could provide an incentive to fish in the southern area during January 1-June 14.

Vessels in the southern management area could as a result of the higher possession limit could land more whiting and red hake (at least that is the intent). Northern red hake and southern whiting are not overfished and overfishing is not occurring. In the past several years, landings have been well below the TAL and catch well below the ABC. Although the higher catch would increase mortality compared to Alternative 1 and Alternative 2, it is not expected to have a negative impact on northern red hake and southern whiting. With respect to whiting, this alternative is therefore expected to have a neutral effect.

For red hake, increases in catch associated with more fishing effort (but without a change in the red hake possession limits) could happen. Northern red hake biomass is above the target and overfishing is not occurring. Landings have however exceeded the TAL, triggering in-season accountability measures. According to the assessment update for 2016, southern red hake is overfished and overfishing is occurring. The proposed 2018-2020 specifications are close to current landings and catch. Any increases in catch associated with this alternative would have a negative impact on red hake (target species), but this could be mitigated by choosing limited access qualification in Action 1. **Therefore, this alternative which increases the southern whiting possession limit while limiting the number of vessels in the fishery is expected to have a neutral to small negative impact on whiting and red hake, compared to No Action.**

6.2.3.2.1.3 Alternative 3

For vessels holding a Category I limited access permit, this alternative would decrease the whiting possession limit for about half of the year in the southern management area. During the summer and fall, a 30,000 lbs. whiting possession limit would be in effect in both management areas. It is intended to reduce the effect of southern area landings on market prices for whiting in all areas.

This alternative has several types of potential impacts, changing the number of trips taken or changing the location or season when small-mesh multispecies trips are taken. It may induce more vessels to fish additional trips to catch and land the same amount as they do under the existing limit. In this case, total fishing effort are expected to remain near current levels.

Trips during the summer and fall would be less profitable than they are presently, thus potentially causing vessels to take more trips during the winter when a higher possession limit applies or shift some fishing

activity to the northern area, if it is advantageous for the vessel to do so. In this case, the most likely impact is to change the distribution of trips, either seasonally within the southern management area or spatially, to the northern area.

This alternative would could decrease effort and catches of the target species to have a lower impact on price during the summer and fall. **Whether coupled with a qualification alternative in Action 1 and using the same rational for Alternative 2, this alternative would have a neutral impact on whiting and northern red hake, while having a slight positive impact on southern red hake, compared to No Action.**

Table 50. Action 2 summary (Category I) - Potential impact of the action alternatives on the target species.

Action 2 Alts.	Whiting possession limit alternatives for vessels with a Category I permit	Affected areas	Affected categories	Affected seasons	Potential impact of the action alternatives on the target species.
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs. • Accountability Measures at 2,000 lbs. (whiting) and 400 lbs. (red hake).		Cat I	All	• Coupled with fewer number of vessels than would be present without limited access • Neutral impact on whiting and low positive impact on red hake.
2	Increase whiting possession limit from 40,000 lbs. to 50,000 lbs.	South	Cat I	Winter, Spring	Neutral to small negative impact on whiting and red hake
3	Decrease whiting possession limit to 30,000 lbs.	South	Cat I	Summer, Fall (Jun 15-Dec 31)	Neutral impact on whiting and northern red hake, while having a slight positive impact on southern red hake

6.2.3.2.2 Whiting[22] Possession Limit for Vessels with a Category II Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category II limited access permit.

[22] Whiting includes silver and offshore hakes.

6.2.3.2.2.1 Alternative 1 (Status quo)

For vessels holding a Category II limited access permit, this alternative would not change the existing small-mesh multispecies possession limits. These limits are summarized under Alternative 1 in the previous section.

Although potentially applying to a smaller number of vessels than are currently fishing, if an Action 1 alternative is chosen this possession limit alternative would not change the amount of fishing effort by vessels that qualify for Category II, but there could be less effort than if there is no limited access to the fishery. **This alternative therefore has a neutral to small positive impact on the target species.**

6.2.3.2.2.2 Alternative 2

This alternative would decrease the whiting possession limit in all management areas from 30,000 lbs. to 15,000 lbs. It is intended to create a whiting possession limit that is more consistent with the usual catches made by Category II vessels (see Section ??? analysis of landings per trip). During 2014-2016, only ???% of trips by vessels that are expected to qualify for a Category II permit had whiting landings that exceeded 15,000 lbs.

For a substantial majority of vessels, this alternative would have no effect on their fishing activity. They would fish as they previously did, but would be unable to make longer trips to capture more whiting than they currently do. Some vessels however would make shorter trips, possibly closer to shore in areas where whiting are available.

For whiting and northern red hake, modest increases in catch could be tolerated and it would not cause overfishing. For these stocks, the impact of this alternative is expected to be neutral. Southern red hake, on the other hand, is overfished and overfishing is occurring. Changes in the whiting possession limit could cause changes in fishing behavior, but if the limit is consistent with vessel activity in the fishery, it could prevent increases in fishing effort. **Using the same rationale about increases in effort for Action 1 alternatives, compared to No Action, this alternative would have a neutral impact on whiting and northern red hake and positive impact on southern red hake.**

Table 51. Action 2 summary (Category II) - Potential impact of the action alternatives on target species.

Action 2 Alts.	Whiting possession limit alternatives for vessels with a Category II permit	Affected areas	Affected categories	Affected seasons	Potential impact of the action alternatives on target species.
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40,000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs.		Cat II	All	• Coupled with fewer number of vessels than would be present without limited access • Neutral to small positive impact on the target species
2	15,0000 whiting possession limit and no change to the red hake possession limits.	All	Cat II	All	Neutral impact on whiting and northern red hake and positive impact on southern red hake

6.2.3.2.3 Incidental possession limits

Vessels that did not qualify for a Category I or II limited access permit would be regulated by the possession limits in the two alternatives below, regardless of the type of gear in use or the species that the vessel is targeting.

6.2.3.2.3.1 Alternative 1 (No Action)

This alternative would retain the existing whiting possession limits, even if an action alternative was chosen in Action 1 (limited access qualification). It might seem counter-intuitive at first, but choosing this alternative with a limited access qualification alternative would allow whiting and red hake possession limits to be adjusted by permit category when needed in the future.

The direct impact on whiting and red hake would be unchanged from the status quo, but it could reduce the potential for increases in small-mesh multispecies fishing effort by additional non-qualified vessels. Indirectly, **this alternative would have a neutral impact on whiting and northern red hake, but a negative impact on southern red hake.**

6.2.3.2.3.2 Alternative 2

This alternative would reduce the whiting and red hake possession limits to 2,000 lbs. and 400 lbs., respectively, for vessels that do not qualify for a small-mesh multispecies limited access permit (see Action 1). Due to relatively low prices for whiting and red hake, it is highly unlikely that non-qualifying vessels would take trips to target small-mesh multispecies. They may, however, continue or increase fishing effort into other fisheries.

The alternative would make the limited access qualification alternatives effective, but implementing a lower incidental possession limit for non-qualifying vessels. As such, compared to No Action, **it would have a neutral to positive impact on the target species.**

Table 52. Action 2 summary (non-qualifiers) - Potential impact of the action alternatives on the target species.

Action 2 Alts.	**Whiting possession limit alternatives**	**Affected areas**	**Affected categories**	**Affected seasons**	**Potential impact of the action alternatives on the target species.**
1	Retain existing whiting and red hake possession limits for non-qualifying vessels in Action 1	All	Non-qualifiers	All	• Potential to continue overfishing of southern red hake • Neutral impact on whiting and northern red hake, but a negative impact on southern red hake
2	Reduce possession limit for whiting at 2,000 lbs. and red hake at 400 lbs. for non-qualifiers in Action 1.	All	Non-qualifier	All	Neutral to positive impact on the target species

6.2.3.3 Action 3 – Permit allowances

Alternatives in Action 3 only apply if an action alternative in Action 1 is chosen. Thus there is no No Action alternative specifically for Action 3.

6.2.3.3.1 Limited access permit characteristics and conditions

The alternatives in Action 3 would affect the characteristics and allowances of a small-mesh multispecies limited access permit. In most cases, the effects are purely administrative but could change compliance costs for vessels that have limited access permits in other fisheries. Small-mesh multispecies limited access permits that are most consistent with the existing permits held by the vessel would minimize costs and maximize opportunity. Many vessels that would potentially qualify for a Category I or II permit in the Action 1 alternatives have one or more of a large-mesh groundfish, an Atlantic herring permit, or a squid/mackerel/butterfish limited access permit (see Section ??? summarizing permits held by qualifying vessels). Table 3??? summarizes the similarities and differences among other limited access permits frequently held by vessels currently targeting small-mesh multispecies.

Because they potentially affect the quality or number of vessels and/or fishing effort, Alternatives 2, 4, and 5 could have an effect on target species

6.2.3.3.1.1 Alternative 1

Alternative 1 would apply the limited access permit characteristics for the Northeast (large mesh) Multispecies fishery to Category I and II permits for the small-mesh multispecies fishery (see Table 7). These include limits for permit accumulation, upgrade restrictions, and consideration of construction during the last year of a qualification period.

Alternative 1 is considered here to be a baseline to compare effects of other alternatives in Action 3. Although there is no existing limited access small-mesh multispecies permit, Alternative 1 serves as a proxy for status quo for analytical comparison since it is difficult to evaluate effects with respect to an open access Category K groundfish permit.

Thus Alternative 1 would have the same effects on target species that applies to any action alternative in Action 1.

6.2.3.3.1.2 Alternative 2

This alternative would not establish any limits on holdings of limited access permits for the small-mesh multispecies fishery.

Although potentially reducing ownership costs, with respect to impacts on target species the number and diversity of ownership is not expected to have a meaningful, or neutral, impact on target species.

6.2.3.3.1.3 Alternative 3

This alternative would not allow consideration of construction or repair of vessels for the year preceding the end of the qualification period. It could therefore reduce the number of limited access permits for the small-mesh multispecies, potentially reducing effort in the fishery.

Compared to Alternative 1, this alternative would qualify fewer vessels and therefore would have a positive effect on target species.

6.2.3.3.1.4 Alternative 4

This alternative would allow only one vessel to qualify based on a single history. In other words, a history could not be transferred to a replacement vessel AND qualify the original vessel (which may have been sold or transferred to a new owner). Thus, this alternative would qualify fewer vessels than the Alternative 1 baseline.

Like Alternative 3, this alternative would qualify fewer vessels and therefore would have a positive effect on target species.

6.2.3.3.1.5 Alternative 5

This alternative would allow upgrades of vessels that hold a limited access small-mesh multispecies fishery permit. It could allow, for example, a vessel to be more capable of fishing offshore or take more frequent trips (vessel becomes more seaworthy), increase hold capacity to take longer trips, or to tow larger trawls.

Although the fishery is limited by ACLs, there is room for increases in whiting catches and more fishing effort by qualifying vessels. Fishing offshore could affect the types of bottom where fishing occurs or the type and amount of bycatch. Fishing longer or more frequent trips implies an increase in fishing effort.

For target species, this alternative is expected to have a neutral to negative impact through increases in catch of the target species, although the magnitude is difficult to quantify depending on a variety of economic and regulatory effects. Vessels that upgrade would presumably be able to pack and land more fish, taking longer and more frequent trips in variety of conditions. Vessels holding a Northeast (large-mesh) Multispecies permit would be prohibited from upgrading at the present time.

Table 53. Action 3 limited access permit alternatives summary (permit allowances) - Potential impact of the action alternatives on the target species.

Alts.	**Permit allowances**	**Potential impact of the action alternatives on the target species.**
1	Status quo. 5% cap on permits + upgrade restriction + consideration for construction at t_{-1} of qualification period.	Depends on choice of Action 1 alternatives
2	No limits on holdings of limited access permits for the small-mesh multispecies.	Neutral, or no meaningful impact.
3	No consideration for construction or repair of vessels for the year preceding the qualification period.	Positive
4	Only one vessel based on single history, i.e., history couldn't be transferred to a replacement vessel AND qualify the original vessel.	Positive
5	Allow upgrade of vessels that hold limited access multi-species fishery permit. (Upgrading is intended for distant fishing, fish frequently, more hold capacity, longer duration trips, and capability for taking more/large tows).	Neutral to negative

6.2.3.3.2 Incidental permit conditions

Vessels holding an incidental permit would be able to land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, regardless of the type of gear in use or species targeted, unless one of the following alternatives is chosen. These alternatives only apply if an action alternative is selected from Action 1, hence there is no relevant status quo for Action 3.

6.2.3.3.2.1 Alternative 1

In addition to the incidental small-mesh multispecies fishery possession limits, vessels with an incidental possession limit permit would be prohibited from using small mesh trawls in small-mesh multispecies exemption areas.

This alternative could limit discards of whiting and red hake, in exemption areas where they are usually more prevalent. Thus, this alternative is expected to have a positive impact on the target species.

It is impossible to quantify the potential to target small-mesh multispecies with an incidental permit under current or future regulatory or market conditions. This potential is thought to be currently limited by the relatively low whiting and red hake prices, although some vessels may otherwise use the incidental permit to fish for bait and sell the catch through the transfer at sea provision.

6.2.3.3.2.2 Alternative 2a

This alternative would allow vessels using large mesh on a groundfish or monkfish DAS to exceed the proposed incidental whiting and red hake possession limits.

This alternative would allow vessels on a groundfish DAS to land the whiting and red hake they catch using large mesh trawls or gillnets during trips targeting large-mesh groundfish. It would reduce discarding of whiting and red hake that would otherwise occur. This alternative would have a positive effect on target species by reducing discards.

6.2.3.3.2.3 Alternative 2b

This alternative would prohibit fishing for small-mesh multispecies on a groundfish DAS. While fishing on a groundfish DAS, the vessel could land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, even if the vessel holds a small-mesh multispecies fishery limited access permit.

For the reasons given for Alternative 2a, this alternative would have the opposite effect and have a negative impact on the target species, because it would increase discards.

6.2.3.3.2.4 Alternative 3

Similar to Alternative 2a, this alternative would allow vessels fishing for Atlantic herring or squid with a limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits.

This alternative has the same effect as Alternative 2b, but applied to small-mesh trawl herring and squid fisheries. Typically vessels in these fisheries catch and land large volumes of their target species. If there is sufficient catch, some whiting and red hake may also be landed. This alternative could reduce discards

of whiting and red hake, but is more likely to have negligible or neutral impact on the target species (in this case, whiting and red hake).

6.2.3.3.2.5 Alternative 4

This alternative would exempt vessels using small-mesh trawls in specific exemption areas from the Incidental Permit possession limits, allowing the vessels to land the same amounts of whiting and red hake as vessels that hold limited access permits. These any exemption areas require the use a more selective raised footrope trawl.

The catch rates of non-target species are somewhat lower in raised footrope trawls than in standard 2- and 4-seam trawls that have the same cod-end mesh (see analysis in Section 5.1.4). This is particularly true for benthic species, e.g. flounders, skates, and monkfish but there are few differences in bycatch of roundfish (cod, haddock, pollock, etc) and red hake. Because these nets are used in different exemption areas and in different seasons, it is difficult to say how much of the reduction is due to net configuration and how much is due to other factors (i.e. where and when fishing occurs). There are no recent paired trawl or side-by-side comparisons in the same season and area (some vessels are known to voluntarily use a raised footrope trawl in Cultivator Shoals, but there are no such observations in the sea sampling or at-sea monitoring data sets. Direct catch comparisons using an experimental rope trawl were conducted by Cornell University researchers in the Cultivator Shoals Area, but the gear is not currently required in an exemption area and does not apply to this alternative.

While the catch rates (discards to total kept, or $\sum D/\sum Kall$) are lower when a raised footrope trawl is used than a for standard trawl for benthic species, the catch rates for roundfish and red hake are at comparable levels. Thus, the measure is unlikely to reduce red hake catch and may even increase it if the fishery continues to expand in the northern exemption areas where the raised footrope trawl is required. **Compared to Alternative 1 and No Action, Alternative 4 is likely to have a neutral to slightly negative impact on northern silver hake and a small negative impact on northern red hake, while having a neutral impact to southern whiting and red hake (because it is unlikely to cause an effort shift and there are no areas in the southern management area that require a raised footrope trawl.**

Table 54. Action 3 incidental permit alternatives summary (permit conditions) - Potential impact of the action alternatives on the target species.

Alts.	Permit allowances	Potential impact of the action alternatives on the target species.
1	Prevents vessels that do not qualify for limited access from targeting whiting and red hake in the exemption areas.	Positive • Limits discards of whiting and red hake,
2a	Allow large-mesh on monkfish DAS or groundfish to exceed incidental whiting and red hake possession limits.	Positive impact • Reduces discards of target species
2b	Prohibit fishing for small-mesh multispecies on groundfish DAS. If fishing on groundfish DAS, the possession limit be 2,000 lbs. (whiting) and 400 lbs. (red hake).	Negative impact • Increases discards of target species
3	Allow fishing for Atlantic herring or squids with limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits.	Positive impact • Reduces discards of target species
4	Allows vessels to fish in exemption areas requiring a raised footrope trawl.	Neutral to slightly negative impact on northern silver hake and a small negative impact on northern red hake, while having a neutral impact to southern whiting and red hake • Potential to increase effort on northern silver hake • Gear does not appear to be more selective to reduce red hake catch • No raised footrope trawl areas are in the southern management area

6.3 Biological Impacts of the Directed Fishery on Non-target Species

Our analysis of bycatch (discard to kept-all, D/Kall) ratios during 2014-2016 for 21 discarded species for the small-mesh whiting fishery (vessels using small-mesh trawls on trips landing more than 2,000 lbs. of whiting or 400 lbs. of red hake) was unable to detect a reliable difference in catch rates for vessels that would potentially qualify for a small-mesh multispecies fishery limited access permit and potential non-qualifiers. A formal Analysis of Variance was conducted on the D/Kall ratios (including hauls where no catch for a species was observed) was conducted on red hake, haddock, and yellowtail flounder (see Appendix B). The PDT also examined box-whisker plots for these three and 18 other discarded species D/Kall rates to detect if it was likely that there would be differences for qualifying and non-qualifying vessels.

More apparent were differences in discard rates by trawl type, with catch rates for the raised footrope trawl being much lower than a standard 2- or 4-seam trawl. These differences were however confounded by the use of various types of gear being associated with specific exemption areas and seasons, Small-Mesh Area I (raised footrope trawl required) vs. the Cultivator Shoals Area (no selective trawl gear required), for example. There were no observed tows in the Cultivator Shoals Area on vessels that were voluntarily using the raised footrope trawl. Differences in catch rates by gear type may have been

associated with bycatch rates from different areas and season. Therefore, no further evaluation of discards by trawl type were conducted.

Average annual discard estimates and the proportion of discards associated with qualifying and non-qualifying vessels are summarized in the following two tables. Because the PDT could not detect a reliable difference in discard rates by qualification category, the discard rate was applied to total landings on whiting trips by year, quarter, and small-mesh multispecies management area (north vs. south).

Bycatch estimates in the northern management area

In the northern management area, the top five discarded species by estimated weight were haddock (709 mt), spiny dogfish (346 mt), red hake (360 mt), winter skate (210 mt), and Atlantic herring (202 mt). Red hake have their own ACL and have been overfished. Yellowtail flounder has a sub-ACL assigned to it for the Cultivator Shoals Area and small-mesh catches had exceeded it in 2013. Haddock has no sub-ACL for the small-mesh multispecies fishery, but has become an issue as discards increased following the appearance of a very large 2013 year class. The third quarter haddock discard rate increased from 0.125 on 223 tows in 2014 to 0.192 on 172 tows in 2015, and to 0.282 on 123 tows in 2016.

Overall, potentially qualifying vessels are estimated to account for 89 to 98% of the total discards of 21 species for the northern management area (see table below). Haddock discards are estimated to be an annual average of 709 mt (0.248 lbs. discard/1 lb. kept; 90-98% by qualifying vessels), followed by 346 mt of spiny dogfish (0.170 lbs. discard/1 lb. kept; 88-98% by qualifying vessels), 360 mt of red hake (0.091 lbs. discard/1 lb. kept; 87-99% by qualifying vessels), 210 mt of winter skate (0.066 lbs. discard/1 lb. kept; 89-97% by qualifying vessels), and 202 mt of Atlantic herring (0.051 lbs. discard/1 lb. kept; 85->99% by qualifying vessels). There are important differences between the proportion of discards by qualifying vessels for Atlantic herring, although this is not a stock with concerns about discards. The estimated yellowtail flounder discards average 8 mt/yr (0.004 lbs. discard/1 lb. kept; 81 to 92%) by qualifying vessels.

Table 55. Estimated **northern management area** discards for the 2014-2016 small-mesh multispecies fishery, by Action 1 limited access alternative, does not total to 100% due to rounding.

	Alternative				
Species	**1**	**2**	**3**	**4**	**5**
All species					
Category I	68%	67%	86%	86%	60%
Category II	22%	26%	12%	12%	28%
Non-qualifiers	10%	7%	2%	2%	11%
Haddock	**709**	**mt/yr**			
Category I	73%	71%	87%	87%	64%
Category II	20%	23%	11%	11%	25%
Non-qualifiers	8%	6%	2%	2%	10%
Spiny dogfish	**346**	**mt/yr**			
Category I	71%	70%	85%	85%	59%
Category II	20%	23%	12%	12%	29%
Non-qualifiers	10%	7%	2%	2%	12%
Red hake	**360**	**mt/yr**			
Category I	61%	60%	84%	84%	57%
Category II	26%	30%	15%	15%	29%
Non-qualifiers	12%	10%	1%	1%	13%
Winter skate	**210**	**mt/yr**			
Category I	69%	67%	85%	85%	62%
Category II	23%	26%	12%	12%	28%
Non-qualifiers	9%	6%	3%	3%	11%
Atlantic herring	**202**	**mt/yr**			
Category I	58%	58%	84%	84%	55%
Category II	27%	31%	16%	16%	31%
Non-qualifiers	15%	12%	0%	0%	14%
Silver hake	**164**	**mt/yr**			
Category I	69%	68%	88%	88%	60%
Category II	24%	28%	11%	11%	32%
Non-qualifiers	7%	4%	2%	2%	8%
Little skate	**87**	**mt/yr**			
Category I	69%	67%	85%	85%	60%
Category II	22%	26%	12%	12%	29%
Non-qualifiers	9%	7%	3%	3%	11%
American plaice	**16**	**mt/yr**			
Category I	70%	69%	87%	87%	63%
Category II	22%	25%	11%	11%	27%
Non-qualifiers	8%	6%	2%	2%	10%

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Species	Alternative 1	2	3	4	5
Witch flounder	**16**	**mt/yr**			
Category I	57%	57%	84%	84%	53%
Category II	31%	35%	15%	15%	36%
Non-qualifiers	11%	8%	1%	1%	11%
Barndoor skate	**12**	**mt/yr**			
Category I	70%	69%	85%	85%	62%
Category II	19%	23%	13%	13%	25%
Non-qualifiers	11%	9%	2%	2%	13%
White hake	**10**	**mt/yr**			
Category I	54%	53%	82%	82%	53%
Category II	31%	35%	17%	17%	33%
Non-qualifiers	14%	12%	1%	1%	14%
Yellowtail flounder	**8**	**mt/yr**			
Category I	73%	72%	86%	86%	63%
Category II	17%	20%	11%	11%	24%
Non-qualifiers	10%	8%	2%	2%	12%
Summer flounder	**7**	**mt/yr**			
Category I	81%	80%	93%	93%	70%
Category II	13%	16%	6%	6%	21%
Non-qualifiers	6%	4%	1%	1%	9%
Winter flounder	**5**	**mt/yr**			
Category I	82%	80%	91%	91%	69%
Category II	11%	14%	7%	7%	20%
Non-qualifiers	7%	6%	2%	2%	11%
Monkfish	**4**	**mt/yr**			
Category I	72%	70%	86%	86%	60%
Category II	20%	23%	12%	12%	29%
Non-qualifiers	9%	6%	2%	2%	11%
Windowpane flounder	**3**	**mt/yr**			
Category I	79%	78%	88%	88%	67%
Category II	12%	15%	10%	10%	22%
Non-qualifiers	9%	7%	2%	2%	12%
Butterfish	**3**	**mt/yr**			
Category I	79%	77%	89%	89%	68%
Category II	13%	16%	9%	9%	21%
Non-qualifiers	8%	6%	2%	2%	12%

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Species	Alternative 1	2	3	4	5
Cod	**1**	**mt/yr**			
Category I	79%	78%	90%	90%	68%
Category II	14%	17%	8%	8%	23%
Non-qualifiers	6%	5%	2%	2%	8%
Thorny skate	**1**	**mt/yr**			
Category I	87%	87%	95%	95%	70%
Category II	10%	12%	5%	5%	26%
Non-qualifiers	3%	2%	1%	1%	3%
Ocean pout	**1**	**mt/yr**			
Category I	71%	69%	84%	84%	59%
Category II	18%	22%	13%	13%	26%
Non-qualifiers	11%	9%	3%	3%	14%
Smooth skate	**0**	**mt/yr**			
Category I	98%	98%	100%	100%	68%
Category II	2%	2%	0%	0%	32%
Non-qualifiers	0%	0%	0%	0%	0%

Bycatch estimates in the southern management area

In the southern area, the ranking of discarded species is different and the amounts are much larger than in the northern management area. Additionally, the proportion of total estimated discards is generally higher for non-qualifying vessels than it is in the northern management area.

In the southern management area (see table below), the top five discarded species are 2,656 mt/yr of spiny dogfish (0.271 lbs. discard/1 lb. kept; 81 to 91% by qualifying vessels, followed by 2,432 mt/yr of red hake (0.241 lbs. discard/1 lb. kept ; 82 to 92% by qualifying vessels), 1300 mt of silver hake (0.104 lbs. discard/1 lb. kept; 83 to 93% by qualifying vessels), 996 mt of butterfish (0.088 lbs. discard/1 lb. kept; 80 to 91% by qualifying vessels), and 909 mt of little skate (0.085 lbs. discard/1 lb. kept; 80 to 91% by qualifying vessels). The estimated yellowtail flounder discards average 30 mt/yr (0.003 lbs. discard/1 lb. kept; 81 to 92%) by qualifying vessels.

Table 56. Estimated **southern management area** discards for the 2014-2016 small-mesh multispecies fishery, by Action 1 limited access alternative, does not total to 100% due to rounding.

	Alternative				
Species	**1**	**2**	**3**	**4**	**5**
All species					
Category I	65%	51%	67%	67%	57%
Category II	17%	41%	22%	22%	24%
Non-qualifiers	18%	8%	12%	10%	19%
Spiny dogfish	**2,656**	**mt/yr**			
Category I	66%	53%	67%	67%	58%
Category II	15%	38%	21%	22%	23%
Non-qualifiers	19%	9%	12%	11%	19%
Red hake	**2,432**	**mt/yr**			
Category I	66%	52%	68%	68%	58%
Category II	17%	40%	21%	22%	24%
Non-qualifiers	17%	8%	11%	10%	18%
Silver hake	**1,308**	**mt/yr**			
Category I	63%	49%	67%	69%	56%
Category II	21%	44%	22%	22%	27%
Non-qualifiers	16%	7%	11%	10%	17%
Butterfish	**996**	**mt/yr**			
Category I	65%	50%	67%	67%	57%
Category II	18%	42%	22%	22%	25%
Non-qualifiers	17%	8%	11%	10%	18%
Little skate	**909**	**mt/yr**			
Category I	61%	46%	64%	65%	53%
Category II	20%	45%	22%	23%	27%
Non-qualifiers	19%	9%	13%	12%	20%
Summer flounder	**410**	**mt/yr**			
Category I	66%	52%	67%	67%	58%
Category II	15%	39%	21%	22%	23%
Non-qualifiers	18%	9%	12%	11%	19%
Haddock	**328**	**mt/yr**			
Category I	66%	53%	67%	68%	58%
Category II	16%	39%	21%	22%	23%
Non-qualifiers	18%	8%	11%	10%	18%
Barndoor skate	**327**	**mt/yr**			
Category I	65%	51%	66%	66%	57%
Category II	16%	40%	22%	23%	24%
Non-qualifiers	19%	9%	12%	10%	20%

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	Alternative				
Species	**1**	**2**	**3**	**4**	**5**
Winter skate	**326**	**mt/yr**			
Category I	64%	49%	65%	66%	55%
Category II	17%	42%	22%	22%	25%
Non-qualifiers	19%	9%	13%	12%	19%
Monkfish	**223**	**mt/yr**			
Category I	63%	49%	65%	66%	55%
Category II	17%	41%	21%	21%	24%
Non-qualifiers	20%	10%	14%	13%	21%
Ocean pout	**72**	**mt/yr**			
Category I	67%	55%	68%	68%	59%
Category II	17%	36%	24%	25%	23%
Non-qualifiers	17%	9%	8%	7%	18%
Witch flounder	**66**	**mt/yr**			
Category I	69%	55%	69%	70%	61%
Category II	15%	37%	20%	21%	22%
Non-qualifiers	16%	8%	11%	10%	17%
Atlantic herring	**40**	**mt/yr**			
Category I	69%	59%	70%	70%	63%
Category II	13%	32%	20%	21%	19%
Non-qualifiers	18%	9%	10%	9%	18%
Winter flounder	**40**	**mt/yr**			
Category I	59%	41%	63%	64%	50%
Category II	24%	51%	24%	24%	30%
Non-qualifiers	17%	8%	12%	11%	20%
Yellowtail flounder	**30**	**mt/yr**			
Category I	60%	44%	64%	66%	52%
Category II	22%	48%	24%	23%	28%
Non-qualifiers	18%	8%	12%	11%	19%
Windowpane flounder	**24**	**mt/yr**			
Category I	62%	46%	65%	67%	54%
Category II	21%	47%	24%	23%	28%
Non-qualifiers	17%	8%	11%	10%	18%
White hake	**4**	**mt/yr**			
Category I	65%	48%	67%	66%	56%
Category II	18%	45%	21%	23%	26%
Non-qualifiers	17%	8%	12%	11%	18%

Continuation of table on previous page

Species	Alternative 1	2	3	4	5
Cod	**3**	**mt/yr**			
Category I	63%	50%	63%	64%	54%
Category II	15%	39%	23%	23%	24%
Non-qualifiers	22%	11%	14%	13%	22%
American plaice	**0**	**mt/yr**			
Category I	65%	49%	67%	67%	55%
Category II	18%	45%	23%	23%	28%
Non-qualifiers	17%	6%	10%	9%	17%

It is important to keep in mind that whiting fishing is relatively concentrated, restricted either by exemption area regulations and/or by availability of commercial concentrations of fish. It is likely that any changes in fishing effort will occur in the same areas that are currently fished. Increases in fishing effort are likely to occur in areas currently fished and the intensity of fishing will change, but would not expand into new areas.

6.3.1 No Action (Preferred)

This alternative, described in Section 4.1, would continue the existing open access small-mesh multispecies fishery. Any vessel would be able to obtain a Category K multispecies permit and target small-mesh multispecies in exemption areas.

This alternative would allow more vessels to enter the fishery to target whiting and red hake using small-mesh trawls. It could make existing regulations less effective to manage small-mesh multispecies catches, than they would otherwise be with limited access in effect. Moderate increases in whiting catches would not cause overfishing, but increases in red hake catches could cause overfishing in the northern management area and exacerbate overfishing in the southern management area.

If the Council does not implement limited access through this amendment, it will need to take more drastic actions later to respond when overfishing occurs, or catches exceed specifications. Several general measures could be applied, depending on the type and severity of the problem. Measures that could reduce non-target catches include requiring more selective gears (although no gear has yet been identified to separate red hake and whiting catch), closed seasons (e.g. when the bycatch rate relative to the target species is highest), and closed areas (e.g. where the bycatch rate relative to the target species is highest). It is difficult to assess the severity of impacts on red hake, because we cannot forecast the effectiveness of these measures (which are currently unknown). It does however take time to identify the problem (at least during the next annual monitoring report) and prepare a framework action or amendment to address it. Furthermore, increases in small-mesh multispecies fishing effort by new entrants could dilute the effectiveness of technical measures to limit catches of red hake. Also, if the catches of whiting increase or if future specifications decline, the Council would be forced to cut small-mesh multispecies fishing effort, either by reducing whiting possession limits, shortening seasons, or by initiating other measures. Again, these other measures would be less effective if new entrants enter the fishery.

Due to the higher difficulty of managing bycatch, particularly the catches of choke species, this alternative is expected to have a low negative impact on non-target species in the short term and a

potential large impact on non-target species in the long term if the catches cannot be effectively controlled.

6.3.2 Whiting Possession Limit for Vessels Using 3-inch and larger Cod-End Mesh Trawls

The possession limits in this set of three alternatives would apply to any vessel Using 3-inch and larger mesh to target small-mesh multispecies in all areas, including areas that are exempt from the large-mesh NE Multispecies regulations.

6.3.2.1 Alternative 1 (Preferred; No Action) – Existing small-mesh multispecies possession limits apply

This alternative would retain the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the current whiting possession limits are 30,000 lbs. in the northern area and 40,000 lbs. in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species. Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area.

In season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger

The current limits and other measures have prevented overfishing of whiting, but overfishing of northern red hake has occurred for a few recent years and for southern red hake began in 2016. Since these occurrences, the specifications have been adjusted to account for changes in stock biomass and accountability measures have been adjusted to prevent future overfishing. New specifications for southern red hake are expected to take effect in fishing year 2018 and current landings are likely to trigger the in-season accountably measure, reducing the red hake possession limit to 400 lbs.

Particularly in an open access fishery, this No Action alternative is expected to have a low negative effect on non-target species. On one hand, any removals have a negative effect on bycatch species and on the other hand increasing fishing effort as has been observed lately in the northern management area could increase bycatch.

6.3.2.2 Alternative 2 – Raise the Whiting possession limit from 40,000 to 50,000 lbs., January 1 to June 14 in the Southern New England and Mid-Atlantic exemption areas

This alternative would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. during the winter/spring season, only in the southern management area. Because the whiting possession limit has not been more than 40,000 lbs. in almost two decades, there is little quantitative information about the potential effects.

Because the Alternative 2 possession limits exceed No Action, vessels could land similar amounts of whiting as they do now. Vessels might also land the higher possession limit, up to 50,000 lbs., lengthening their fishing trips and increasing effort per trip. Vessels may take the same number of trips of longer duration than they would with a 40,000 lbs. possession limit, or they might take fewer trips, and keep total landings the same. This alternative could provide an incentive to fish in the southern area during January 1-June 14.

Vessels in the southern management area could, as a result of the higher possession limit, land more whiting and red hake (at least that is the intent). Northern red hake, northern silver hake, and southern whiting are not overfished and overfishing is not occurring. In the past several years, landings have been well below the silver hake and whiting TALs and their catch has been well below the ABC. Although a higher catch of southern whiting would increase mortality compared to Alternative 1 and Alternative 3, it is not expected to have a negative impact on northern red hake.

On the other hand, southern red hake is often not a target species in the fishery and recent red hake landings have been 9% more than the expected 2018-2020 TAL. Southern red hake catch also caused overfishing in 2016. Any increases in small-mesh multispecies fishing effort in the southern management area could cause increases in southern red hake catch and bycatch of other species such as yellowtail flounder (Georges Bank yellowtail flounder is overfished and a sub-ACL is allocated to the small-mesh multispecies fishery). **These potential increases in southern red hake catch and bycatch of other species means that Alternative 2 is, compared to No Action, expected to have a negative effect on non-target species in the southern management area and a low positive impact on non-target species in the northern management area due to a small potential effort shift.**

6.3.2.3 Alternative 3 – Lower the Whiting possession limit from 40,000 to 30,000 lbs., June 15 to December 31 in the Southern New England and Mid-Atlantic exemption areas

Alternative 3 would decrease the whiting possession limit for about half of the year in the southern management area. During the summer and fall, a 30,000 lbs. whiting possession limit would be in effect in both management areas. It is intended to reduce the effect of southern area landings on market prices for whiting in all areas.

This alternative has several types of potential impacts, changing the number of trips taken or changing the location or season when small-mesh multispecies trips are taken. It may induce more vessels to fish additional trips to catch and land the same amount as they do under the existing limit. In this case, total fishing effort would probably remain the same as it is now.

Trips during the summer and fall would be less profitable than they are presently, thus potentially causing vessels to take more trips during the winter when a higher possession limit applies or shift some fishing activity to the northern area, if it is advantageous for the vessel to do so. The most likely impact of a seasonal whiting possession limit reduction is to change the distribution of trips, either seasonally within the southern management area or spatially, to the northern area.

It is possible that reducing the southern management area whiting possession limit could reduce fishing pressure on red hake and other non-target species, with a small potential for shifting effort into the northern management area, particularly during the summer and fall. **Thus, compared to No Action, this alternatives is expected to have a low positive impact on red hake and bycatch species in the southern management area and a low negative impact on non-target species in the northern management area.**

6.3.3 Limited Access Alternatives

6.3.3.1 Action 1 – Qualification criteria

The alternatives in Action 1 consider establishing a limited access program for the small-mesh multispecies fishery, targeting whiting and red hake using 3-inch or smaller mesh in areas that are exempt from the large-mesh groundfish regulations. In addition to No Action, there are five alternatives with

different qualification criteria and periods. In addition to a cores set of vessels that would qualify for all alternatives (20 Category I and 37 Category II), each alternative qualifies a different set of vessels that landed whiting or red hake at various times. The qualification period for Alternatives 1, 2, and 5 ends at the control date, but the qualification period for Alternative 3 and 4 extend to the end of calendar year 2016. For all alternatives, qualifiers would be able to fish in the small mesh multispecies exemption areas, subject to the possession limits specified in Section 4.3.2 and the permit allowances specified in Section 4.3.3. Depending on the alternatives selected in Action 3 (Section 4.3.3), the vessels may not be able to use small mesh in the exemption areas, unless they are permitted to fish for other small-mesh species, such as squid and herring. Non-qualifying vessels would no longer be allowed to land more than 2,000 lbs. of whiting and 400 lbs. of red hake.

6.3.3.1.1 No Action

This alternative, described in Section 4.1, would continue the existing open access small-mesh multispecies fishery. Any vessel would be able to obtain a Category K multispecies permit and target small-mesh multispecies in exemption areas.

Compared to any of the action alternatives, No Action is expected to have a negative impact on non-target species, because it would not put a cap on fishing effort (other than that created by the whiting and red hake ACLs), more vessels could enter the fishery, and regulations to control bycatch could be much less effective than if a limited access program existed.

6.3.3.1.2 Alternative 1

This alternative is expected to quality 40 Category I and 74 Category II vessels. Thirty-three (33) Category I and 38 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 42 non-qualifying vessels and 15 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

This alternative is expected to have a more positive impact on non-target species than all alternatives except for Alternative 5. For all estimated species, the proportion of bycatch associated with qualifying vessel is estimated to be 90% in the northern management area and 82% in the southern management area. The proportions by species are very like the total, except for herring in the northern management area, which ranked lowest in qualifier catches than any alternative. Details by species and alternative are in Table 55 and Table 56.

6.3.3.1.3 Alternative 2

This alternative is expected to qualify 20 Category I and 203 Category II vessels. Nineteen (19) Category I and 69 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 25 non-qualifying vessels and 15 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

In the northern management area, this alternative is expected to have a more positive impact on non-target species than No Action and Alternatives 3 and 4, but a less positive impact than Alternatives 1 and 5. For all estimated species, the proportion of bycatch associated with qualifying vessel is estimated to be 93% in the northern management area. The proportions by species are very like the total, including for herring.

In the southern management area, this alternative ranked less positive than any alternative except No Action. This is because Alternative 2 would qualify more Category II vessels than any other alternative, and most of those vessels fish for whiting in the southern management area. Details by species and alternative are in Table 55 and Table 56, respectively.

6.3.3.1.4 Alternative 3

This alternative is expected to quality 51 Category I and 90 Category II vessels. Nineteen (44) Category I and 46 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 48 non-qualifying vessels that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

In the northern management area, this alternative is expected to have a more positive impact on non-target species than all alternatives except for No Action, but equal to Alternative 4. For all estimated species, the proportion of bycatch associated with qualifying vessel is estimated to be 98% in the northern management area. The proportions by species are very like the total, except for herring where qualifying vessels account for 100% of the estimated bycatch.

In the southern management area, this alternative ranked more positive than Alternatives 2 and 4, but less positive than Alternatives 1 and 5. The proportion of discards by qualifying vessels is estimated to be 88% and individual species have similar proportions by qualifying vessels. Details by species and alternative are in Table 55 and Table 56, respectively.

6.3.3.1.5 Alternative 4

This alternative is expected to quality 55 Category I and 124 Category II vessels. Forty-two (42) Category I and 38 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 48 non-qualifying vessels that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

In the northern management area, this alternative is expected to have a more positive impact on non-target species than all alternatives except for No Action, but equal to Alternative 3. For all estimated species, the proportion of bycatch associated with qualifying vessel is estimated to be 98% in the northern management area. The proportions by species are very like the total, except for herring where qualifying vessels account for 100% of the estimated bycatch.

In the southern management area, this alternative ranked more positive than Alternatives 2 and 4, but less positive than Alternatives 1 and 5. The proportion of discards by qualifying vessels is estimated to be 88% and individual species have similar proportions by qualifying vessels. Details by species and alternative are in Table 55 and Table 56, respectively.

6.3.3.1.6 Alternative 5

This alternative is expected to quality 84 Category I and 159 Category II vessels. Forty-three (43) Category I and 30 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 45 non-qualifying vessels and 10 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

In the northern and management areas, this alternative is expected to have the most positive impact on non-target species than any alternative. For all estimated species, the proportion of bycatch associated with qualifying vessel is estimated to be 81% in both areas, with proportions of estimated discards for qualifiers about the same level for all the discarded species in the small-mesh multispecies fishery. Details by species and alternative are in Table 55 and Table 56, respectively.

The positive impact of this alternative is however mitigated by the fact that it is associated with much more latent effort than the other qualification alternatives. It is not possible to quantify this consideration and compare it to the estimated proportion of discards by qualifying vessels. One could apply the same discards for non-qualifying vessels that were fishing in 2014-2016 to vessels that fished during the qualification period but not since. Doing this would be a bit unfair and inaccurate because we cannot evaluate whether those vessels would re-enter the fishery. Some of those permits may have been retired by buy-out, vessel transfer, or loss of business.

6.3.3.2 Action 2 - Possession limit alternatives

The alternatives in Action 2 propose adjustments to the whiting possession limits, primarily to adjust the capacity of the small-mesh multispecies fleet to land whiting and to minimize negative effects on price. These possession limits would apply to either vessels qualifying for a Category I or II permit, or to both (i.e. the same possession limit would apply to both permit categories.

In addition, Action 2 includes an alternative that would establish an incidental possession limit for whiting and an incidental limit for red hake. These incidental possession limits would apply to all fishing activity by vessels that do not have a Category I or II permit, regardless of mesh or gear in use. Depending on the final alternatives selected in Action 3 (Section 4.3.3), vessels with an incidental permit may be able to exceed the incidental possession limits if they are participating in another limited access small-mesh fishery, such as herring or squid.

6.3.3.2.1 Whiting[23] Possession Limit for Vessels with a Category I Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category I limited access permit. It is not possible to quantify the effect of changing a whiting possession limit on non-target species, but a qualitative evaluation is possible depending on how vessels would react to the change in the whiting possession limit associated with Alternatives 2 and 3.

6.3.3.2.1.1 Alternative 1 (Status quo)

For vessels holding a Category I limited access permit, this alternative would not change the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the current whiting possession limits are 30,000 lbs. in the northern area and 40,000 lb in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species. Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area.

In season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger

[23] Whiting includes silver and offshore hakes.

Although potentially applying to a smaller number of vessels than are currently fishing, if an action alternative is selection under Action 1 this alternative would not change the amount of fishing effort by these vessels.

Thus, no matter which alternative is chosen for Action 1, this alternative by itself would have a neutral impact on non-target species, but when combined with one of the limited access qualification alternatives in Action 1, it would have a positive impact on non-target species.

6.3.3.2.1.2 Alternative 2

For vessels holding a Category I limited access permit, this alternative would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. during the winter/spring season, only in the southern management area. Because the whiting possession limit has not been more than 40,000 lbs. in almost two decades, there is little quantitative information about the potential effects. This alternative may also be selected if No Action for Action 1 is chosen.

Because the Alternative 2 possession limits exceed No Action, vessels could land similar amounts of whiting as they do currently. Vessels might land the higher possession limit, up to 50,000 lbs., lengthening their fishing trips and increasing effort per trip. Vessels may take the same number of trips of longer duration than they would with a 40,000 lbs. possession limit, or they might take fewer trips, and keep total landings the same. This alternative could provide an incentive to fish in the southern area during January 1-June 14.

If vessels take more trips, because trips are more profitable with the higher whiting possession limit, this alternative is likely to have a negative impact on non-target species relative to Alternatives 1 and 3. This is particularly true for non-target species in the southern management area, because some vessel may take more trips there with the higher limit than elsewhere. In this case, in could have a small positive impact on non-target species in the northern management area. If on the other hand, vessels take fewer trips to land the same amount of whiting during the year, this alternative would have no effect on non-target species, or a neutral impact relative to status quo.

6.3.3.2.1.3 Alternative 3

For vessels holding a Category I limited access permit, this alternative would decrease the whiting possession limit for about half of the year in the southern management area. During the summer and fall, a 30,000 lbs. whiting possession limit would be in effect in both management areas. It is intended to reduce the effect of southern area landings on market prices for whiting in all areas. This alternative may also be selected if No Action for Action 1 is chosen.

This alternative has several types of potential impacts, changing the number of trips taken or changing the location or season when small-mesh multispecies trips are taken. It may induce more vessels to fish additional trips to catch and land the same amount as they do under the existing limit. In this case, total fishing effort would remain the same as it is now.

Trips during the summer and fall would be less profitable than they are presently, thus potentially causing vessels to take more trips during the winter when a higher possession limit applies or shift some fishing activity to the northern area, if it is advantageous for the vessel to do so.
In this case, the most likely impact is to change the distribution of trips, either seasonally within the southern management area or spatially, to the northern area.

This alternative would have the opposite effect as Alternative 2, reducing the duration or number of trips, depending on how fishermen react to the lower possession limit in the summer and fall. Therefore this alternative could have a neutral impact relative to status quo, or a neutral or positive impact relative to Alternative 2. Some vessels may be more likely to take small-mesh multispecies trips in the northern management area during the summer and fall, when the whiting possession limits would be equal in both areas. Relative to status quo, this alternative could have a slight negative impact on non-target species in the northern management area.

Table 57. Action 2 summary (Category I) - Potential impact of the action alternatives on non-target species.

Action 2 Alts.	**Whiting possession limit alternatives for vessels with a Category I permit**	**Affected areas**	**Affected categories**	**Affected seasons**	**Potential impact of the action alternatives on non-target species.**
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs. • Accountability Measures at 2,000 lbs. (whiting) and 400 lbs. (red hake).		Cat I	All	Positive impact when combined with an Action 1 alternative.
2	Increase whiting possession limit from 40,000 lbs. to 50,000 lbs.	South	Cat I	Winter, Spring	• Negative impact, particularly in the northern management area • Small positive impact in the southern management area
3	Decrease whiting possession limit to 30,000 lbs.	South	Cat I	Summer, Fall (Jun 15-Dec 31)	• Low positive impact in the southern management area • Low negative impact in the northern management area

6.3.3.2.2 Whiting[24] Possession Limit for Vessels with a Category II Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category II limited access permit. None of these alternatives would be applicable if No Action for Action 1 is chosen.

It is also not possible to quantify the effect of changing a whiting possession limit on non-target species, but a qualitative evaluation is possible depending on how vessels would react to the change in the whiting possession limit associated with Alternative 2. It is however less likely for an effort shift between northen and southern management areas for smaller vessels that would qualify for a Category II permit (see

[24] Whiting includes silver and offshore hakes.

Section ??? for a discussion about vessel size), particularly since most Category II vessels land less than 15,000 lbs. of whiting.

6.3.3.2.2.1 Alternative 1 (Status quo)

For vessels holding a Category II limited access permit, this alternative would not change the existing small-mesh multispecies possession limits. These limits are summarized under Alternative 1 in the previous section.

Although potentially applying to a smaller number of vessels than are currently fishing, if an action alternative is selection under Action 1 this alternative would not change the amount of fishing effort by these vessels.

Thus, no matter which alternative is chosen for Action 1, this alternative by itself would have a neutral impact on non-target species, but when combined with one of the limited access qualification alternatives in Action 1, it would have a positive impact on non-target species.

6.3.3.2.2.2 Alternative 2

This alternative would decrease the whiting possession limit in all management areas from 30,000 lbs. to 15,000 lbs. It is intended to create a whiting possession limit that is more consistent with the usual catches made by Category II vessels (see Section ??? analysis of landings per trip). During 2014-2016, only ???% of trips by vessels that are expected to qualify for a Category II permit had whiting landings that exceeded 15,000 lbs.

The proposed 15,000 lbs. whiting possession limit for this alternative is rarely exceeded by vessels that would qualify for Category II and they are typically smaller and less mobile than vessels with a Category I permit. It is therefore likely that this alternative will have a neutral impact on non-target species.

Table 58. Action 2 summary (Category II) - Potential impact of the action alternatives on non-target species.

Action 2 Alts.	**Whiting possession limit alternatives for vessels with a Category II permit**	**Affected areas**	**Affected categories**	**Affected seasons**	**Potential impact of the action alternatives on non-target species.**
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40,000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs.		Cat II	All	Positive impact when combined with an Action 1 alternative.
2	15,0000 whiting possession limit and no change to the red hake possession limits.	All	Cat II	All	Neutral impact

6.3.3.2.3 Incidental possession limits

Vessels that did not qualify for a Category I or II limited access permit would be regulated by the possession limits in the two alternatives below, regardless of the type of gear in use or the species that the vessel is targeting.

6.3.3.2.3.1 Alternative 1 (No Action)

This alternative would retain the existing whiting possession limits, even if an action alternative was chosen in Action 1 (limited access qualification). It might seem counter-intuitive at first, but choosing this alternative with a limited access qualification alternative would allow whiting and red hake possession limits to be adjusted by permit category when needed in the future.

The direct impact on non-target species would be unchanged from the status quo, but it could reduce the potential for increases in small-mesh multispecies fishing effort by additional non-qualified vessels. If an action alternative is chosen in Action 1, this alternative would have an indirect positive effect on non-target species because it is expected to limit increases in fishing effort, even though non-qualifying vessels would be able to continue targeting small-mesh multispecies. On the other hand, if new vessels begin fishing for small-mesh multispecies or increase their trips targeting whiting and red hake, this Alternative would have a negative effect on non-target species depending on the characteristics of fisheries that they reduced their effort. Therefore this alternative would have a neutral to negative effect on non-target species.

6.3.3.2.3.2 Alternative 2

This alternative would reduce the whiting and red hake possession limits to 2,000 lbs. and 400 lbs., respectively, for vessels that do not qualify for a small-mesh multispecies limited access permit (see Action 1). Due to relatively low prices for whiting and red hake, it is highly unlikely that non-qualifying vessels would take trips to target small-mesh multispecies. They may, however, continue or increase fishing effort into other fisheries.

Many non-qualifying vessels have permits for and experience with alternative fisheries (see Section ??? analysis of 2014-2016 fishing activity by non-qualifying vessels). Most fish in another trawl fishery for squids or herring, large-mesh groundfish, monkfish, or skates. Some also participated in the groundfish gillnet fishery.

With respect to effects on non-target species, these potential shifts in fishing effort could mitigate or reverse the effect of small-mesh multispecies limited access. Large-mesh trawl gears targeting groundfish, monkfish, and skates is thought to have a positive or negative effect on non-target species, relative to the same amount of fishing effort targeting small-mesh multispecies. Groundfish gillnet gear is thought to have a negative effect on non-target species, relative to the same amount of fishing effort targeting small-mesh multispecies. Small-mesh trawls used to target herrings and squids is likely to have a neutral impact on non-target species but there may be some redistribution of effort in time or space that could have a positive or negative effect.

Therefore this alternative could have a positive or negative effect through a reduction of small-mesh multispecies possession limits for non-qualifying vessels. It depends on whether and how they react to not being able to target small-mesh multispecies.

Table 59. Action 2 summary (non-qualifiers) - Potential impact of the action alternatives on non-target species.

Action 2 Alts.	Whiting possession limit alternatives	Affected areas	Affected categories	Affected seasons	Potential impact of the action alternatives on non-target species.
1	Retain existing whiting and red hake possession limits for non-qualifying vessels in Action 1	All	Non-qualifiers	All	Neutral to negative
2	Reduce possession limit for whiting at 2,000 lbs. and red hake at 400 lbs. for non-qualifiers in Action 1.	All	Non-qualifier	All	Positive or negative • Depends on whether and how non-qualifying vessels react to not being able to target small-mesh multispecies

6.3.3.3 Action 3 – Permit allowances

Alternatives in Action 3 only apply if an action alternative in Action 1 is chosen. Thus there is no No Action alternative specifically for Action 3.

6.3.3.3.1 Limited access permit characteristics and conditions

The alternatives in Action 3 would affect the characteristics and allowances of a small-mesh multispecies limited access permit. In most cases, the effects are purely administrative but could change compliance costs for vessels that have limited access permits in other fisheries. Small-mesh multispecies limited access permits that are most consistent with the existing permits held by the vessel would minimize costs and maximize opportunity. Many vessels that would potentially qualify for a Category I or II permit in the Action 1 alternatives have one or more of a large-mesh groundfish, an Atlantic herring permit, or a squid/mackerel/butterfish limited access permit (see Section ??? summarizing permits held by qualifying vessels). Table 3??? summarizes the similarities and differences among other limited access permits frequently held by vessels currently targeting small-mesh multispecies.

Because they potentially affect the quality or amount of vessels and/or fishing effort, Alternatives 2, 4, and 5 could have an effect on non-target species.

6.3.3.3.1.1 Alternative 1

Alternative 1 would apply the limited access permit characteristics for the Northeast (large mesh) Multispecies fishery to Category I and II permits for the small-mesh multispecies fishery (see Table 7). These include limits for permit accumulation, upgrade restrictions, and consideration of construction during the last year of a qualification period.

Alternative 1 is considered here to be a baseline to compare effects of other alternatives in Action 3. Although there is no existing limited access small-mesh multispecies permit, Alternative 1 serves as a proxy for status quo for analytical comparison since it is difficult to evaluate effects with respect to an open access Category K groundfish permit.

Thus Alternative 1 would have the same effects on non-target species that would apply to any action alternative in Action 1.

6.3.3.3.1.2 Alternative 2

This alternative would not establish any limits on holdings of limited access permits for the small-mesh multispecies fishery.

Although potentially reducing ownership costs, with respect to impacts on non-target species, the number and diversity of ownership is not expected to have a meaningful impact (i.e. neutral impact).

6.3.3.3.1.3 Alternative 3

This alternative would not allow consideration of construction or repair of vessels for the year preceding the end of the qualification period. It could therefore reduce the number of limited access permits for the small-mesh multispecies, potentially reducing effort in the fishery.

If non-qualifying vessels do not fish or shift to fisheries that have less impact on non-target species, this alternative would have a positive impact. Conversely, if they shift to fisheries that have a greater impact, this alternative would have a negative impact. Increase in fishing effort by qualifying vessels could mitigate the effects. Overall, this alternative is expected to have a neutral to positive impact on non-target species, because fewer vessels would qualify than they would under Alternative 1.

6.3.3.3.1.4 Alternative 4

This alternative would allow only one vessel to qualify based on a single history. In other words, a history could not be transferred to a replacement vessel AND qualify the original vessel (which may have been sold or transferred to a new owner). Thus, this alternative would qualify fewer vessels than the Alternative 1 baseline.

Because it has the same directional effect on qualification as Alternative 3 it would have similar but somewhat larger impacts to that alternative. If non-qualifying vessels do not fish or shift to fisheries that have less impact on non-target species, this alternative would have a positive impact. Conversely, if they shift to fisheries that have a greater impact, this alternative would have a negative impact. Increase in fishing effort by qualifying vessels could mitigate the effects. Overall, this alternative is expected to have a neutral to positive impact on non-target species, because fewer vessels would qualify than they would under Alternative 1.

6.3.3.3.1.5 Alternative 5

This alternative would allow upgrades of vessels that hold a limited access small-mesh multispecies fishery permit. It could allow, for example, a vessel to be more capable of fishing offshore or take more frequent trips (vessel becomes more seaworthy), increase hold capacity to take longer trips, or to tow larger trawls.

Although the fishery is limited by ACLs, there is room for increases in whiting catches and more fishing effort by qualifying vessels. Fishing offshore could affect the types of bottom where fishing occurs or the type and amount of bycatch. Fishing longer or more frequent trips implies an increase in fishing effort.

This alternative is expected to have a positive impact on non-target species found inshore, and a negative impact on non-target species offshore. Vessels holding a Northeast (large-mesh) Multispecies permit would however be prohibited from upgrading at the present time.

Table 60. Action 3 limited access permit alternatives summary (permit allowances) - Potential impact of the action alternatives on non-target species.

Alts.	Permit allowances	Potential impact of the action alternatives on non-target species.
1	Status quo. 5% cap on permits + upgrade restriction + consideration for construction at t_{-1} of qualification period.	Same as impacts associated with the selected Action 1 alternative
2	No limits on holdings of limited access permits for the small-mesh multispecies.	Neutral or no meaningful impact
3	No consideration for construction or repair of vessels for the year preceding the qualification period.	Neutral to positive impact • Fewer vessels would qualify for limited access
4	Only one vessel based on single history, i.e., history couldn't be transferred to a replacement vessel AND qualify the original vessel.	Neutral to positive impact • Fewer vessels would qualify for limited access
5	Allow upgrade of vessels that hold limited access multi-species fishery permit. (Upgrading is intended for distant fishing, fish frequently, more hold capacity, longer duration trips, and capability for taking more/large tows).	Positive impact for non-target species inshore Negative impact for non-target species offshore

6.3.3.3.2 Incidental permit conditions

Vessels holding an incidental permit would be able to land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, regardless of the type of gear in use or species targeted, unless one of the following alternatives is chosen. These alternatives only apply if an action alternative is selected from Action 1, hence there is no relevant status quo for Action 3.

6.3.3.3.2.1 Alternative 1

In addition to the incidental small-mesh multispecies fishery possession limits, vessels with an incidental possession limit permit would be prohibited from using small mesh trawls in small-mesh multispecies exemption areas.

This alternative would prevent vessels from targeting small-mesh multispecies on short, inshore trips despite not having a limited access small-mesh multispecies permit. As such, it potential has a positive impact on these non-target species.

It is impossible to quantify the potential to target small-mesh multispecies with an incidental permit under current or future regulatory or market conditions. This potential is thought to be currently limited by the relatively low whiting and red hake prices, although some vessels may otherwise use the incidental permit to fish for bait and sell the catch through the transfer at sea provision.

6.3.3.3.2.2 Alternative 2a

This alternative would allow vessels using large mesh on a groundfish or monkfish DAS to exceed the proposed incidental whiting and red hake possession limits.

This alternative is likely to have a positive impact on non-target species, because vessels would be able to land allowable limits of whiting and red hake without taking a special trip to target them, thus reducing overall effort.

6.3.3.3.2.3 Alternative 2b

This alternative would prohibit fishing for small-mesh multispecies on a groundfish DAS. While fishing on a groundfish DAS, the vessel could land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, even if the vessel holds a small-mesh multispecies fishery limited access permit.

This alternative could have a potential negative effect on non-target species, particularly if the vessels compensate for the prohibited landings by taking longer or more trips to target groundfish or other species (including small-mesh multispecies if they qualify for a limited access permit).

6.3.3.3.2.4 Alternative 3

Similar to Alternative 2a, this alternative would allow vessels fishing for Atlantic herring or squid with a limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits.

This alternative is likely to have a positive impact on non-target species, because vessels would be able to land allowable limits of whiting and red hake without taking a special trip to target them, thus reducing overall effort.

6.3.3.3.2.5 Alternative 4

This alternative would exempt vessels using small-mesh trawls in specific exemption areas from the Incidental Permit possession limits, allowing the vessels to land the same amounts of whiting and red hake as vessels that hold limited access permits. These any exemption areas require the use a more selective raised footrope trawl.

This alternative could allow continued expansion of the fishery in the Gulf of Maine, where the exemption areas require vessels to use a raised footrope trawl, designed to be more selective particularly effective for excluding flatfish (flounders, skates, and monkfish). Vessels that do not qualify for a limited access permit may travel to these specific exemption areas to target whiting and red hake, depending on the potential economic return and fishing opportunities that exist elsewhere. Not only could non-qualifying vessels shift fishing effort from other areas, but total small-mesh multispecies fishing in the Gulf of Maine could increase from entry by new or existing vessels that target other species.

Depending on how fishermen react to the opportunity, this alternative could increase catches of non-target roundfish (particularly haddock) and other non-flatfish species in areas that require a raised footrope trawl in the Gulf of Maine and around Cape Cod. It would not be very effective either to reduce the catches of red hake, because the raised footrope trawl does not appear to catch fewer red hake. Thus, depending on the species, this alternative is expected to have a low positive effect on flatfish species and a low negative effect on roundfish species and red hake.

Table 61. Action 3 incidental permit alternatives summary (permit conditions) - Potential impact of the action alternatives on non-target species.

Alts.	Permit allowances	Potential impact of the action alternatives on non-target species.
1	Prevents vessels that do not qualify for limited access from targeting whiting and red hake in the exemption areas.	Low positive impact on non-target species that are in exemption areas
2a	Allow large-mesh on monkfish DAS or groundfish to exceed incidental whiting and red hake possession limits.	Positive impact on non-target species • Vessels would be able to land allowable limits of whiting and red hake without taking a special trip to target them, thus reducing overall effort.
2b	Prohibit fishing for small-mesh multispecies on groundfish DAS. If fishing on groundfish DAS, the possession limit be 2,000 lbs. (whiting) and 400 lbs. (red hake).	Potential negative effect on non-target species • Vessels might compensate for the prohibited landings by taking longer or more trips to target groundfish or other species
3	Allow fishing for Atlantic herring or squids with limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits.	Same as Alternative 2a
4	Allows vessels to fish in exemption areas requiring a raised footrope trawl.	Low positive effect on flatfish species and a low negative effect on roundfish species and red hake

6.4 Biological Impacts on Protected Resources

Description of how impacts to protected resources were evaluated

It is important to keep in mind that whiting fishing is relatively concentrated relative to other fisheries having fewer gear, seasonal, and area restrictions. It is likely that any changes in fishing effort will occur in the same areas that are currently fished. Increases in fishing effort are likely to occur in areas currently fished and the intensity of fishing will change, but would not expand into new areas.

Section 5.2.4.1 summarizes the number of observed takes of protected species on trips using small-mesh trawls to target small-mesh multispecies (defined as trips landing at least 2000 lbs. of whiting or 400 lbs. of red hake). Of the 24 observed takes in 2007-2016, 20 (83%) are from catches of common dolphin (protected but not threatened or endangered). The remaining protected species were pilot whale (spp.), Risso's dolphin, Atlantic sturgeon (threatened), and a loggerhead sea turtle (threatened). The Atlantic sturgeon take was observed in the Cape Cod raised footrope trawl area, at the tip of Cape Cod where whiting fishing effort is infrequent. The loggerhead sea turtle take occurred between the southern tip of Long Island, NY and Block Island, RI, where there is some inshore whiting fishing activity. The pilot whale take was observed in the Cultivator Shoals Area, where whiting fishing regularly occurs. All other observed takes were scattered off of Southern New England and the SE edge of Georges Bank.

The impacts of the whiting fishery on protected species is slightly negative, especially compared with fisheries using fixed and other gears. In this context, alternatives that are expected to allow increases in fishing effort in the southern management area are assessed as being slightly negative (and vice versa) relative to No Action, while impacts that allow increases in fishing effort in the northern management

area are assessed as being neutral relative to No Action. It is not possible to quantify the amount of interactions with the whiting fishery under the various alternatives, because some of the impacts depend on market prices and fishing behavior that cannot be reliably predicted. The following factors were considered to determine whether impacts of an alternative were more positive (i.e. less effort) or more negative (i.e. more effort) than No Action:

- Amount of gear – mainly related to the number of vessels in the small-mesh multispecies fishery
- Duration of use – is the gear fished for a longer period during trips without a reduction in the number or duration of trips?
- Shifts in fishing effort – does the alternative tend to increase (or decrease) small-mesh multispecies fishing effort in areas where protected species are more prevalent?
- Total fishing effort – do the number of trips increase or do trips become longer when the number of trips remains constant?

Although the direct impacts on protected species is generally positive when effort or permitted vessels is reduced or limited by an alternative, it is likely that non-qualifying vessels that have been in the small-mesh multispecies fishery may redirect effort onto other species, provided that they have a permit to do so. These vessels could target squid or herring, which probably have about the same low degree of protected species impacts that is associated with the small-mesh multispecies fishery. On the other hand, some vessels also hold groundfish or lobster permits and may use gears that have a larger negative impact on protected species. Thus effort shifts caused by limited access and/or reduced opportunity to target small-mesh multispecies could have a small negative indirect protected species impact. The reason that the proposed alternatives would have a small negative indirect protected species impact is because the number of non-qualifying vessels that have been active in the small-mesh multispecies fishery has been relatively low, accounting for only two to five percent of small-mesh multispecies landings.

NMFS initiated a Section 7 consultation to examine the risk to right whales (an endangered species with a recent population decline), which could affect the small-mesh multispecies fishery. Directly, measures could be required to reduce interactions with right whales, but this is unlikely because no interactions between small-mesh multispecies fishing and right whales have been observed. It may be possible however that areas where small-mesh multispecies fishing occurs overlap areas of critical right whale habitat, which could trigger action. Indirectly, measures taken in other fisheries to protect right whales could cause more vessels to enter the small-mesh multispecies fishery as an alternative source of income. If more vessels enter the small-mesh multispecies fishery, it could have a negative impact on other protected species and make it more difficult to manage the small-mesh multispecies fishery without significant effects on existing fishery participants.

6.4.1 No Action (Preferred)

This alternative, described in Section 4.1, would continue the existing open access small-mesh multispecies fishery. Any vessel would be able to obtain a Category K multispecies permit and target small-mesh multispecies in exemption areas.

This alternative would allow more vessels to enter the fishery to target whiting and red hake using small-mesh trawls. It could make existing regulations less effective to manage small-mesh multispecies catches, than they would otherwise be with limited access in effect. Moderate increases in whiting catches would not cause overfishing, but increases in red hake catches could cause overfishing in the northern management area and exacerbate overfishing in the southern management area.

If the Council does not implement limited access through this amendment, it will need to take more drastic actions later to respond when overfishing occurs, or catches exceed specifications. Several general measures could be applied, depending on the type and severity of the problem. Measures that could reduce non-target catches include requiring more selective gears (although no gear has yet been identified to separate red hake and whiting catch), closed seasons (e.g. when the bycatch rate relative to the target species is highest), and closed areas (e.g. where the bycatch rate relative to the target species is highest).

It is difficult to assess the severity of impacts on protected species, because we cannot forecast the effectiveness of these measures (which are currently unknown) or when and where such measures would be in force. Furthermore, increases in small-mesh multispecies fishing effort by new entrants could dilute the effectiveness of technical measures to limit catches of red hake or other species that require catch reductions. Also, if the catches of whiting increase or if future specifications decline, the Council would be forced to cut small-mesh multispecies fishing effort, either by reducing whiting possession limits, shortening seasons, or by initiating other measures. Again, these other measures would be less effective if new entrants enter the fishery.

With respect to protected species, No Action would at face value allow more vessels to enter the fishery and increase the number of trips targeting whiting. The recent trend is an increasing number of vessels and trips fishing in the northern management area, where takes of protected species have not been observed. But increases in small-mesh multispecies fishing effort in the southern management area are also possible because the specifications (see Section 3.3.3.4) are higher than recent catch of whiting.

If effort does not increase with No Action, this alternative would have a slightly negative impact on protected species. If the number of vessels targeting whiting and red hake increases, then No Action would have a more negative impact, but still minor compared to impacts caused by other fisheries. Thus it is possible that vessels entering the small-mesh multispecies fishery may reduce trips targeting other species with gears and fishing methods that have a higher impact on protected species.

6.4.2 Whiting Possession Limit for Vessels Using 3-inch and larger Cod-End Mesh Trawls

The possession limits in this set of three alternatives would apply to any vessel using 3-inch or larger mesh to target small-mesh multispecies in all areas, including areas that are exempt from the large-mesh NE Multispecies regulations.

6.4.2.1 Alternative 1 (Preferred; No Action) – Existing small-mesh multispecies possession limits apply

This alternative would retain the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the current whiting possession limits are 30,000 lbs. in the northern area and 40,000 lbs. in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species. Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area.

In season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger

The current limits and other measures have prevented overfishing of whiting, but overfishing of northern red hake has occurred for a few recent years and for southern red hake began in 2016. Since these occurrences, the specifications have been adjusted to account for changes in stock biomass and

accountability measures have been adjusted to prevent future overfishing. New specifications for southern red hake are expected to take effect in fishing year 2018 and current landings are likely to trigger the in-season accountably measure, reducing the red hake possession limit to 400 lbs.

With respect to protected species, this alternative would have the same impact as the No Action alternative in Section 6.4.1. Some increases in fishing effort could be expected because recent catches are well below the whiting specifications. This alternative thus has a slight negative impact on protected species.

6.4.2.2 Alternative 2 – Raise the Whiting possession limit from 40,000 to 50,000 lbs., January 1 to June 14 in the Southern New England and Mid-Atlantic exemption areas

This alternative would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. during the winter/spring season, only in the southern management area. Because the whiting possession limit has not been more than 40,000 lbs. in almost two decades, there is little quantitative information about the potential effects.

Because the Alternative 2 possession limits exceed No Action, vessels could land similar amounts of whiting as they do now. Vessels might also land the higher possession limit, up to 50,000 lbs., lengthening their fishing trips and increasing effort per trip. Vessels may take the same number of trips of longer duration than they would with a 40,000 lbs. possession limit, or they might take fewer trips, and keep total landings the same. This alternative could provide an incentive to fish in the southern area during January 1-June 14.

Vessels in the southern management area could, as a result of the higher possession limit, land more whiting and red hake (at least that is the intent). Northern red hake and southern whiting are not overfished and overfishing is not occurring. In the past several years, landings have been well below the TAL and catch well below the ABC.

Because this alternative is expected to increase fishing effort (via number of trips, duration of trips, effort shifts from the northern management area), it will have a slight negative impact on protected species and a more negative impact on protected species (particularly on common dolphin) than No Action would have.

6.4.2.3 Alternative 3 – Lower the Whiting possession limit from 40,000 to 30,000 lbs., June 15 to December 31 in the Southern New England and Mid-Atlantic exemption areas

Alternative 3 would decrease the whiting possession limit for about half of the year in the southern management area. During the summer and fall, a 30,000 lbs. whiting possession limit would be in effect in both management areas. It is intended to reduce the effect of southern area landings on market prices for whiting in all areas.

This alternative has several types of potential impacts, changing the number of trips taken or changing the location or season when small-mesh multispecies trips are taken. It may induce more vessels to fish additional trips to catch and land the same amount as they do under the existing limit. In this case, total fishing effort would probably remain the same as it is now.

Trips during the summer and fall would be less profitable than they are presently, thus potentially causing vessels to take more trips during the winter when a higher possession limit applies or shift some fishing activity to the northern area, if it is advantageous for the vessel to do so. The most likely impact of a

seasonal whiting possession limit reduction is to change the distribution of trips, either seasonally within the southern management area or spatially, to the northern area.

Therefore, this alternative could reduce the number of trips and amount of fishing effort in the southern management area, where more takes of protected species have been observed. The fishery would still have a slight negative impact on protected species, but relative to No Action the alternative would have a positive impact on protected species.

6.4.3 Limited Access Alternatives

6.4.3.1 Action 1 – Qualification criteria

The alternatives in Action 1 consider establishing a limited access program for the small-mesh multispecies fishery, targeting whiting and red hake using 3-inch or smaller mesh in areas that are exempt from the large-mesh groundfish regulations. In addition to No Action, there are five alternatives with different qualification criteria and periods. In addition to a cores set of vessels that would qualify for all alternatives (20 Category I and 37 Category II), each alternative qualifies a different set of vessels that landed whiting or red hake at various times. The qualification period for Alternatives 1, 2, and 5 ends at the control date, but the qualification period for Alternative 3 and 4 extend to the end of calendar year 2016. For all alternatives, qualifiers would be able to fish in the small mesh multispecies exemption areas, subject to the possession limits specified in Section 4.3.2 and the permit allowances specified in Section 4.3.3. Depending on the alternatives selected in Action 3 (Section 4.3.3), the vessels may not be able to use small mesh in the exemption areas, unless they are permitted to fish for other small-mesh species, such as squid and herring. Non-qualifying vessels would no longer be allowed to land more than 2,000 lbs. of whiting and 400 lbs. of red hake.

6.4.3.1.1 Alternative 1

This alternative is expected to quality 40 Category I and 74 Category II vessels. Thirty-three (33) Category I and 38 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 42 non-qualifying vessels and 15 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

This alternative is expected to reduce the potential for increases in the number of vessels in the fishery. The amount of fishing effort could still increase because there is no regulatory restriction on the amount of trips a qualifying vessel may take and the whiting catches have been well below the ABC in both northern and southern management areas.

Thus, this alternative will still have a slight negative impact on protected species, but have a less negative impact than No Action. It would qualify more Category I vessels than Alternative 2, but less than the other alternatives. Vessels that would qualify for a Category II permit tend to be less active in the fishery than Category I vessels, but depending on the possession limits chosen for Category II may have more opportunity to increase small-mesh multispecies fishing effort. Alternative 1 qualifies fewer vessels than any other action alternative. On the basis of 2014-2016 fishing activity, vessels that qualify under Alternative 1 accounted for 94% of the small-mesh multispecies landings (Table 53???). This amount is equal to the landings by qualifiers in Alternative 5 and less than the amount landed in all other alternatives.

All other choices for Actions 2 and 3 being equal, Alternative 1 has more positive impacts (i.e. reduces effort) than Alternatives 2 to 4, but equal to the protected species impacts for Alternative 5. It should however be kept in mind that Alternatives 4 and 5 are associated with more latent effort (i.e. qualifiers not currently fishing in the small-mesh multispecies fishery) than any other alternative.

6.4.3.1.2 Alternative 2

This alternative is expected to qualify 20 Category I and 203 Category II vessels. Nineteen (19) Category I and 69 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 25 non-qualifying vessels and 15 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

This alternative is expected to reduce the potential for increases in the number of vessels in the fishery. The amount of fishing effort could still increase because there is no regulatory restriction on the number of trips a qualifying vessel may take and the whiting catches have been well below the ABC in both northern and southern management areas.

Thus, this alternative will still have a slight negative impact on protected species, but have a less negative impact than No Action. It would qualify for Category I the least number of vessels (accounting for 77% of 2014-2016 landings, Table 74) than any other alternative. On the other hand, the alternative would qualify the most vessels for Category II, which accounted for 29% of the landings. On the basis of 2014-2016 fishing activity, vessels that qualify under Alternative 2 accounted for 96% of the small-mesh multispecies landings (Table 74). This amount is more than Alternatives 1 and 5, equal to Alternative 4 (which is associated with more latent effort), and less than Alternative 3.

All other choices for Actions 2 and 3 being equal, Alternative 2 has more positive impacts (i.e. reduces effort) than Alternatives 3 to 5, but would have a negative impact relative to Alternative 1.

6.4.3.1.3 Alternative 3

This alternative is expected to quality 51 Category I and 90 Category II vessels. Nineteen (44) Category I and 46 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 48 non-qualifying vessels that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

This alternative is expected to reduce the potential for increases in the number of vessels in the fishery. The amount of fishing effort could still increase because there is no regulatory restriction on the number of trips a qualifying vessel may take and the whiting catches have been well below the ABC in both northern and southern management areas.

Thus, this alternative will still have a slight negative impact on protected species, but have a less negative impact than No Action. It would qualify more Category I vessels than Alternatives 1 and 2, but less than the other alternatives. Vessels that would qualify for a Category II permit tend to be less active in the fishery than Category I vessels, but depending on the possession limits chosen for Category II may have more opportunity to increase small-mesh multispecies fishing effort. Alternative 2 qualifies fewer vessels than any other action alternative, except Alternative 1, but more of the qualifying vessels have been active in the 2014-2016 small-mesh multispecies fishery. On the basis of 2014-2016 fishing activity, vessels that qualify under Alternative 2 accounted for 99% of the small-mesh multispecies landings (Table 74). This amount is more than all other alternatives, except for No Action.

All other choices for Actions 2 and 3 being equal, Alternative 3 has more negative impacts (i.e. reduces effort) than any other action alternative. It should however be kept in mind that Alternatives 4 and 5 are associated with more latent effort (i.e. qualifiers not currently fishing in the small-mesh multispecies fishery) than any other alternative.

6.4.3.1.4 Alternative 4

This alternative is expected to quality 55 Category I and 124 Category II vessels. Forty-two (42) Category I and 38 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 48 non-qualifying vessels that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

This alternative is expected to reduce the potential for increases in the number of vessels in the fishery. The amount of fishing effort could still increase because there is no regulatory restriction on the number of trips a qualifying vessel may take and the whiting catches have been well below the ABC in both northern and southern management areas.

Thus, this alternative will still have a slight negative impact on protected species, but have less impact than No Action. It would qualify more Category I vessels than any alternative except for Alternative 5. Vessels that would qualify for a Category II permit tend to be less active in the fishery than Category I vessels, but depending on the possession limits chosen for Category II may have more opportunity to increase small-mesh multispecies fishing effort. Alternative 4 qualifies more vessels than any other action alternative, except for Alternative 5, and is associated with more latent effort than Alternatives 1 to 3. On the basis of 2014-2016 fishing activity, vessels that qualify under Alternative 4 accounted for 96% of the small-mesh multispecies landings (Table 74). This amount is more than the landings by qualifiers in any alternative except for Alternative 3.

All other choices for Actions 2 and 3 being equal, Alternative 3 has more positive impacts (i.e. reduces effort) than Alternative 5, but more negative than the protected species impacts for Alternatives 1 to 3.

6.4.3.1.5 Alternative 5

This alternative is expected to quality 84 Category I and 159 Category II vessels. Forty-three (43) Category I and 30 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 45 non-qualifying vessels and 10 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

This alternative is expected to reduce the potential for increases in the number of vessels in the fishery. The amount of fishing effort could still increase because there is no regulatory restriction on the number of trips a qualifying vessel may take and the whiting catches have been well below the ABC in both northern and southern management areas.

Thus, this alternative will still have a slight negative impact on protected species, but have less impact than No Action. It would qualify more Category I vessels than any other alternative and is associated with the most latent effort (creating an opportunity for more vessels to enter the small-mesh multispecies fishery). Vessels that would qualify for a Category II permit tend to be less active in the fishery than Category I vessels, but depending on the possession limits chosen for Category II may have more opportunity to increase small-mesh multispecies fishing effort. Alternative 5 qualifies more vessels than

any other action alternative. On the basis of 2014-2016 fishing activity, vessels that qualify under Alternative 5 accounted for 94% of the small-mesh multispecies landings (Table 74). This amount is equal to the landings by qualifiers in Alternative 1 and less than the amount landed in all other alternatives.

All other choices for Actions 2 and 3 being equal, Alternative 5 has less positive impacts (i.e. reduces effort) than Alternatives 1 to 4.

6.4.3.2 Action 2 - Possession limit alternatives

The alternatives in Action 2 propose adjustments to the whiting possession limits, primarily to adjust the capacity of the small-mesh multispecies fleet to land whiting and to minimize negative effects on price. These possession limits would apply to either vessels qualifying for a Category I or II permit, or to both (i.e. the same possession limit would apply to both permit categories.

In addition, Action 2 includes an alternative that would establish an incidental possession limit for whiting and an incidental limit for red hake. These incidental possession limits would apply to all fishing activity by vessels that do not have a Category I or II permit, regardless of mesh or gear in use. Depending on the final alternatives selected in Action 3 (Section 4.3.3), vessels with an incidental permit may be able to exceed the incidental possession limits if they are participating in another limited access small-mesh fishery, such as herring or squid.

6.4.3.2.1 Whiting[25] Possession Limit for Vessels with a Category I Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category I limited access permit.

6.4.3.2.1.1 Alternative 1 (Preferred; Status quo)

For vessels holding a Category I limited access permit, this alternative would not change the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the current whiting possession limits are 30,000 lbs. in the northern area and 40,000 lb in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species. Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area.

In season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger

Although potentially applying to a smaller number of vessels than are currently fishing, if an action alternative is selection under Action 1, this alternative would not change the amount of fishing effort by these vessels. Coupled with an Action 1 alternative, this alternative would have a slight negative impact on protected species, but more positive than No Action because fewer vessels would be permitted to target small-mesh multispecies. It would have a small positive impact on protected species relative to Alternative 2 and a small negative impact relative to Alternative 3.

6.4.3.2.1.2 Alternative 2

[25] Whiting includes silver and offshore hakes.

For vessels holding a Category I limited access permit, this alternative would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. during the winter/spring season, only in the southern management area. Because the whiting possession limit has not been more than 40,000 lbs. in almost two decades, there is little quantitative information about the potential effects. This alternative may also be selected if No Action for Action 1 is chosen.

Because the Alternative 2 possession limits exceed No Action, vessels could land similar amounts of whiting as they do currently. Vessels might land the higher possession limit, up to 50,000 lbs., lengthening their fishing trips and increasing effort per trip. Vessels may take the same number of trips of longer duration than they would with a 40,000 lbs. possession limit, or they might take fewer trips, and keep total landings the same. This alternative could provide an incentive to fish in the southern area during January 1-June 14.

Because this alternative is intended to encourage fishing in the southern management area by either increasing fishing effort or causing an effort shift from the northern management area, it is expected to have a small negative impact relative to Alternatives 1 and 3. When coupled with one of the Action 1 limited access alternatives, it is expected to have a neutral impact on protected species relative to No Action.

6.4.3.2.1.3 Alternative 3

For vessels holding a Category I limited access permit, this alternative would decrease the whiting possession limit for about half of the year in the southern management area. During the summer and fall, a 30,000 lbs. whiting possession limit would be in effect in both management areas. It is intended to reduce the effect of southern area landings on market prices for whiting in all areas. This alternative may also be selected if No Action for Action 1 is chosen.

This alternative has several types of potential impacts, changing the number of trips taken or changing the location or season when small-mesh multispecies trips are taken. It may induce more vessels to fish additional trips to catch and land the same amount as they do under the existing limit. In this case, total fishing effort would remain the same as it is now.

Trips during the summer and fall would be less profitable than they are presently, thus potentially causing vessels to take more trips during the winter when a higher possession limit applies or shift some fishing activity to the northern area, if it is advantageous for the vessel to do so.
In this case, the most likely impact is to change the distribution of trips, either seasonally within the southern management area or spatially, to the northern area.

Because it has the potential to reduce effort in the southern management area where takes of protected species have been observed and reduce or limit the number of vessels targeting small-mesh multispecies, it has a small positive impact on protected species relative to Alternatives 1 and 2, as well as No Action.

Table 62. Action 2 summary (Category I) - Potential impact of the action alternatives on protected species.

Action 2 Alts.	Whiting possession limit alternatives for vessels with a Category I permit	Affected areas	Affected categories	Affected seasons	Potential impact of the action alternatives on protected species.
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs. • Accountability Measures at 2,000 lbs. (whiting) and 400 lbs. (red hake).		Cat I	All	
2	Increase whiting possession limit from 40,000 lbs. to 50,000 lbs.	South	Cat I	Winter, Spring	•
3	Decrease whiting possession limit to 30,000 lbs.	South	Cat I	Summer, Fall (Jun 15-Dec 31)	•

6.4.3.2.2 Whiting[26] Possession Limit for Vessels with a Category II Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category II limited access permit. None of these alternatives would be applicable if No Action is chosen.

6.4.3.2.2.1 Alternative 1 (Status quo)

For vessels holding a Category II limited access permit, this alternative would not change the existing small-mesh multispecies possession limits. These limits are summarized under Alternative 1 in the previous section.

Although applying to a smaller number of vessels than are currently fishing, this alternative would not change the amount of fishing effort by these vessels.

Therefore, Alternative 1 would have a low negative effect on protected species. Coupled with an Action 1 alternative, this alternative would have a small positive protected species impact because fewer vessels would be allowed to target small-mesh multispecies. On the other hand, vessels with Category II permits typically have lower landings per trip than a 30,000 or 40,000 lbs. limit and could increase fishing effort. This is particularly true in the southern management area for Action 1, Alternative 2 which would qualify

[26] Whiting includes silver and offshore hakes.

203 vessels. So compared to Alternative 2 below, Alternative 1 would have a small negative protected species impact, but a more positive impact than No Action.

6.4.3.2.2.2 Alternative 2

This alternative would decrease the whiting possession limit in all management areas from 30,000 lbs. to 15,000 lbs. It is intended to create a whiting possession limit that is more consistent with the usual catches made by Category II vessels (see Section 6.6.3.2.2 analysis of landings per trip). During 2014-2016, only ???% of trips by vessels that are expected to qualify for a Category II permit had whiting landings that exceeded 15,000 lbs.

For most vessels, this alternative would have no effect on their fishing activity, but reduce the potential for taking longer trips, further offshore to land more whiting. They would fish as they previously did. Some vessels however would make shorter trips, possibly closer to shore in areas where whiting are available. It is unlikely that effort would shift from the northern management area to the southern management area, or vice versa if the 15,000 lbs. possession limit applied in both areas.

Thus, coupled with an Action 1 limited access alternative, Alternative 2 would have a small positive impact relative to No Action and relative to Alternative 1 above.

Table 63. Action 2 summary (Category II) - Potential impact of the action alternatives on protected species.

Action 2 Alts.	**Whiting possession limit alternatives for vessels with a Category II permit**	**Affected areas**	**Affected categories**	**Affected seasons**	**Potential impact of the action alternatives on protected species.**
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40,000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs.		Cat II	All	
2	15,0000 whiting possession limit and no change to the red hake possession limits.	All	Cat II	All	•

6.4.3.2.3 Incidental possession limits

Vessels that did not qualify for a Category I or II limited access permit would be regulated by the possession limits in the three alternatives below, regardless of the type of gear in use or the species that the vessel is targeting.

6.4.3.2.3.1 Alternative 1 (No Action)

This alternative would retain the existing whiting possession limits, even if an action alternative was chosen in Action 1 (limited access qualification). It might seem counter-intuitive at first, but choosing

this alternative with a limited access qualification alternative would allow whiting and red hake possession limits to be adjusted by permit category when needed in the future.

Because it is equivalent to No Action, i.e. vessels that qualify would initially have the same possession limit as qualifying vessels, Alternative 1 would have a neutral protected species impact (i.e. small negative) relative to No Action and a small negative impact relative to Alternative 2.

6.4.3.2.3.2 Alternative 2

This alternative would reduce the whiting and red hake possession limits to 2,000 lbs. and 400 lbs., respectively, for vessels that do not qualify for a small-mesh multispecies limited access permit (see Action 1). Due to relatively low prices for whiting and red hake, it is highly unlikely that non-qualifying vessels would take trips to target small-mesh multispecies. They may, however, continue or increase fishing effort into other fisheries.

Many non-qualifying vessels have permits for and experience with alternative fisheries (see Section ??? analysis of 2014-2016 fishing activity by non-qualifying vessels). Most fish in another trawl fishery for squids or herring, large-mesh groundfish, monkfish, or skates. Some also participated in the groundfish gillnet fishery.

In 2014-2016, non-qualifying vessels that targeted small-mesh multispecies accounted for two to five percent of small-mesh multispecies landings (and an equivalent amount of fishing effort). Thus relative to No Action and Alternative 1 above, this alternative would have a small positive protected species impact. If non-qualifying vessels have a permit (see Section 6.6.3.1 that summarizes other permits held by non-qualifying vessels) and shift effort into other fisheries (squid, herring, butterfish, groundfish, skate, lobster, etc.), this alternative could have a small negative protected species impact relative to No Action.

Table 64. Action 2 summary (non-qualifiers) - Potential impact of the action alternatives on protected species.

Action 2 Alts.	**Whiting possession limit alternatives**	**Affected areas**	**Affected categories**	**Affected seasons**	**Potential impact of the action alternatives on protected species.**
1	Retain existing whiting and red hake possession limits for non-qualifying vessels in Action 1	All	Non-qualifiers	All	
2	Reduce possession limit for whiting at 2,000 lbs. and red hake at 400 lbs. for non-qualifiers in Action 1.	All	Non-qualifier	All	•

6.4.3.3 Action 3 – Permit allowances

Alternatives in Action 3 only apply if an action alternative in Action 1 is chosen. Thus, there is no No Action alternative specifically for Action 3.

6.4.3.3.1 Limited access permit characteristics and conditions

The alternatives in Action 3 would affect the characteristics and allowances of a small-mesh multispecies limited access permit. In most cases, the effects are purely administrative but could change compliance costs for vessels that have limited access permits in other fisheries. Small-mesh multispecies limited access permits that are most consistent with the existing permits held by the vessel would minimize costs and maximize opportunity. Many vessels that would potentially qualify for a Category I or II permit in the Action 1 alternatives have one or more of a large-mesh groundfish, an Atlantic herring permit, or a squid/mackerel/butterfish limited access permit (see Section ??? summarizing permits held by qualifying vessels). Table 7 summarizes the similarities and differences among other limited access permits frequently held by vessels currently targeting small-mesh multispecies.

Because they potentially affect the quality or number of vessels and/or fishing effort, Alternatives 3 to 5 could have a positive or negative impact on protected species, depending on whether they reduce or increase the number of potential vessels that qualify, relative to Alternative 1.

6.4.3.3.1.1 Alternative 1 (Preferred)

Alternative 1 would apply the limited access permit characteristics for the Northeast (large mesh) Multispecies fishery to Category I and II permits for the small-mesh multispecies fishery (see Table 7). These include limits for permit accumulation, upgrade restrictions, and consideration of construction during the last year of a qualification period.

Alternative 1 is considered here to be a baseline to compare effects of other alternatives in Action 3. Although there is no existing limited access small-mesh multispecies permit, Alternative 1 serves as a proxy for status quo for analytical comparison since it is difficult to evaluate effects with respect to an open access Category K groundfish permit.

Alternative 1 is largely administrative, associating a Category I and II limited access permit with the conditions that apply to existing multispecies limited access permits, which many small-mesh multispecies vessels already possess. Thus, coupled with an Action 1 limited access alternative, Alternative 1 would have a small positive protected species impact. Alternatives 3 and 5 could increase the number of qualifying vessels compared to Alternative 1 and Alternative 3 could reduce them. Thus, relative to Alternative 3 and 5, Alternative 1 would have a small positive protected species impact and would have a small negative protected species impact relative to Alternative 4.

6.4.3.3.1.2 Alternative 2

This alternative would not establish any limits on holdings of limited access permits for the small-mesh multispecies fishery.

Although potentially reducing ownership costs, with respect to protected species impacts the number and diversity of ownership is not expected to have a meaningful impact on total fishing effort. Thus, this alternative has a small positive impact relative to No Action (because of limits on the number of vessels in the fishery) and a neutral impact relative to other Action 3 alternatives.

6.4.3.3.1.3 Alternative 3

This alternative would not allow consideration of construction or repair of vessels for the year preceding the end of the qualification period. Compared to Alternative 1, it could therefore reduce the number of

limited access permits for the small-mesh multispecies, potentially reducing effort in the fishery. There are no data available about how many vessels that participate in the small-mesh multispecies fishery that were under construction or re-construction during the year after the qualification periods in Action 1. Estimating the number of vessels that would qualify under Alternative 1 (which has this provision) and Alternative 3 (which could exclude some vessels under construction with fewer landings than the limited access qualification thresholds) is impossible.

Coupled with an Action 1 limited access alternative, this alternative would make a limited access program more conservative and effective. Compared to No Action and Alternative 1 above, this alternative is therefore expected to have a small positive protected species impact.

6.4.3.3.1.4 Alternative 4 (Preferred)

This alternative would allow only one vessel to qualify based on a single history. In other words, a history could not be transferred to a replacement vessel AND qualify the original vessel (which may have been sold or transferred to a new owner). Thus, this alternative would qualify fewer vessels than the Alternative 1 baseline.

As with Alternative 3, this measure is expected to make limited access more conservative and effective, qualifying fewer vessels than would qualify with Alternative 1. As such, it is expected to have a small positive protected species impact compared to No Action and Alternative 1.

6.4.3.3.1.5 Alternative 5

This alternative would allow upgrades of vessels that hold a limited access small-mesh multispecies fishery permit. It could allow, for example, a vessel to be more capable of fishing offshore or take more frequent trips (vessel becomes more seaworthy), increase hold capacity to take longer trips, or to tow larger trawls.

Although the fishery is limited by ACLs, there is room for increases in whiting catches and more fishing effort by qualifying vessels. Fishing offshore could affect the types of bottom where fishing occurs or the type and amount of bycatch. Fishing longer or more frequent trips implies an increase in fishing effort.

Because vessels that upgrade could take longer trips and fish further offshore where more protected species takes were observed, the alternative is expected to have a small negative protected species impact compared to Alternative 1, but a small positive protected species impact compared to No Action because any vessel could enter the fishery and upgrade with no limited access program in place subject to upgrade restrictions for other permits the vessel may hold. The degree to which vessels might upgrade with this alternative is subject to many individual business decisions and is therefore impossible to quantify. Some vessels hold other fishing permits that have existing upgrade restrictions, while others do not. Decisions on whether to upgrade could depend on future whiting prices or a vessel's requirements when fishing for other species.

Table 65. Action 3 limited access permit alternatives summary (permit allowances) - Potential impact of the action alternatives on protected species.

Alts.	Permit allowances	Potential impact of the action alternatives on protected species.
1	Status quo. 5% cap on permits + upgrade restriction + consideration for construction at t_{-1} of qualification period.	

Alts.	Permit allowances	Potential impact of the action alternatives on protected species.
2	No limits on holdings of limited access permits for the small-mesh multispecies.	
3	No consideration for construction or repair of vessels for the year preceding the qualification period.	
4	Only one vessel based on single history, i.e., history couldn't be transferred to a replacement vessel AND qualify the original vessel.	
5	Allow upgrade of vessels that hold limited access multi-species fishery permit. (Upgrading is intended for distant fishing, fish frequently, more hold capacity, longer duration trips, and capability for taking more/large tows).	

6.4.3.3.2 Incidental permit conditions

Coupled with Alternative 2 in Action 2, vessels holding an incidental permit would be able to land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, regardless of the type of gear in use or species targeted. If Alternatives 1 or 3 are chosen of Action 2, the whiting and red hake possession limits would not initially change from the status quo. The following Action 3 alternatives only apply if an action alternative is selected from Action 1. Thus, there is no relevant status quo for Action 3.

6.4.3.3.2.1 Alternative 1

In addition to the incidental small-mesh multispecies fishery possession limits, vessels with an incidental possession limit permit would be prohibited from using small mesh trawls in small-mesh multispecies exemption areas.

It is impossible to quantify the potential to target small-mesh multispecies with an incidental permit under current or future regulatory or market conditions. This potential is thought to be currently limited by the relatively low whiting and red hake prices, although some vessels may otherwise use the incidental permit to fish for bait and sell the catch through the transfer at sea provision.

This alternative has the potential to restrict small-mesh fishing for whiting and red hake on day trips, or for bait in the exemption areas. Because there have been only one observed takes in the Gulf of Maine exemption areas, this alternative would have a neutral protected species impact from this perspective. It is unlikely to have any effect on small-mesh multispecies fishing activity offshore when coupled with low incidental possession limits. There are some exemption areas in inshore portions of Southern New England that could be affected by this alternative. In this respect, the alternative could have a small positive protected species impact relative to No Action or allowing vessels with incidental permits to use small-mesh in exemption areas.

6.4.3.3.2.2 Alternative 2a

This alternative would allow vessels using large mesh on a groundfish or monkfish DAS to exceed the proposed incidental whiting and red hake possession limits. The alternative is intended to minimize

discards of whiting and red hake while fishing for groundfish, skates, and monkfish using large-mesh trawls.

Because this alternative is not expected to influence fishing behavior or change the duration or location of fishing, it is expected to have a small positive protected species impact compared to No Action and a neutral impact relative to Alternative 2b.

6.4.3.3.2.3 Alternative 2b

This alternative would prohibit fishing for small-mesh multispecies on a groundfish DAS. While fishing on a groundfish DAS, the vessel could land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, even if the vessel holds a small-mesh multispecies fishery limited access permit.

This alternative is the inverse of Alternative 2a, applying an incidental whiting and red hake possession limit when a vessel is (presumably fishing with large-mesh trawls or gillnets) on a groundfish DAS. It is not expected to change fishing behavior, but it could cause some additional discards of whiting and red hake.

Coupled with a limited access alternative in Action 1, this alternative is expected to have a small positive protected species impact and a neutral impact relative to Alternative 2a.

6.4.3.3.2.4 Alternative 3 (Preferred)

Similar to Alternative 2a, this alternative would allow vessels fishing for Atlantic herring or squid with a limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits.

This alternative is intended to reduce whiting and red hake discards when vessels are fishing for herring or squid, using small-mesh trawls. It is not expected to change fishing behavior or the duration of fishing, but it could cause slight changes in where vessels fish. With this measure, a vessel may be less likely to avoid catches of whiting and red hake, although the effect is expected to be minor if their target is really herring or squid. Coupled with a limited access alternative for Action 1, Alternative 3 is expected to have a small positive protected species impact and a neutral impact compared to not allowing squid and herring vessels to exceed the incidental whiting and red hake possession limits.

6.4.3.3.2.5 Alternative 4

This alternative would exempt vessels using small-mesh trawls in specific exemption areas from the Incidental Permit possession limits, allowing the vessels to land the same amounts of whiting and red hake as vessels that hold limited access permits. These any exemption areas require the use a more selective raised footrope trawl.

This alternative could allow continued expansion of the fishery in the Gulf of Maine, where the exemption areas require vessels to use a raised footrope trawl, designed to be more selective particularly effective for excluding flounders, skates, and monkfish. Vessels that do not qualify for a limited access permit may travel to these specific exemption areas to target whiting and red hake, depending on the potential economic return and fishing opportunities that exist elsewhere. Not only could non-qualifying vessels shift fishing effort from other areas, but total small-mesh multispecies fishing in the Gulf of Maine could increase from entry by new or existing vessels that target other species.

Some fishermen with vessels that do not qualify for limited access may take small-mesh multispecies trips in the Gulf of Maine exemption areas, where the raised footrope trawl is a required gear. If they previously fished in the Cultivator Shoals Area or in the Mid-Atlantic/Southern New England exemption areas (where the raised footrope trawl is not required), this alternative could shift fishing effort away from areas where protected species takes have been observed. Therefore, coupled with a limited access alternative and compared to not applying this alternative, Alternative 4 is expected to have a small positive protected species impact.

Table 66. Action 3 incidental permit alternatives summary (permit conditions) - Potential impact of the action alternatives on protected species.

Alts.	Permit allowances	Potential impact of the action alternatives on protected species.
1	Prevents vessels that do not qualify for limited access from targeting whiting and red hake in the exemption areas.	
2a	Allow large-mesh on monkfish DAS or groundfish to exceed incidental whiting and red hake possession limits.	
2b	Prohibit fishing for small-mesh multispecies on groundfish DAS. If fishing on groundfish DAS, the possession limit be 2,000 lbs. (whiting) and 400 lbs. (red hake).	
3	Allow fishing for Atlantic herring or squids with limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits.	
4	Allows vessels to fish in exemption areas requiring a raised footrope trawl.	

6.5 Impacts of the Physical Environment and Essential Fish Habitat

The Essential Fish Habitat (EFH) impacts discussion below focuses on changes in the amount or location of fishing that might occur due to the implementation of the various alternatives in this amendment. This approach to evaluating adverse effects to EFH is based on two principles: (1) seabed habitat vulnerability to fishing effects varies spatially, due to variations in seabed substrates, energy regimes, living and non-living seabed structural features, etc., between areas and (2) the magnitude of habitat impacts is based on the amount of time that fishing gear spends in contact with the seabed. This seabed area swept (seabed contact time) is grossly related to the amount of time spent fishing, although it will of course vary depending on catch efficiency, gear type used, and other factors.

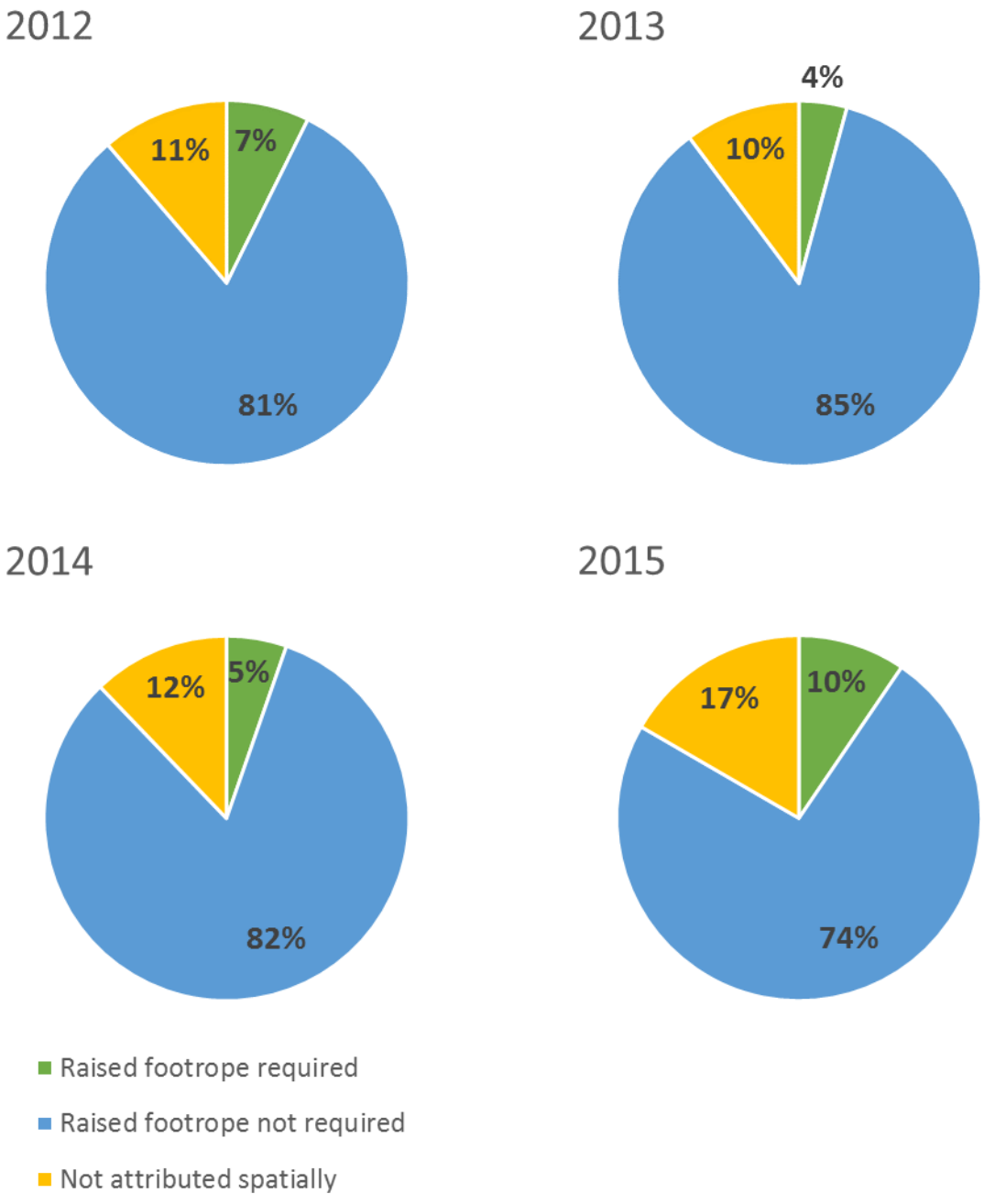
It is important to keep in mind that whiting fishing is spatially concentrated relative to some other fisheries, restricted by exemption area regulations and by availability of commercial concentrations of fish. It is likely that any changes in fishing effort will occur in the same general areas that are currently fished. While the intensity of fishing could change as a result of a limited entry program and any associated changes in possession limits and permit conditions, it is not likely that fishing will expand into new areas.

Most fishing activity for whiting (over 97% of landings during 2008-2010) occurs with bottom trawls, and some of these trawls are required to have raised footropes. As compared to bottom trawls outfitted with rollers or rockhoppers along the footrope, raised footrope trawls have lower contact with the seabed along that portion of the gear, and therefore lower impacts to the seafloor. In the Gulf of Maine/Northern Georges Bank Regulated Mesh Areas, whiting must be fished in specific exemption areas. Raised footropes are required in the following exemption areas: GOM Grate Raised Footrope, Small Mesh Area 1, Small Mesh Area 2, and the two Raised Footrope Trawl Exempted Whiting Fishery Areas. Raised footropes are not required in the Cultivator Shoals Exemption Area, or in the Southern New England or Mid-Atlantic Regulated Mesh Areas.

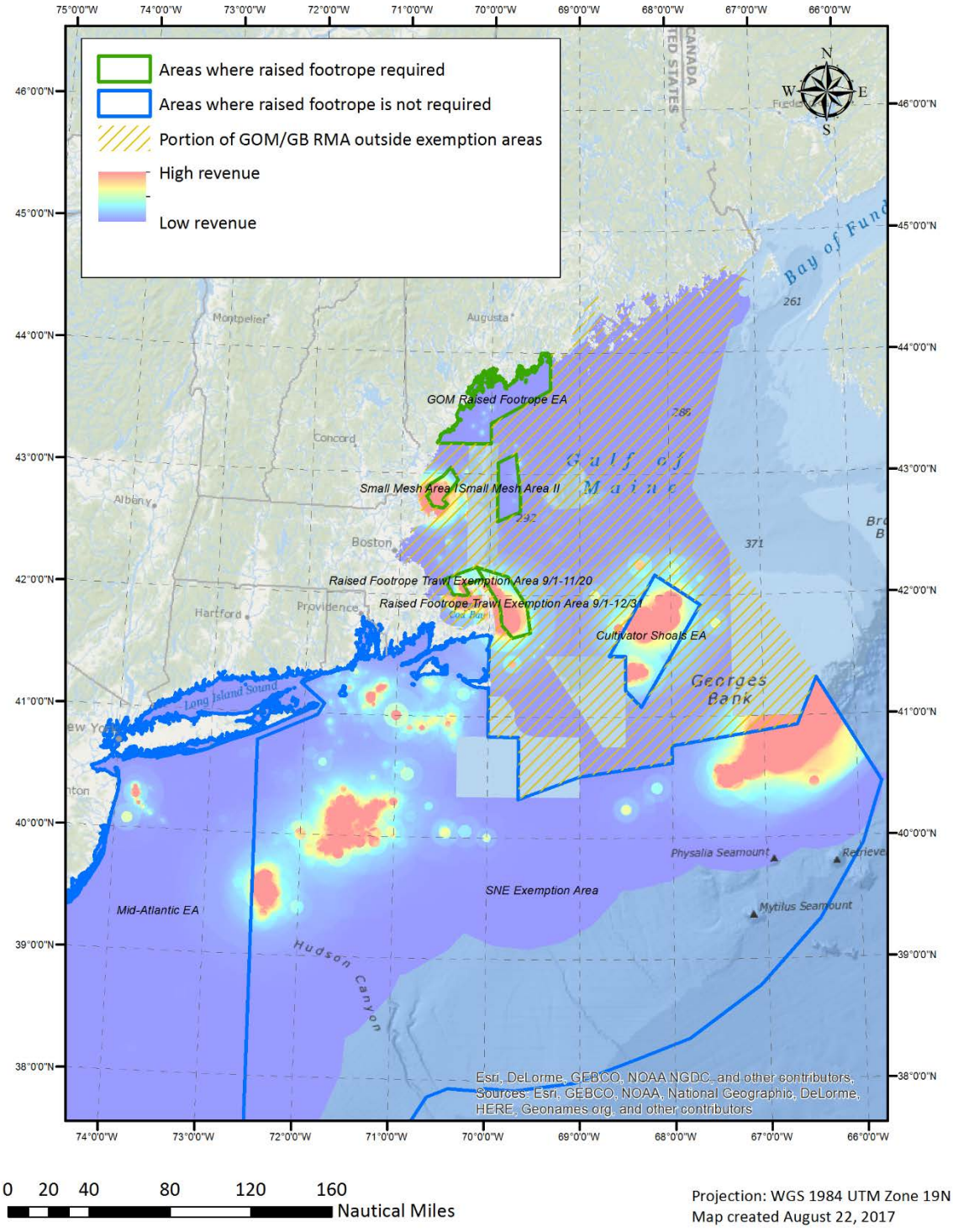
Most whiting revenues, and by extension, most whiting fishing effort and swept area, are from areas that do not require a raised footrope trawl (Figure 53). This conclusion was reached by summing fishery revenue within groups of exemption areas and regulated mesh areas using the Zonal Statistics by Table tool in the Spatial Analyst extension to ArcMap 10.5. Whiting revenues were attributed spatially according to a statistical model that combines vessel trip report positions with information about the spatial footprint of each trip, derived from at sea observer data (DePiper 2014). Vessel trip reports in the whiting fishery, as in other fisheries, report an average fishing location for each trip, and do not report fishing according to exemption area. Because these VTR positions are uncertain, and the statistical model is only an estimate, between 10-17% of annual revenues do not overlap any whiting exemption areas. Map 8 shows 2015 revenues relative to exemption areas as an example.

In terms of estimating impacts to EFH, the key questions are whether the alternatives will increase or decrease effort in the fishery overall, and if the alternatives will affect the relative use of each trawl gear type. If effort increases overall, impacts to EFH would increase; if effort decreases, impacts would decrease. If effort shifts into areas where raised footropes are required, from the Cultivator Shoals, Southern New England, or Mid-Atlantic exemption areas, impacts would also decrease. Change in the magnitude of effort as well as the relative use of different gear types could occur in combination.

Figure 53. Whiting revenues from areas where raised footrope trawls are required (green), vs. not required (blue), calendar years 2012-2015. Some effort was not attributed to any exemption areas (yellow). See text for explanation of methods.



Map 8. Whiting revenue and small mesh exemption areas. Revenue approaches zero in the dark blue shaded areas. Exemption areas are color-coded by requirement for raised footrope trawl. Source: calendar year 2015 vessel trip report data.



6.5.1 No Action (Preferred)

This alternative, described in Section 4.1, would continue the existing open access small-mesh multispecies fishery. Any vessel would be able to obtain a Category K multispecies permit and target small-mesh multispecies in exemption areas.

This alternative would allow more vessels to enter the fishery in the future to target whiting and red hake using small-mesh trawls. Additional entrants could make existing small-mesh multispecies regulations less effective to manage catches, than they would otherwise be with limited access in effect. Moderate increases in whiting catches would not cause overfishing, but increases in red hake catches could cause overfishing in the northern management area and exacerbate overfishing in the southern management area.

If the Council does not implement limited access through this amendment, it will need to take more drastic actions later to respond if overfishing occurs, or if catches exceed specifications. Several general measures could be applied, depending on the type and severity of the problem. Measures that could reduce non-target catches include requiring more selective gears (although no gear has yet been identified to separate red hake and whiting catch), closed seasons (e.g. when the bycatch rate relative to the target species is highest), and closed areas (e.g. where the bycatch rate relative to the target species is highest). It is difficult to assess the severity of impacts on red hake, because we cannot forecast the effectiveness of these measures (which are currently unknown). It does however take time to identify the problem (at least during the next annual monitoring report) and prepare a framework action or amendment to address it. Furthermore, increases in small-mesh multispecies fishing effort by new entrants could dilute the effectiveness of technical measures to limit catches of red hake. Also, if the catches of whiting increase or if future specifications decline, the Council would be forced to cut small-mesh multispecies fishing effort, either by reducing whiting possession limits, shortening seasons, or by initiating other measures. Again, these other measures would be less effective if new entrants enter the fishery.

Whiting fishery landings have been relatively consistent over the previous ten or so years (Table 25, Figure 29), and landings of whiting remain well below catch limits (Figure 50, Figure 51). In the absence of a limited access program, the potential exists to increase fishing effort and therefore increase impacts to fish habitat, but this potential exists under the various limited entry approaches as well. In this sense, the impacts of the fishery to habitat under No Action are unlikely to increase or decrease relative to current conditions. However, bycatch issues are likely to affect effort in the small mesh multispecies fishery in the coming years given relatively restrictive catch limits for bycatch species. If catches of red hake and yellowtail flounder exceed allowable limits, then fishing activity and therefore habitat impacts would decrease as accountability measures including gear restrictions and incidental catch limits are triggered. Limited entry is expected to have positive effects on bycatch management, in the sense that utilization of whiting quota is maintained or even improved. Thus, the absence of a limited entry program under No Action could decrease effort in the fishery, decreasing impacts to EFH relative to current conditions.

6.5.2 Whiting Possession Limit for Vessels Using 3-inch and larger Cod-End Mesh Trawls

The possession limits in this set of three alternatives would apply to any vessel using 3-inch and larger mesh to target small-mesh multispecies in all areas, including areas that are exempt from the large-mesh NE Multispecies regulations.

6.5.2.1 Alternative 1 (Preferred; No Action) – Existing small-mesh multispecies possession limits apply

This alternative would retain the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the current whiting possession limits are 30,000 lbs. in the northern area and 40,000 lbs. in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species. Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area.

In season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger

The current limits and other measures have prevented overfishing of whiting, but overfishing of northern red hake has occurred for a few recent years and for southern red hake began in 2016. Since these occurrences, the specifications have been adjusted to account for changes in stock biomass and accountability measures have been adjusted to prevent future overfishing. New specifications for southern red hake are expected to take effect in fishing year 2018 and current landings are likely to trigger the in-season accountably measure, reducing the red hake possession limit to 400 lbs.

This alternative would …

6.5.2.2 Alternative 2 – Raise the Whiting possession limit from 40,000 to 50,000 lbs., January 1 to June 14 in the Southern New England and Mid-Atlantic exemption areas

This alternative would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. during the winter/spring season, only in the southern management area. Because the whiting possession limit has not been more than 40,000 lbs. in almost two decades, there is little quantitative information about the potential effects.

Because the Alternative 2 possession limits exceed No Action, vessels could land similar amounts of whiting as they do now. Vessels might also land the higher possession limit, up to 50,000 lbs., lengthening their fishing trips and increasing effort per trip. Vessels may take the same number of trips of longer duration than they would with a 40,000 lbs. possession limit, or they might take fewer trips, and keep total landings the same. This alternative could provide an incentive to fish in the southern area during January 1-June 14.

Vessels in the southern management area could, as a result of the higher possession limit, land more whiting and red hake (at least that is the intent). Northern red hake and southern whiting are not overfished and overfishing is not occurring. In the past several years, landings have been well below the TAL and catch well below the ABC. Although the higher catch would increase mortality compared to Alternative 1 and Alternative 3, but is not expected to have a negative impact on northern red hake and southern whiting. With respect to whiting, this alternative is therefore expected to have a neutral effect.

This alternative would …

6.5.2.3 Alternative 3 – Lower the Whiting possession limit from 40,000 to 30,000 lbs., June 15 to December 31 in the Southern New England and Mid-Atlantic exemption areas

Alternative 3 would decrease the whiting possession limit for about half of the year in the southern management area. During the summer and fall, a 30,000 lbs. whiting possession limit would be in effect

in both management areas. It is intended to reduce the effect of southern area landings on market prices for whiting in all areas.

This alternative has several types of potential impacts, changing the number of trips taken or changing the location or season when small-mesh multispecies trips are taken. It may induce more vessels to fish additional trips to catch and land the same amount as they do under the existing limit. In this case, total fishing effort would probably remain the same as it is now.

Trips during the summer and fall would be less profitable than they are presently, thus potentially causing vessels to take more trips during the winter when a higher possession limit applies or shift some fishing activity to the northern area, if it is advantageous for the vessel to do so. The most likely impact of a seasonal whiting possession limit reduction is to change the distribution of trips, either seasonally within the southern management area or spatially, to the northern area.

This alternative would …

6.5.3 Limited Access Alternatives

6.5.3.1 Action 1 – Qualification criteria

The alternatives in Action 1 consider establishing a limited access program for the small-mesh multispecies fishery, targeting whiting and red hake using 3-inch or smaller mesh in areas that are exempt from the large-mesh groundfish regulations. In addition to No Action, there are five alternatives with different qualification criteria and periods. In addition to a core set of vessels that would qualify for all alternatives (20 Category I and 37 Category II), each alternative qualifies a different set of vessels that have landed whiting or red hake at various times. The qualification period for Alternatives 1, 2, and 5 ends at the control date, but the qualification period for Alternative 3 and 4 extend to the end of calendar year 2016. For all alternatives, qualifiers would be able to fish in the small mesh multispecies exemption areas, subject to the possession limits specified in Section 4.3.2 and the permit allowances specified in Section 4.3.3. Depending on the alternatives selected in Action 3 (Section 4.3.3), the vessels may not be able to use small mesh in the exemption areas, unless they are permitted to fish for other small-mesh species, such as squid and herring. Non-qualifying vessels would no longer be allowed to land more than 2,000 lbs. of whiting and 400 lbs. of red hake per trip.

As described in Section 6.1.3, market demand for whiting, combined with low quotas for red hake and certain other stocks and a high degree of market and fishery knowledge required to be successful in the fishery, limit the amount of effort. At present, whiting catches are well below targets and limits. Because none of the qualification alternatives in the range represent a substantial departure from the current number of active participants, the other factors listed above are expected to have a greater influence on the amount of effort in the fishery, and therefore on the fishery's impacts to habitat. Differences in terms of the number of qualifiers could have slight effects on the overall magnitude of fishing effort and therefore on impacts to habitat. Impacts are expected to track the impacts of the qualification criteria alternatives on the target species, as described in Section 6.2.3. Alternatives that reduce fishing effort whiting and therefore have positive biological impacts on the target stock are likely to reduce impacts on EFH as well. Reductions in impacts to habitat could be mitigated if vessels shift their effort into other fisheries.

6.5.3.1.1 No Action

This alternative, described in Section 4.1, would continue the existing open access small-mesh multispecies fishery. Any vessel would be able to obtain a Category K multispecies permit and target small-mesh multispecies in exemption areas.

Assuming market- and bycatch-related limits on effort do not change substantially, fishing effort and therefore impacts to EFH are unlikely to change in magnitude if the exiting open access management system is continued under No Action.

6.5.3.1.2 Alternative 1

This alternative is expected to qualify 40 Category I and 74 Category II vessels. Thirty-three (33) Category I and 38 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 42 non-qualifying vessels and 15 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

Like No Action, market- and bycatch-related factors are expected to by the dominant influences on the magnitude of effort in the whiting fishery under Alternative 1. If these conditions continue, Alternative 1 is expected to have neutral impacts on EFH relative to No Action. If conditions in the fishery change, for example if the market for whiting expands, or bycatch sub-ACLs are no longer constraining, there remain a large number of Category I and II qualifiers without recent landings that could become more active in the fishery, thereby increasing landings and impacts to EFH. Under these conditions, **Alternative 1 could have positive impacts relative to No Action, which does not place any constraints on the number of entrants.**

6.5.3.1.3 Alternative 2

This alternative is expected to qualify 20 Category I and 203 Category II vessels. Nineteen (19) Category I and 69 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 25 non-qualifying vessels and 15 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

Like No Action, market- and bycatch-related factors are expected to by the dominant influences on the magnitude of effort in the whiting fishery under Alternative 2. If these conditions continue, Alternative 2 is expected to have neutral impacts on EFH relative to No Action. If conditions in the fishery change, for example if the market for whiting expands, or bycatch sub-ACLs are no longer constraining, there remain a large number of Category II qualifiers without recent landings that could become more active in the fishery, thereby increasing landings and impacts to EFH. Under these conditions, **Alternative 2 could have positive impacts relative to No Action, which does not place any constraints on the number of entrants.** Because the number of Category I vessels in Alternative 2 is low, and includes only one vessel without recent history, latent effort, and thus the possibility for large increases in target species and EFH impacts, is reduced.

6.5.3.1.4 Alternative 3

This alternative is expected to qualify 51 Category I and 90 Category II vessels. Forty-four (44) Category I and 46 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more

trips in 2014-2016. Additionally, there were 48 non-qualifying vessels that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

Alternatives 3 through 5 would qualify increasingly larger numbers of vessels in each of the two categories. Like No Action, market- and bycatch-related factors are expected to by the dominant influences on the magnitude of effort in the whiting fishery under Alternative 3. If these conditions continue, Alternative 3 is expected to have neutral impacts on EFH relative to No Action. If conditions in the fishery change, for example if the market for whiting expands, or bycatch sub-ACLs are no longer constraining, there remain many Category I and II qualifiers without recent landings that could become more active in the fishery, thereby increasing landings and impacts to EFH. Under these conditions, **Alternative 3 could still have positive impacts relative to No Action, which does not place any constraints on the number of entrants, but Alternative 3 allows effort in the fishery to expand considerably from the number of presently active vessels**.

6.5.3.1.5 Alternative 4

This alternative is expected to qualify 55 Category I and 124 Category II vessels. Forty-two (42) Category I and 38 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 48 non-qualifying vessels that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

Like No Action, market- and bycatch-related factors are expected to by the dominant influences on the magnitude of effort in the whiting fishery under Alternative 4. If these conditions continue, Alternative 4 is expected to have neutral impacts on EFH relative to No Action. If conditions in the fishery change, for example if the market for whiting expands, or bycatch sub-ACLs are no longer constraining, there remain a large number of Category I and II qualifiers without recent landings that could become more active in the fishery, thereby increasing landings and impacts to EFH. Under these conditions, **Alternative 4 could still have positive impacts relative to No Action, which does not place any constraints on the number of entrants, but Alternative 4 allows effort in the fishery to expand considerably from the number of presently active vessels**.

6.5.3.1.6 Alternative 5

This alternative is expected to quality 84 Category I and 159 Category II vessels. Forty-three (43) Category I and 30 Category II vessels landed more than 2,000 lbs. of whiting or 400 lbs. of red hake on one or more trips in 2014-2016. Additionally, there were 45 non-qualifying vessels and 10 vessels with no history during the qualification period that landed more than 2,000 lbs. of whiting or 400 lbs. of red hake in 2014-2016.

Like No Action, market- and bycatch-related factors are expected to by the dominant influences on the magnitude of effort in the whiting fishery under Alternative 5. If these conditions continue, Alternative 5 is expected to have neutral impacts on EFH relative to No Action. If conditions in the fishery change, for example if the market for whiting expands, or bycatch sub-ACLs are no longer constraining, there remain a very large number of Category I and II qualifiers without recent landings that could become more active in the fishery, thereby increasing landings and impacts to EFH. Under these conditions, **Alternative 5 could still have positive impacts relative to No Action, which does not place any constraints on the number of entrants, but Alternative 5 allows effort in the fishery to expand considerably from the number of presently active vessels.**

6.5.3.2 Action 2 - Possession limit alternatives

The alternatives in Action 2 propose adjustments to the whiting possession limits, primarily to adjust the capacity of the small-mesh multispecies fleet to land whiting and to minimize negative effects on price. These possession limits would apply to either vessels qualifying for a Category I or II permit, or to both (i.e. the same possession limit would apply to both permit categories.

In addition, Action 2 includes an alternative that would establish an incidental possession limit for whiting and an incidental limit for red hake. These incidental possession limits would apply to all fishing activity by vessels that do not have a Category I or II permit, regardless of mesh or gear in use. Depending on the final alternatives selected in Action 3 (Section 4.3.3), vessels with an incidental permit may be able to exceed the incidental possession limits if they are participating in another limited access small-mesh fishery, such as herring or squid.

6.5.3.2.1 Whiting[27] Possession Limit for Vessels with a Category I Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category I limited access permit.

6.5.3.2.1.1 Alternative 1 (Status quo)

For vessels holding a Category I limited access permit, this alternative would not change the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the current whiting possession limits are 30,000 lbs. in the northern area and 40,000 lbs. in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species. Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area.

In season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger.

If an action alternative is selected under Action 1, changes to possession limits would apply to a smaller number of vessels. Under the status quo, whatever pool of vessels qualifies will be subject to the existing possession limits. This means that the amount of effort in the fishery will be governed by other factors, such as market demand or ACLs for bycatch species.

6.5.3.2.1.2 Alternative 2

For vessels holding a Category I limited access permit, this alternative would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. during the winter/spring season, only in the southern management area. This alternative could provide an incentive to fish in the southern area during January 1-June 14. Because the whiting possession limit has not been greater than 40,000 lbs. in almost two decades, there is little quantitative information about the potential effects. Note that this alternative can be selected even if the fishery remains open access.

Because the Alternative 2 possession limits exceed No Action, vessels could land similar amounts of whiting as they do currently. Vessels might land the higher possession limit, up to 50,000 lbs.,

[27] Whiting includes silver and offshore hakes.

lengthening their fishing trips and increasing effort per trip. Vessels may take the same number of trips of longer duration than they would with a 40,000 lbs. possession limit, increasing effort and impacts to habitat, or they might take fewer trips, and keep total landings the same, resulting in neutral impacts to habitat relative to No Action.

Overall, **impacts of this alternative to EFH could range from neutral, if the magnitude of effort is unchanged, to slightly negative, if effort increases.**

6.5.3.2.1.3 Alternative 3

For vessels holding a Category I limited access permit, this alternative would decrease the whiting possession limit for about half of the year in the southern management area. During the summer and fall, a 30,000 lbs. whiting possession limit would be in effect in both management areas. It is intended to reduce the effect of southern area landings on market prices for whiting in all areas. Note that this alternative can be selected even if the fishery remains open access.

This alternative has several types of potential impacts, changing the number of trips taken or changing the location or season when small-mesh multispecies trips are taken. It may induce more vessels to fish additional trips to catch and land the same amount as they do under the existing limit. In this case, total fishing effort would remain the same as it is now.

Trips during the summer and fall would be less profitable than they are presently, thus potentially causing vessels to take more trips during the winter when a higher possession limit applies, or shift some fishing activity to the northern area, if it is advantageous for the vessel to do so. In this case, the most likely impact is to change the distribution of trips, either seasonally within the southern management area or spatially, to the northern area.

It is therefore unlikely that this alternative would have a meaningful impact on the physical environment.

Table 67. Action 2 summary (Category I) - Potential impact of the action alternatives on the physical environment and EFH.

Action 2 Alts.	Whiting possession limit alternatives for vessels with a Category I permit	Affected areas	Affected categories	Affected seasons	Potential impact of the action alternatives on the physical environment and EFH.
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs. • Accountability Measures at 2,000 lbs. (whiting) and 400 lbs. (red hake).		Cat I	All	
2	Increase whiting possession limit from 40,000 lbs. to 50,000 lbs.	South	Cat I	Winter, Spring	•
3	Decrease whiting possession limit to 30,000 lbs.	South	Cat I	Summer, Fall (Jun 15-Dec 31)	•

6.5.3.2.2 Whiting[28] Possession Limit for Vessels with a Category II Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category II limited access permit. None of these alternatives would be applicable if No Action for Action 1 is chosen.

6.5.3.2.2.1 Alternative 1 (Status quo)

For vessels holding a Category II limited access permit, this alternative would not change the existing small-mesh multispecies possession limits. These limits are summarized under Alternative 1 in the previous section.

Although applying to a smaller number of vessels than are currently fishing, this alternative would not change the amount of fishing effort by these vessels.

Therefore, **Alternative 1 would have no direct or indirect effect on the physical environment**.

6.5.3.2.2.2 Alternative 2

[28] Whiting includes silver and offshore hakes.

This alternative would decrease the whiting possession limit in all management areas from 30,000 lbs. to 15,000 lbs. It is intended to create a whiting possession limit that is more consistent with the usual catches made by Category II vessels (see Section 6.6.3.2.2analysis of landings per trip). During 2014-2016, only ???% of trips by vessels that are expected to qualify for a Category II permit had whiting landings that exceeded 15,000 lbs.

For most vessels, this alternative would have no effect on their fishing activity. They would fish as they previously did. Some vessels however would make shorter trips, possibly closer to shore in areas where whiting are available.

Table 68. Action 2 summary (Category II) - Potential impact of the action alternatives on the physical environment and EFH.

Action 2 Alts.	**Whiting possession limit alternatives for vessels with a Category II permit**	**Affected areas**	**Affected categories**	**Affected seasons**	**Potential impact of the action alternatives on the physical environment and EFH.**
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40,000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs.		Cat II	All	
2	15,0000 whiting possession limit and no change to the red hake possession limits.	All	Cat II	All	•

6.5.3.2.3 Incidental possession limits

Vessels that did not qualify for a Category I or II limited access permit would be regulated by the possession limits in the two alternatives below, regardless of the type of gear in use or the species that the vessel is targeting.

6.5.3.2.3.1 Alternative 1 (No Action)

This alternative would retain the existing whiting possession limits, even if an action alternative was chosen in Action 1 (limited access qualification). It might seem counter-intuitive at first, but choosing this alternative with a limited access qualification alternative would allow whiting and red hake possession limits to be adjusted by permit category when needed in the future.

The direct impact on . . . would be unchanged from the status quo, but it could reduce the potential for increases in small-mesh multispecies fishing effort by additional non-qualified vessels. Indirectly, this alternative would have a positive effect on ??? because it is expected to limit increases in fishing effort.

6.5.3.2.3.2 Alternative 2

This alternative would reduce the whiting and red hake possession limits to 2,000 lbs. and 400 lbs., respectively, for vessels that do not qualify for a small-mesh multispecies limited access permit (see

Action 1). Due to relatively low prices for whiting and red hake, it is highly unlikely that non-qualifying vessels would take trips to target small-mesh multispecies. They may, however, continue or increase fishing effort into other fisheries.

Many non-qualifying vessels have permits for and experience with alternative fisheries (see Section ??? analysis of 2014-2016 fishing activity by non-qualifying vessels). Most fish in another trawl fishery for squids or herring, large-mesh groundfish, monkfish, or skates. Some also participated in the groundfish gillnet fishery.

With respect to effects on ???, these potential shifts in fishing effort could mitigate or reverse the effect of small-mesh multispecies limited access. Large-mesh trawl gears targeting groundfish, monkfish, and skates is thought to have a pos/neg??? effect on VEC???, relative to the same amount of fishing effort targeting small-mesh multispecies. Groundfish gillnet gear is thought to have a pos/neg??? effect on VEC???, relative to the same amount of fishing effort targeting small-mesh multispecies. Small-mesh trawls used to target herrings and squids is likely to have a neutral impact on VEC???, but there may be some redistribution of effort in time or space that could have a positive or negative effect.

Table 69. Action 2 summary (non-qualifiers) - Potential impact of the action alternatives on the physical environment and EFH.

Action 2 Alts.	**Whiting possession limit alternatives**	**Affected areas**	**Affected categories**	**Affected seasons**	**Potential impact of the action alternatives on the physical environment and EFH.**
1	Retain existing whiting and red hake possession limits for non-qualifying vessels in Action 1	All	Non-qualifiers	All	
2	Reduce possession limit for whiting at 2,000 lbs. and red hake at 400 lbs. for non-qualifiers in Action 1.	All	Non-qualifier	All	•

6.5.3.3 Action 3 – Permit allowances

Alternatives in Action 3 only apply if an action alternative in Action 1 is chosen. Thus there is no No Action alternative specifically for Action 3.

6.5.3.3.1 Limited access permit characteristics and conditions

The alternatives in Action 3 would affect the characteristics and allowances of a small-mesh multispecies limited access permit. In most cases, the effects are purely administrative but could change compliance costs for vessels that have limited access permits in other fisheries. Small-mesh multispecies limited access permits that are most consistent with the existing permits held by the vessel would minimize costs and maximize opportunity. Many vessels that would potentially qualify for a Category I or II permit in the Action 1 alternatives have one or more of a large-mesh groundfish, an Atlantic herring permit, or a squid/mackerel/butterfish limited access permit (see Section ??? summarizing permits held by qualifying vessels). Table 3??? summarizes the similarities and differences among other limited access permits frequently held by vessels currently targeting small-mesh multispecies.

Because they potentially affect the quality or amount of vessels and/or fishing effort, Alternatives 2, 4, and 5 could have an effect on this VEC???.

6.5.3.3.1.1 Alternative 1

Alternative 1 would apply the limited access permit characteristics for the Northeast (large mesh) Multispecies fishery to Category I and II permits for the small-mesh multispecies fishery (see Table 3???). These include limits for permit accumulation, upgrade restrictions, and consideration of construction during the last year of a qualification period.

Alternative 1 is considered here to be a baseline to compare effects of other alternatives in Action 3. Although there is no existing limited access small-mesh multispecies permit, Alternative 1 serves as a proxy for status quo for analytical comparison since it is difficult to evaluate effects with respect to an open access Category K groundfish permit.

Thus Alternative 1 would have the same effects on this VEC??? That applies to any action alternative in Action 1.

6.5.3.3.1.2 Alternative 2

This alternative would not establish any limits on holdings of limited access permits for the small-mesh multispecies fishery.

Although potentially reducing ownership costs, with respect to this VEC??? the number and diversity of ownership is not expected to have a meaningful impact.

6.5.3.3.1.3 Alternative 3

This alternative would not allow consideration of construction or repair of vessels for the year preceding the end of the qualification period. It could therefore reduce the number of limited access permits for the small-mesh multispecies, potentially reducing effort in the fishery.

If non-qualifying vessels do not fish or shift to fisheries that have less impact on this VEC???, this alternative would have a positive impact. Conversely, if they shift to fisheries that have a greater impact, this alternative would have a negative impact. Increase in fishing effort by qualifying vessels could mitigate the effects.

6.5.3.3.1.4 Alternative 4

This alternative would allow only one vessel to qualify based on a single history. In other words, a history could not be transferred to a replacement vessel AND qualify the original vessel (which may have been sold or transferred to a new owner). Thus, this alternative would qualify fewer vessels than the Alternative 1 baseline.

If non-qualifying vessels do not fish or shift to fisheries that have less impact on this VEC???, this alternative would have a positive impact. Conversely, if they shift to fisheries that have a greater impact, this alternative would have a negative impact. Increase in fishing effort by qualifying vessels could mitigate the effects.

6.5.3.3.1.5 Alternative 5

This alternative would allow upgrades of vessels that hold a limited access small-mesh multispecies fishery permit. It could allow, for example, a vessel to be more capable of fishing offshore or take more frequent trips (vessel becomes more seaworthy), increase hold capacity to take longer trips, or to tow larger trawls.

Although the fishery is limited by ACLs, there is room for increases in whiting catches and more fishing effort by qualifying vessels. Fishing offshore could affect the types of bottom where fishing occurs or the type and amount of bycatch. Fishing longer or more frequent trips implies an increase in fishing effort.

For this VEC???, this alternative is expected to have a pos/neg??? impact, although the magnitude is difficult to quantify depending on a variety of economic and regulatory effects. Vessels holding a Northeast (large-mesh) Multispecies permit would be prohibited from upgrading at the present time.

Table 70. Action 3 limited access permit alternatives summary (permit allowances) - Potential impact of the action alternatives on the physical environment and EFH.

Alts.	Permit allowances	Potential impact of the action alternatives on the physical environment and EFH.
1	Status quo. 5% cap on permits + upgrade restriction + consideration for construction at t_{-1} of qualification period.	
2	No limits on holdings of limited access permits for the small-mesh multispecies.	
3	No consideration for construction or repair of vessels for the year preceding the qualification period.	
4	Only one vessel based on single history, i.e., history couldn't be transferred to a replacement vessel AND qualify the original vessel.	
5	Allow upgrade of vessels that hold limited access multi-species fishery permit. (Upgrading is intended for distant fishing, fish frequently, more hold capacity, longer duration trips, and capability for taking more/large tows).	

6.5.3.3.2 Incidental permit conditions

Vessels holding an incidental permit would be able to land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, regardless of the type of gear in use or species targeted, unless one of the following alternatives is chosen. These alternatives only apply if an action alternative is selected from Action 1, hence there is no relevant status quo for Action 3.

6.5.3.3.2.1 Alternative 1

In addition to the incidental small-mesh multispecies fishery possession limits, vessels with an incidental possession limit permit would be prohibited from using small mesh trawls in small-mesh multispecies exemption areas.

This alternative would prevent vessels from targeting small-mesh multispecies on short, inshore trips despite not having a limited access small-mesh multispecies permit. As such, it potential has a positive??? Impact on this VEC???.

It is impossible to quantify the potential to target small-mesh multispecies with an incidental permit under current or future regulatory or market conditions. This potential is thought to be currently limited by the relatively low whiting and red hake prices, although some vessels may otherwise use the incidental permit to fish for bait and sell the catch through the transfer at sea provision.

6.5.3.3.2.2 Alternative 2a

This alternative would allow vessels using large mesh on a groundfish or monkfish DAS to exceed the proposed incidental whiting and red hake possession limits.

For this VEC???, this alternative would have a pos/neg??? effect because . . .

6.5.3.3.2.3 Alternative 2b

This alternative would prohibit fishing for small-mesh multispecies on a groundfish DAS. While fishing on a groundfish DAS, the vessel could land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, even if the vessel holds a small-mesh multispecies fishery limited access permit.

For this VEC???, this alternative would have a pos/neg??? effect because . . .

6.5.3.3.2.4 Alternative 3

Similar to Alternative 2a, this alternative would allow vessels fishing for Atlantic herring or squid with a limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits.

For this VEC???, this alternative would have a pos/neg??? effect because . . .

6.5.3.3.2.5 Alternative 4

This alternative would exempt vessels using small-mesh trawls in specific exemption areas from the Incidental Permit possession limits, allowing the vessels to land the same amounts of whiting and red hake as vessels that hold limited access permits. These any exemption areas require the use a more selective raised footrope trawl.

This alternative could allow continued expansion of the fishery in the Gulf of Maine, where the exemption areas require vessels to use a raised footrope trawl, designed to be more selective particularly effective for excluding flounders, skates, and monkfish. Vessels that do not qualify for a limited access permit may travel to these specific exemption areas to target whiting and red hake, depending on the potential economic return and fishing opportunities that exist elsewhere. Not only could non-qualifying vessels shift fishing effort from other areas, but total small-mesh multispecies fishing in the Gulf of Maine could increase from entry by new or existing vessels that target other species.

Depending on how fishermen react to the opportunity, this alternative could ???

Table 71. Action 3 incidental permit alternatives summary (permit conditions) - Potential impact of the action alternatives on the physical environment and EFH.

Alts.	Permit allowances	Potential impact of the action alternatives on the physical environment and EFH.
1	Prevents vessels that do not qualify for limited access from targeting whiting and red hake in the exemption areas.	
2a	Allow large-mesh on monkfish DAS or groundfish to exceed incidental whiting and red hake possession limits.	
2b	Prohibit fishing for small-mesh multispecies on groundfish DAS. If fishing on groundfish DAS, the possession limit be 2,000 lbs. (whiting) and 400 lbs. (red hake).	
3	Allow fishing for Atlantic herring or squids with limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits.	
4	Allows vessels to fish in exemption areas requiring a raised footrope trawl.	

6.6 Impacts on the Human Environment (Economic and Fishery-Dependent Community Impacts)

The analysis of impacts on the human environment characterizes the magnitude and extent of the economic and social impacts likely to result from the alternatives considered, individually and in relation to each other. National Standard 8 requires the Council to consider the importance of fishery resources to affected communities and provide those communities with continuing access to fishery resources, but it does not allow the Council to compromise the conservation objectives of the management measures. Thus, continued overall access to fishery resources is a consideration, but not a guarantee that fishermen will be able to use a particular gear type, harvest a particular species of fish, fish in a particular area, or fish during a certain time of the year.

Description of how impacts to the human environment were evaluated

A fundamental difficulty exists in forecasting economic and social change relative to fishery management alternatives when communities or other societal groups are constantly evolving in response to numerous external factors, such as market conditions, technology, alternate uses of waterfront, and tourism. Certainly, management regulations influence the direction and magnitude of economic and social change, but attribution is difficult with the tools and data available. While this analysis focuses generally on the economic and social impacts of the proposed fishing regulations, external factors may also influence change, both positive and negative, in the affected communities. In many cases, these factors contribute to a community's vulnerability and ability to adapt to new or different fishing regulations.

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); dealers and processors; fish consumers; 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 sustainable fisheries.

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 change revenues (by changing quantities supplied or by influencing market prices). These economic effects may be felt by the directly regulated entities. They may also be felt by related industries.

The social impact factors outlined below can be used to describe the 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).

For this action, it is important to keep in mind that whiting fishing is relatively concentrated, restricted either by exemption area regulations and/or by availability of commercial concentrations of fish. It is likely that any increases in fishing effort are likely to occur in areas currently fished; the intensity of fishing would change, but fishing would not expand into new areas.

6.6.1 No Action (Preferred)

No Action (Section 4.1) would continue the existing open access small-mesh multispecies fishery. Any vessel would be able to obtain a Category K multispecies permit and target small-mesh multispecies in exemption areas. Vessels would continue to be allowed to enter the fishery to target whiting and red hake using small-mesh trawls.

Relative to establishing a limited access program, there would likely be more active vessels under No Action. It could make existing regulations less effective to manage small-mesh multispecies catch and bycatch than they would otherwise be with a limited access program in effect. Moderate increases in whiting catches would not cause overfishing, but increases in red hake catches could cause overfishing in the northern management area and exacerbate overfishing in the southern management area.

If the Council does not implement limited access through this amendment, it will need to take more drastic actions later to respond when overfishing occurs, or catches exceed specifications. Several general measures could be applied, depending on the type and severity of the problem. Measures that could reduce non-target catches include requiring more selective gears (although no gear has yet been identified to separate red hake and whiting catch), closed seasons (e.g. when the bycatch rate relative to the target species is highest), and closed areas (e.g. where the bycatch rate relative to the target species is highest). It is difficult to assess the severity of economic and community impacts, because we cannot forecast the effectiveness of these measures (which are currently unknown) to manage small-mesh multispecies catch and bycatch in a future open access fishery. It does however take time to identify the problem (at least during the next annual monitoring report) and prepare a framework action or amendment to address it. Furthermore, increases in small-mesh multispecies fishing effort by new entrants could dilute the effectiveness of technical measures to limit catches of red hake. Also, if the catches of whiting increase or if future specifications decline, the Council would be forced to cut small-mesh multispecies fishing effort, either by reducing whiting possession limits, shortening seasons, or by initiating other measures. Again, these other measures would be less effective if new entrants enter the fishery.

The impacts of No Action, relative to establishing a limited access program (Alternatives 1-5), are expected to be ***neutral for the whiting fishery and negative for the red hake fishery***. In the short term, the *Size and Demographic Characteristics* of the fishery would continue to depend on market forces, possession limits and other measures to keep the fishery within its catch limits. Prices of whiting and red hake have been rising steeply in recent years compared to earlier years (Figure 40 and Figure 41). If this continues, new participants may be attracted to the fishery, resulting in higher landings. Should the fisheries attract new entrants, No Action has potential to increase whiting landings from the recent 3-yr average of about 14 M lbs., with $10.5 M in real ($2016) revenue. Increased landings may slightly depress whiting prices in short term, however, increased revenue from higher landings may outweigh any negative price effect. On the other hand, higher whiting landings may be constrained by the catch of nontarget species with low ACLs.

In the long term, No Action could lead to more regulatory burden if additional measures are needed to ensure catches remain within ACLs. If due to increased fishery participation, possession limits were reduced or exemption areas were closed to limit non-target species landings and bycatch, No Action could have a negative impact on the more historically active fishery participants relative to establishing a limited access program. Additional constraints may result in a negative impact on the *Attitudes, Beliefs, and Values* of fishermen towards management. With a limited access program, other fishery measures may be less necessary. However, No Action would have positive impacts on the fishermen who have been less active, as well as new entrants, as they would have future opportunities to participate in the directed fishery. The fishery has declined substantially over the past two decades, with a big gap between whiting landings and the ACL over the past several years, an opportunity for new entrants if not for actions to address catches of choke species. However, there is inadequate information about the degree to which new entrants would target small-mesh multispecies and remain in the fishery permanently. No Action could have higher administrative costs in the long term relative to establishing having a limited access program, which would likely reduce (or prevent an increase in) the number of fishery participants.

On one hand, there could be negative economic and community impacts from No Action caused by more restrictive regulations on existing fishery participants to address excessive catches of choke

species. On the other hand, positive economic and community impacts could occur from greater utilization of the whiting resource and greater economic activity from the higher landings and more fishing effort, as long as overfishing can be prevented through other means.

6.6.2 Whiting Possession Limit for Vessels Using 3-inch and larger Cod-End Mesh Trawls

The possession limits in this set of three alternatives would apply to any vessel using 3-inch and larger mesh to target small-mesh multispecies in all areas, including areas that are exempt from the large-mesh NE Multispecies regulations.

6.6.2.1 Alternative 1 (Preferred; No Action) – Existing small-mesh multispecies possession limits apply

Alternative 1 (No Action) would retain the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the whiting possession limit is 30,000 lbs. in the northern area and 40,000 lbs. in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species (i.e. squids and herring). Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area. In-season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger.

Alternative 1 is expected to have a positive impact on economics and communities, as there would be no change to the possession limits. With the in-season accountability measure trigger, landings of small-mesh multispecies would continue per the accountability measure. The current limits and other measures have prevented overfishing of whiting, but overfishing of northern red hake has occurred for a few recent years and for southern red hake beginning in 2016. In response, the specifications have been adjusted to account for changes in stock biomass and accountability measures have been adjusted to prevent future overfishing. New specifications for southern red hake are expected to take effect in fishing year 2018 and current landings are likely to trigger the in-season accountably measure, reducing the red hake possession limit to 400 lbs.

6.6.2.2 Alternative 2 – Raise the Whiting possession limit from 40,000 to 50,000 lbs., January 1 to June 14 in the Southern New England and Mid-Atlantic exemption areas

Alternative 2 would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. from January 1 to June 14 in the southern management area.

The impacts of Alternative 2 on the small-mesh multispecies fishery is expected to be **neutral to positive relative to Alternative 1, and positive relative to Alternative 3**. Because the Alternative 2 possession limit is higher in the southern area relative to No Action during winter/spring, vessels would be able to increase their trip landings (i.e., effort per trip), up to 50,000 lbs. if operationally feasible. Vessels may take the same number of trips of longer duration than they would with a 40,000 lbs. possession limit. This could potentially increase total landings per vessel. Alternatively, vessels could take fewer, longer trips, keeping total annual landings the same. Because the whiting possession limit has not been over 40,000 lbs. in almost two decades, there is little quantitative information to help identify how fishing behavior might actually change.

Alternative 2 could provide an incentive to fish in the southern area during winter/spring (January 1-June 14, an area and season that could absorb more fishing without threatening the whiting resource or

impacting prices). Southern whiting is not overfished and overfishing is not occurring. In the past several years, catch has been well below the ABC and landings have been well below the TAL. Thus, Alternative 2 may help the fishery achieve Optimum Yield more readily than under Alternative 1, a positive impact on the fishery and its fishing communities.

Alternative 2 is expected to have a positive impact on the vessels of very large capacities relative to Alternative 1, because they could land more whiting when there are opportunities to catch very high volume of whiting while avoiding bycatch. There would be an incentive to fish in southern management area during winter and spring. Increasing the whiting possession limit may lower price slightly in the short run, if vessels land increased volumes within the same timeframe and space (port). Longer trips may deteriorate fish quality, potentially lowering market price.

6.6.2.3 Alternative 3 – Lower the Whiting possession limit from 40,000 to 30,000 lbs., June 15 to December 31 in the Southern New England and Mid-Atlantic exemption areas

Alternative 3 would decrease the whiting possession limit from 40,000 lbs. to 30,000 lbs. from June 15 to December 31 in the southern management area. As a result, both management areas would have the same whiting possession limit (30,000 lbs.) during the summer and fall. The intent is to reduce the negative effect of high southern area landings on market prices for whiting in all areas during the spring and fall when the northern management area exemption areas are open.

The economic and community impacts of Alternative 3 are expected to be ***neutral to negative relative to Alternatives 1 and 2***. Recently, up to 340,000 lbs. of whiting (valued at about $289,000) has been landed during this season and area in excess of the Alternative 3 possession limit. These landings have been from about 45 to 106 trips per vessel by the larger capacity vessels. By reducing the possession limit, vessels may take more, shorter trips to keep landings the same as under the existing limit. If so, total fishing effort would be unchanged.

The most likely impact of a seasonal whiting possession limit reduction is to change the distribution of trips, either seasonally within the southern management area or spatially, to the northern area. As trips during the summer and fall in the southern management area would be less profitable than they are presently, vessels may shift effort to take more trips during the winter when a higher possession limit applies or shift some fishing activity to the northern area, if it is advantageous for vessels to do so. A reduction in trip possession limit will have a negative impact on landings and income from whiting unless any loss in landing is compensated by increasing trip frequencies. Further, taking frequent trips for the same landing volume of whiting is also inefficient affecting the profitability unless the increased cost of fishing operation is offset by an increase in price.

6.6.3 Limited Access Alternatives

General impacts of establishing a limited access program

Implementing a limited access permit program for the small mesh multispecies fishery would be a substantial change from the current open access permit approach. Future participation in the directed fishery would be limited to vessels/permits with historic participation, according to the permit qualification criteria. Some general economic and social impacts of establishing such programs should be considered.

Relative to No Action, the impacts of establishing a limited access permit are expected to be neutral to positive for the fishery component that qualifies for the limited access program, as these vessels would

continue their participation in the directed fishery. Qualifying vessel owners would bear administrative costs in applying for new permits, and NMFS may recover costs from permit recipients. Impacts to the remainder of the fishery would be neutral to negative relative to No Action, as vessels would continue to have a low level of participation and the opportunities to expand participation (for less active vessels as well as new entrants) would be limited. Fishery participation may also become constrained by the cost of purchasing a limited access permit, which is expected to increase relative to the current open access permits (in limited supply). With limited access, other measures to constrain fishing may be less necessary, a positive impact on the *Attitudes, Beliefs, and Values* of fishermen towards management. The traditional flexibility of the fishery would become restrained under limited access, such that it may be more difficult to adapt to changing conditions (e.g., resiliency declines). Using recorded fishing history, particularly far back in time, as eligibility to obtain a limited access permit may be onerous for fishermen, if they believe that their history does not match official NMFS records of their catch. Fishermen would need sufficiently detailed receipts from buyers to prove their history and work with NMFS to reconcile any differences in records. The decision to transition to limited access is contentious, because such a decision is often perceived as being very difficult to change or reverse. In contrast, fishermen who seek business and planning stability want management decisions that are not constantly undergoing examination or change.

6.6.3.1 Action 1 – Qualification criteria

Table 72 characterizes the five limited access permit alternatives under consideration, including the number of vessels qualifying under Categories I and II, the number of non-qualifying vessels (active vessels during the qualifying period whose landings were below the Category II threshold), and those vessels with no history (vessels with landings in 2014-2016, but no landings during the qualifying period).

Table 72. Summary of potentially qualifying vessels under each alternative (w/ trips landing ≥ 1 lb. small-mesh multispecies)

Alt.	Qualifying Period	# of Years	Cat I Threshold	Cat II Threshold	Cat I	Cat II	No history	Non-qualifier	Total	Remarks
1	2008-2012	5	500k (100k/yr)	100k (20k/yr)	40	74	1,581	971	**2,666**	• Smallest Cat II fleet. • Hardest to qualify for Cat II.
2	2008-2012	5	1,000k (200k/yr)	20k (4k/yr)	20	203	1,581	908	**2,712**	▪ Smallest Cat I fleet. ▪ Largest Cat II ▪ Relative to Alt 1, half of the no. of Cat I vessels ▪ Hardest to qualify for Cat I; easiest for Cat II.
3	2008-2016	9	500k (56k/yr)	100k (11k/yr)	51	90	1447	1,099	**2,687**	▪ Relative to Alt 1, Cat I & II adds 11 & 16 more vessels, respectively ▪ Relative to Alt 2, Cat I adds 31 more vessels, but has 113 less Cat II vessels
4	2000-2016	17	500k (29k/yr)	100k (6k/yr)	55	124	464	2,035	**2,678**	• Relative to Alt 1, Cat I & II adds 15 & 50 more vessels, respectively • Relative to Alt 3, Cat I & II adds 4 & 34 more vessels, respectively • Easiest to qualify for Cat II.
5	1996-2012	17	1,000k (59k/yr)	200k (12k/yr)	84	159	91	2,345	**2,679**	• Largest Cat I fleet • Relative to Alt 1, Cat I & II have 44 & 85 more vessels, respectively • Relative to Alt 4, Cat I & II adds 29 & 35 more vessels, respectively

Table 73 characterizes a subset of vessels identified in Table 28, those which had directed fishing effort for small-mesh multispecies (i.e., ≥2,000 lbs. of small-mesh multispecies landings in a trip) during the baseline period, 2014-2016.

Table 73. Summary of vessels under each alternative which had trips landing ≥ 2,000 lbs. small-mesh multispecies during the baseline period, 2014-2016.

Alt.	Cat I	Cat II	No History	Non-Qualifier	Remarks
1	33 (83%)	38 (51%)	15 (1%)	42 (4%)	
2	19 (95%)	69 (34%)	15 (1%)	25 (3%)	• Least Cat I fleet, but largest Cat II • Highest current effort on Cat I • Relative to Alt 1, Cat I fleet 38% lesser
3	44 (86%)	46 (51%)	0	38 (3%)	• Relative to Alt 1, Cat I & II adds 11 & 8 more vessels, respectively • Relative to Alt 2, Cat I adds 25 more vessels, but 23 less Cat II vessels
4	42 (76%)	38 (31%)	0	48 (2%)	• Relative to Alt 1, Cat I adds 9 more vessels, same size Cat II fleet • Relative to Alt 2, Cat I adds 23 more vessels, but 31 less Cat II vessels • Relative to Alt3, Cat I & II have 4 & 8 less vessels, respectively.
5	43 (51%)	30 (19%)	10 (11%)	45 (2%)	• Least Current Efforts (%) for both Cat I & Cat II o Cat I: CE5<CE4<CE3<CE2 o Cat II: CE5<CE4<(CE1=CE3) • Relative to Alt 1, Cat I adds 10 more, but 8 less Cat II vessels • Relative to Alt 2, Cat I & II adds 24 but 39 less Cat II vessels • Relative to Alt 3, Cat I has 1 less vessel and 16 fewer Cat II vessels • Relative to Alt 4, Cat I adds 1 more but 8 less Cat II vessels
Note: Percentages are small-mesh directed current effort level (Current Effort% = 100% – Latent Effort% in recent years (2014-16). Current effort is defined as an active vessel that had at least a trip landing ≥ 2,000 lbs. small-mesh multispecies.					

Table 74. Summary of economic performance of alternatives based on recent participation in the fishery. Evaluation of alternatives is based on effort and output data with trips landing ≥ 2,000 lbs. small-mesh multispecies in recent years (2014-2016).

Alt	Cat	Avg. GTON	Qualifying fleet (w/ trips ≥ 1 lb. hakes)	Current active fleet (w/ trips ≥ 2000 lbs hakes)	Latent Effort	Hakes trips (2014-16)		Hakes trips (%)	Hakes/ Fish trips ratio	Annual average hakes landing (lbs)	Share of hakes landings (%)	Hakes/ Fish landed ratio	Annual CPUE lbs/ GTON	Annual Fish revenue/ boat (nominal $)*	Annual Hakes revenue/ boat (in 2016$)	Revenue Ratio Hakes/ Fish	Hakes lbs./ trip	Hakes revenue/ trip (in 2016$)	Annual total fleet hakes revenue (in 2016$)
						3-yr total	Annual / boat												
1	I	151	40	33	17%	1780	18	66%	0.30	11,712,196	83%	0.39	2343	$847,869	$262,637	31%	19,740	$14,607	$8.67 mil
	II	66	74	38	49%	505	4	19	0.11	1,478,780	11	0.15	590	350,653	28,797	8%	8,785	6,501	1.09 mil
	NQ	43	971	42	NA	345	3	13	0.14	670,184	5	0.13	370	303,182	11,808	4%	5,828	4,312	0.50 mil
2	I	190	20	19	5%	1413	25	52	0.39	10,763,803	77	0.44	2979	1,098,180	$419,222	38%	22,853	16,911	7.97 mil
	II	71	203	69	66%	1016	5	38	0.12	2,692,883	19	0.14	553	339,692	$28,880	9%	7,951	5,884	1.99 mil
	NQ	33	908	25	NA	201	3	7	0.17	404,474	3	0.16	488	390,909	$11,972	3%	6,037	4,467	0.30 mil
3	I	132	51	44	14%	2054	16	76	0.26	12,628,196	90	0.38	2181	733,297	$212,383	29%	18,444	13,649	9.34 mil
	II	65	90	46	49%	532	4	20	0.11	1,202,882	9	0.12	401	351,631	$19,351	6%	6,784	5,020	0.89 mil
	NQ	49	1,099	38	NA	119	1	4	0.09	235,964	2	0.12	127	276,692	$4,595	2%	5,949	4,402	0.17 mil
4	I	143	55	42	24%	1887	15	70	0.29	12,109,019	86	0.37	2015	774,067	$213,349	28%	19,251	14,246	8.96 mil
	II	65	124	38	69%	535	5	20	0.11	1,422,681	10	0.14	577	349,584	$27,705	8%	7,978	5,903	1.05 mil
	NQ	45	2,035	48	NA	283	2	10	0.11	535,341	4	0.14	247	253,762	$8,253	3%	5,675	4,199	0.40 mil
5	I	139	84	43	49%	1860	14	69	0.30	12,034,712	86	0.38	1495	748,695	$207,109	28%	19,411	14,364	8.91 mil
	II	68	159	30	81%	427	5	16	0.10	1,154,175	8	0.14	562	332,318	$28,470	9%	8,110	6,001	0.85 mil
	NQ	40	2,341	45	NA	367	3	14	0.14	760,729	5	0.14	421	271,882	$12,510	5%	6,218	4,602	0.56 mil

Note: Hakes in this table refers to small-mesh multispecies (silver hake, offshore hake, and red hake)

*Annual fish revenue and non-qualifiers in Alternative 1, 2 and 5 include revenue for no-history vessels (for 15, 15, and 10 vessels, respectively).

Table 75. Characteristics of whiting landings in the Northern and Southern Management Areas, during 2014-2016.

Limited Access Category	Description		Northern					Southern				
			Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5
Category I	Vessels fishing (>2000 lbs. whiting)	A	9	8	16	12	13	31	18	41	40	40
	Trip value, all species	B	$14,044,030	$13,487,819	$16,780,533	$15,262,396	$16,072,211	$79,648,549	$60,439,790	$86,797,045	$88,319,761	$84,564,126
	Whiting value	C	$7,807,137	$7,684,849	$9,129,519	$8,399,117	$8,409,963	$16,984,125	$15,640,359	$17,302,080	$17,286,188	$17,162,621
	Whiting, lbs.	D	10,935,537	10,598,992	12,945,718	11,624,319	11,637,625	22,261,267	20,335,704	22,742,435	22,722,718	22,503,795
	Whiting, lbs. on Trips > 2,000 lbs.	E	9,376,715	9,171,985	10,922,931	9,992,469	9,995,684	17,368,136	16,545,730	17,535,488	17,546,765	17,464,610
	Whiting trips	F	880	786	1,119	897	918	3,187	1,886	3,772	3,509	3,350
	Trips > 2000 lbs. (hake trips)	G	517	460	697	539	540	1,141	876	1,216	1,213	1,195
	Whiting lbs/boat/yr (on trips >2000 lbs.)	E/A/3	347,286	382,166	227,561	277,569	256,300	186,754	306,402	142,565	146,223	145,538
	Whiting lbs/trip (on trips >2000 lbs.)	E/G	18,137	19,939	15,671	18,539	18,511	15,222	18,888	14,421	14,466	14,615
	Trip value/trip, all species	B/F	$15,959	$17,160	$14,996	$17,015	$17,508	$24,992	$32,047	$23,011	$25,169	$25,243
Category II	Vessels fishing (>2000 lbs. whiting)	H	16	24	19	18	12	32	59	37	30	25
	Trip value, all species	I	$3,935,622	$5,716,819	$4,403,859	$5,985,967	$3,024,196	$25,704,635	$52,255,666	$26,205,775	$22,771,698	$23,778,540
	Whiting value	J	$1,594,025	$1,841,688	$953,394	$1,458,012	$801,727	$965,968	$2,584,463	$1,100,440	$912,744	$933,992
	Whiting, lbs.	K	2,400,216	2,990,324	1,402,085	2,261,815	1,457,553	1,544,658	3,867,541	1,727,325	1,455,897	1,491,257
	Whiting, lbs. on Trips > 2,000 lbs.	L	1,706,695	2,004,650	751,216	1,464,721	966,432	629,492	1,551,217	711,996	580,544	578,259
	Whiting trips	M	451	730	534	568	376	1,708	3,396	1,635	1,713	1,678
	Trips > 2000 lbs.	N	237	344	216	284	182	217	546	247	204	195
	Whiting lbs/boat/yr (on trips >2000 lbs.)	L/H/3	35,556	27,842	13,179	27,124	26,845	6,557	8,764	6,414	6,450	7,710
	Whiting lbs/trip (on trips >2000 lbs.)	L/N	7,201	5,827	3,478	5,157	5,310	2,901	2,841	2,883	2,846	2,965
	Trip value/trip, all species	I/M	$8,726	$7,831	$8,247	$10,539	$8,043	$15,050	$15,387	$16,028	$13,293	$14,171
Non-qualifier	Vessels fishing (>2000 lbs. whiting)	O	14	7	4	9	14	19	5	4	12	17
	Trip value, all species	P	$4,943,465	$3,718,479	$1,738,725	$1,674,754	$3,826,710	$9,145,116	$1,802,844	$1,495,480	$3,406,841	$6,155,634
	Whiting value	Q	$699,994	$574,619	$18,244	$244,027	$889,466	$482,837	$208,108	$30,410	$233,998	$336,316
	Whiting, lbs.	R	1,037,364	783,801	25,314	486,983	1,277,939	706,097	308,777	42,262	333,407	516,970
	Whiting, lbs. on Trips > 2,000 lbs.	S	595,312	502,087	4,575	221,532	716,606	255,319	156,000	5,463	125,638	210,078
	Whiting trips	T	375	190	53	241	412	568	181	56	241	435
	Trips > 2000 lbs.	U	162	112	3	93	194	112	48	7	53	80
	Whiting lbs/boat/yr (on trips >2000 lbs.)	S/O/3	14,174	23,909	381	8,205	17,062	4,479	10,400	455	3,490	4,119
	Whiting lbs/trip (on trips >2000 lbs.)	S/U	3,675	4,483	1,525	2,382	3,694	2,280	3,250	780	2,371	2,626
	Trip value/trip, all species	P/T	$13,183	$19,571	$32,806	$6,949	$9,288	$16,101	$9,960	$26,705	$14,136	$14,151

Table 76. Annual number of vessels under different revenue dependency classes by alternatives and qualifying categories in 2014-2016.

Alternatives and Categories	Revenue Dependency Percent (Small-mesh multispecies$/All Fish$)									
	0-10%	10 - 20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%
Category I										
1	15	6	3	2	0	1	2	2	1	0
2	7	3	1	1	0	1	2	2	1	0
3	21	6	3	2	0	1	3	3	1	0
4	24	7	3	1	0	1	2	3	1	0
5	27	6	3	1	0	1	2	3	1	0
Category II										
1	37	5	2	1	0	1	0	1	0	1
2	82	9	5	3	0	1	0	1	1	2
3	45	6	3	1	0	1	0	0	0	1
4	38	4	2	2	0	1	0	1	1	1
5	36	4	1	1	0	1	0	1	1	1
Non-qualifier										
1	47	2	3	0	0	1	0	0	1	1
2	10	1	1	0	0	0	0	0	0	0
3	34	1	1	0	0	0	0	0	0	0
4	38	2	2	1	0	0	0	0	0	1
5	37	3	3	1	0	0	0	0	0	1

Table 77. Annual number of vessels under different revenue dependency classes by alternatives and qualifying categories (on landings w/ trips >2,000 lbs.) in 2014-2016.

Categories	Alternatives	Revenue Dependency (No. of Boats)			Revenue Dependency (% of Boats)		
		0-10%	10-50%	50-100%	0-10%	10-50%	50-100%
Category I	**1**	15	10	6	48%	33%	19%
	2	7	5	6	38%	29%	33%
	3	21	12	9	50%	29%	21%
	4	24	11	7	58%	26%	16%
	5	27	11	7	60%	25%	15%
Category II	**1**	37	8	4	76%	17%	7%
	2	82	16	6	79%	16%	5%
	3	45	10	3	78%	17%	5%
	4	38	8	4	75%	16%	9%
	5	36	6	4	79%	13%	8%
Non-qualifiers	**1**	47	5	2	86%	10%	4%
	2	10	2	0	79%	18%	3%
	3	34	2	1	93%	5%	2%
	4	38	5	1	86%	11%	2%
	5	37	7	2	80%	16%	4%
Note: revenue dependency percentages =Small-mesh multispecies$/All Fish$							

Table 78. Non-qualifiers' fisheries characteristics by management area in recent years, 2014-2016

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
Description	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**
Trips.	2,522	2,975	2,037	1,235	1,702	1,368	2,534	2,413	2,725	2,808
Species landings lbs.										
Northern shrimp	0	467,600	0	467,600	0	467,600	0	467,600	0	467,600
Atlantic herring	3,421,800	2,754,520	3,310,715	1,469,000	3,378,750	2,754,545	3,422,000	2,754,770	3,422,000	2,754,545
Illex squid	[redacted]	157,250	[redacted]	59,400	[redacted]	155,750	[redacted]	155,750	[redacted]	155,750
Loligo squid	[redacted]	2,817,366	[redacted]	1,135,650	[redacted]	2,613,271	[redacted]	2,807,186	[redacted]	2,387,326
Haddock	4,061,495	87,505	3,899,878	70,130	3,532,443	108,885	3,010,753	83,035	3,490,061	87,335
Yellowtail flounder	260,655	181,459	267,526	103,971	139,278	104,817	239,590	104,517	279,489	153,230
Monkfish	310,832	166,953	308,186	155,109	293,111	156,030	280,654	14,749	293,884	167,573
Skates	511,975	2,025,042	228,186	1,104,823	453,651	1,121,417	430,253	1,284,928	436,695	5,681,596
Other large mesh groundfish	16,087,837	225,247	15,687,760	126,304	14,273,717	179,453	12,967,308	146,082	14,554,917	242,568
Landings, all species	32,647,693	16,492,498	31,222,481	8,755,302	29,114,056	11,746,040	26,386,322	13,488,457	29,102,518	18,775,504
Value (Nominal $)										
Trip value	$33,457,741	$15,954,959	$31,532,073	$8,554,103	$29,122,579	$10,436,325	$26,177,658	$12,812,552	$29,051,371	$14,927,615
Value per trip	$13,266	$5,363	$15,480	$6,926	$17,111	$7,629	$10,331	$5,310	$10,661	$5,316

Table 79. Non-qualifiers' fisheries characteristics with shares of landings by management area in recent years, 2014-2016

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5	
Description	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**	**North**	**South**
Northern shrimp	0.00%	2.84%	0.00%	5.34%	0.00%	3.98%	0.00%	3.47%	0.00%	2.49%
Atlantic herring	10.48%	16.70%	10.60%	16.78%	11.61%	23.45%	12.97%	20.42%	11.76%	14.67%
Illex squid	[redacted]	0.95%	[redacted]	0.68%	[redacted]	1.33%	[redacted]	1.15%	[redacted]	0.83%
Loligo squid	[redacted]	17.08%	[redacted]	12.97%	[redacted]	22.25%	[redacted]	20.81%	[redacted]	12.72%
Haddock	12.44%	0.53%	12.49%	0.80%	12.13%	0.93%	11.41%	0.62%	11.99%	0.47%
Yellowtail flounder	0.80%	1.10%	0.86%	1.19%	0.48%	0.89%	0.91%	0.77%	0.96%	0.82%
Monkfish	0.95%	1.01%	0.99%	1.77%	1.01%	1.33%	1.06%	0.11%	1.01%	0.89%
Skates	1.57%	12.28%	0.73%	12.62%	1.56%	9.55%	1.63%	9.53%	1.50%	30.26%
Other large mesh groundfish	49.28%	1.37%	50.25%	1.44%	49.03%	1.53%	49.14%	1.08%	50.01%	1.29%
Other species (including small-mesh multispecies)	24.43%	46.14%	24.03%	46.41%	24.14%	34.77%	22.85%	42.03%	22.76%	35.57%
Landings, all species	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Table 80. Non-qualifiers' fisheries characteristics with shares of whiting and red hake landings by management area, 2014-2016

Area	Alternative	Whiting value $	Red hake value $	All fish, lbs.	All fish value $	Whiting value %	Red hake value %
		(A)	(B)	(C)	(D)	(E=A/D)	(F=B/D)
Northern	1	$358,379	$2,576	8,873,935	$10,875,909	3.295%	0.024%
	2	$344,428	$1,375	8,453,632	$10,247,423	3.361%	0.013%
	3	$193,673	$1,383	7,701,751	$9,251,914	2.093%	0.015%
	4	$195,178	$2,576	7,093,307	$8,571,399	2.277%	0.030%
	5	$354,054	$2,576	7,897,159	$9,440,986	3.750%	0.027%
Southern	1	$54,333	$12,693	5,572,227	$6,530,632	0.832%	0.194%
	2	$35,400	$7,308	2,982,436	$3,550,968	0.997%	0.206%
	3	$36,599	$8,078	3,814,669	$4,545,080	0.805%	0.178%
	4	$37,762	$8,432	4,750,001	$5,384,722	0.701%	0.157%
	5	$39,178	$8,956	7,765,935	$6,511,514	0.602%	0.138%

Table 81. Number of vessels landing ≥ 2,000 lbs. small-mesh multispecies by home port, 2014-2016

State	Home Port	Category I					Category II					No history					Non-qualifier				
		Alternatives					Alternatives					Alternatives					Alternatives				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
CT	Mystic, New London, Stonington	3	c	3	3	4	3	4	3	3	c						c	c	c	c	c
MA	Gloucester	c	c	5	c	3	4	6	5	5	3	c	c				10	9	8	11	12
	New Bedford, Fairhaven				c	c		4	4	c		6	6			5	6	c	8	9	6
	Provincetown, Boston			c	c	c	4	5	3	4	3	3	3			c	5	4	7	7	6
ME/ NH	Portland, Rockland, Hampton, Portsmouth, Rye, Seabrook	c	c	c	c	c	4	6	4	3	3	c	c				c		c	3	3
NJ	Belford, Cape May, Pt. Pleasant, Tom's River	c	c	3	c	3	3	8	6	4	3	c	c			c	4		c	5	4
NY	Montauk	10	6	10	11	11	c	7	4	c	c						3	c	c	c	c
	Greenport, Hampton Bays, Islip, New York, Pt. Lookout, Shinnecock	c		c	c		4	7	4	4	5						3	c	c	3	3
RI	Point Judith	15	9	18	19	18	15	23	14	13	13	c	c			c	3	c	c	c	c
	Narragansett and Newport			c	c	c	c	c	c	c											c
Note: c = confidential																					

Table 82. Balance sheet or flow of small-mesh multispecies (SMS) landing in major landing and home ports, 2014-16

State	Ports (Landing or Home)	SMS lbs. in Landing Ports			SMS lbs. by vessels with different Home Ports		Differences between landing port and home port SMS lbs.	Remarks-- SMS flows or landing balance
		on landings ≥ 1 lb.	on landings ≥ 2,000 lbs.	on landings ≥ 2,000 lbs.	on landings ≥ 2,000 lbs.	on landings ≥ 2,000 lbs.		
		3-yr total	3-yr total	Annual avg.	3-yr total	Annual avg.	Annual	
		A	B	C	D	E	C-E	
CT	New London	4,112,455	4,104,218	1,368,073	3,892,784	1,297,595	70,478	**Inflow**-- home port vessels mostly land in the same port, but the home port receives some SMS lbs. from elsewhere.
MA	New Bedford	17,347,000	17,328,613	5,776,204	1,460,727	486,909	5,289,295	**Inflow**-- home port vessels mostly land in the same port plus the port receives huge SMS lbs. from Montauk and Point Judith.
	Gloucester	6,102,637	6,023,060	2,007,687	6,416,240	2,138,747	(131,060)	**Outflow**-- home port vessels land mostly land in the same port, but a small volume is landed elsewhere.
NY/RI	Montauk and Point Judith	13,205,454	13,111,867	4,370,622	27,596,924	9,198,975	(4,828,352)	**Outflow**-- home port vessels land significant volume of SMS catches in New Bedford.

Table 83. Home ports of small-mesh multispecies directed vessels, by limited access alternatives in 2014-2016.

Communities by Alternatives			Total Fish		Qualifiers (Cat I & II)			Non-qualifiers (NH+NQ)			Qualifier's SMS Revenue	
	Home States	Home Ports	Fish lbs.	Fish Revenue $	SMS lbs.	SMS Revenue $	No. of Vessels	SMS lbs.	SMS Revenue $	No. of Vessels	as % of Total Fish $	as % of Total SMS $
			a	b	c	d	e	f	g	h	d/b	d/(d+g)
Alternative 1	CT	New London	7,449,955	$5,732,389	3,892,784	$2,880,660	3	-	-	-	50%	100%
		Other Ports	2,637,261	$2,943,556	316,609	$234,291	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	MA	Gloucester	3,312,523	$12,821,039	5,796,413	$4,289,346	6	619,827	$458,672	12	33%	90%
		Other Ports	5,219,805	$16,152,740	453,068	$335,270	4	1,007,659	$745,668	20	2%	31%
	ME/NH/ NJ	Portland, Seabrook, etc.	13,762,322	$11,271,439	1,423,856	$1,053,653	10	414,665	$306,852	9	9%	77%
	NY	Montauk	30,462,676	$28,139,327	12,553,520	$9,289,605	12	140,163	$103,721	3	33%	99%
		Other Ports	4,654,091	$3,809,683	455,543	$337,102	6	57,151	$42,292	4	9%	89%
	RI	Point Judith	58,814,562	$46,614,328	14,648,249	$10,839,704	30	254,992	$188,694	4	23%	98%
		Other Ports	1,145,202	$528,356	29,410	$21,763	2	-	-	-	4%	100%
Alternative 2	CT	New London	7,449,955	$5,732,389	3,892,784	$2,880,660	3	-	-	-	50%	100%
		Other Ports	2,637,261	$2,943,556	316,609	$234,291	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	MA	Gloucester	33,312,523	$12,821,039	5,873,753	$4,346,577	7	542,487	$401,440	11	34%	92%
		Other Ports	15,219,805	$16,152,740	720,202	$532,949	9	740,525	$547,989	15	3%	49%
	ME/NH/ NJ	Portland, Seabrook, etc.	13,762,322	$11,271,439	1,711,217	$1,266,301	16	127,304	$94,205	3	11%	93%
	NY	Montauk	30,462,676	$28,139,327	12,593,938	$9,319,514	13	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Other Ports	4,654,091	$3,809,683	497,799	$368,371	9	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	RI	Point Judith	58,814,562	$46,614,328	14,692,240	$10,872,258	32	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Other Ports	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	-	-	4%	100%

Communities by Alternatives			Total Fish		Qualifiers (Cat I & II)			Non-qualifiers (NH+NQ)			Qualifier's SMS Revenue	
	Home States	Home Ports	Fish lbs.	Fish Revenue $	SMS lbs.	SMS Revenue $	No. of Vessels	SMS lbs.	SMS Revenue $	No. of Vessels	as % of Total Fish $	as % of Total SMS $
			a	b	c	d	e	f	g	h	d/b	d/(d+g)
Alternative 3	CT	New London	7,449,955	$5,732,389	3,892,784	$2,880,660	3	-	-	-	50%	100%
		Other Ports	2,637,261	$2,943,556	316,609	$234,291	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	MA	Gloucester	33,312,523	$12,821,039	6,253,686	$4,627,728	10	162,554	$120,290	8	36%	97%
		Other Ports	15,219,805	$16,152,740	1,126,268	$833,438	9	334,459	$247,500	15	5%	77%
	ME/NH/ NJ	Portland, Seabrook, etc.	13,762,322	$11,271,439	1,817,777	$1,345,155	15	20,744	$15,351	4	12%	99%
	NY	Montauk	30,462,676	$28,139,327	2,674,433	$9,379,080	14	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Other Ports	4,654,091	$3,809,683	477,044	$353,013	8	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	RI	Point Judith	58,814,562	$46,614,328	14,843,520	$10,984,205	32	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Other Ports	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	-	-	4%	100%
Alternative 4	CT	New London	7,449,955	$5,732,389	3,892,784	$2,880,660	3	-	-	-	50%	100%
		Other Ports	2,637,261	$2,943,556	316,609	$234,291	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	MA	Gloucester	33,312,523	$12,821,039	5,809,819	$4,299,266	7	606,421	$448,752	11	34%	91%
		Other Ports	15,219,805	$16,152,740	1,065,788	$788,683	8	394,939	$292,255	16	5%	73%
	ME/NH/ NJ	Portland, Seabrook, etc.	13,762,322	$11,271,439	1,568,783	$1,160,899	11	269,738	$199,606	8	10%	85%
	NY	Montauk	30,462,676	$28,139,327	12,593,938	$9,319,514	13	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Other Ports	4,654,091	$3,809,683	470,974	$348,521	7	41,720	$30,873	3	9%	92%
	RI	Point Judith	58,814,562	$46,614,328	14,843,520	$10,984,205	32	59,721	$44,194	2	24%	100%
		Other Ports	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	4%	100%
Alternative 5	CT	New London	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	49%	97%
		Other Ports	2,637,261	$2,943,556	316,609	$234,291	3	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	MA	Gloucester	33,312,523	$12,821,039	5,649,517	$4,180,643	6	766,723	$567,375	12	33%	88%
		Other Ports	15,219,805	$16,152,740	529,218	$391,621	5	931,509	$689,317	19	2%	36%
	ME/NH/ NJ	Portland, Seabrook, etc.	13,762,322	$11,271,439	1,527,631	$1,130,447	11	310,890	$230,059	8	10%	83%
	NY	Montauk	0,462,676	$28,139,327	12,593,938	$9,319,514	13	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Other Ports	4,654,091	$3,809,683	470,974	$348,521	7	41,720	$30,873	3	9%	92%
	RI	Pt. Judith	58,814,562	$46,614,328	4,681,790	$10,864,525	31	221,451	$163,874	3	23%	99%
		Other Ports	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	3%	71%

6.6.3.1.1 Alternative 1

Alternative 1 would establish a limited access program, with vessels having ≥500,000 lbs. of whiting and/or red hake landings from 2008 to 2012 qualifying for a Category I permit and those landing ≥100,000 lbs. qualifying for a Category II permit.

Qualifying vessels. Alternative 1 is expected to qualify 40 Category I and 74 Category II vessels (Table 72). It has the smallest Category II fleet relative to Alternatives 2-5, due to its more restrictive qualifying threshold requirement. For the same reason, the Category I fleet is larger than under Alternative 2, but smaller than Alternatives 3-5. In 2014-2016, 33 Category I and 38 Category II vessels had at least one trip that landed ≥ 2,000 lbs. of small-mesh multispecies. There would be 57 non-qualifying vessels, including 15 no-history vessels that had at least one trip that landed ≥ 2,000 lbs. small-mesh multispecies in 2014-2016 (Table 73 characterizes a subset of vessels identified in Table 28, those which had directed fishing effort for small-mesh multispecies (i.e., ≥2,000 lbs. of small-mesh multispecies landings in a trip) during the baseline period, 2014-2016.

Table 73).

Active and latent vessels. Alternative 1 would qualify the lowest number of limited access permits (n=114) relative to Alternatives 2-5 (range = 114-243), and the second to lowest number of Category I permits (n=40; range = 20-84; Table 72). Under Alternative 1, a lower percentage of vessels that would qualify for Category I permits are currently latent compared to Alternatives 4 and 5, but more compared to Alternatives 2 and 3.

Vessel size. Vessels that would qualify for Category I permits under Alternative 1 have an average vessel size of 151 GRT, which is higher than for Alternatives 3 and 4, but lower than for Alternatives 2 and 5 (Table 74). For the Category II vessels, the average vessel size is lower, 66 GRT, and range in vessel size is much narrower across alternatives (65-71 GRT) than for Category I.

Landings. Under Alternative 1, the recent annual average small-mesh multispecies landings for Category I and II vessels (11.71M and 1.48M lbs., respectively) is higher than Alternative 5, but less than the other alternatives (Table 74). Category I vessels in Alternative 1 landed about 83% of total recent small-mesh multispecies landings, which is higher than Alternative 2, but lower than the other alternatives. In contrast, Category II vessels in Alternative 1 landed about 11% of total recent small-mesh multispecies, which is lower than Alternative 2, and higher than the other alternatives.

Table 75 characterizes whiting landings in the Northern and Southern Management Areas in 2014-2016. For all limited access categories across all alternatives, annual and per trip whiting landings per boat on whiting directed trips are generally higher in the Northern management area than in the Southern area. However, aggregate volume of whiting landings and trip value (revenue from all species) per trip are higher in the Southern management area. Vessels in the northern management area have a higher dependency on revenue from whiting.

Revenue. Compared to Alternatives 2-5, the recently active vessels (w/ trips landing 2,000 lbs. or more small-mesh multispecies) under Alternative 1 are expected to generate similar aggregate landings and revenues, though there are differences in landing by qualifying categories across alternatives (Table 74).

Per boat revenue. Annual per boat revenue from small-mesh multispecies for the Category I vessels in Alternative 1 is $262,637, higher than Alternatives 3, 4 and 5, but lower than that of Alternative 2. Similarly, annual per boat revenue from small-mesh multispecies for the Category II vessels in Alternative 1 is at $28,797, which is second highest compared to all other alternatives except for Alternative 2.

Per trip revenue[29]. Per trip revenue from small-mesh multispecies directed trips for the Category I vessels in Alternative 1 is at $14,607. Per trip revenue from small-mesh multispecies is higher than Alternatives 3, 4 and 5, but lower than that of Alternative 2. Similarly, per trip revenue from hake for the Category II vessels in Alternative 1 is highest compared to all other alternatives.

Dependence on small-mesh multispecies. The Alternative 1, Category I vessels had a landings ratio of small-mesh multispecies to total fish of 0.39. Thus, the dependency on small-mesh multispecies is lower than under Alternative 2, but marginally higher than Alternatives 3, 4, and 5.

Revenue dependency on small-mesh multispecies. Table 76 and Table 77 detail the distribution of boats that derived different levels of revenues from small-mesh multispecies. In Alternative 1, majority of boats (i.e., 48% of Category I boats, 76% of Category II boats, and 86% of non-qualifiers) had less than

[29] Trip lengths are assumed to be homogenous within a category in an alternative.

10% of revenue derived from small mesh multispecies. About 33% of Category I boats, 17% of Category II boats, and 10% of non-qualifiers had their 10-50% of revenue derived from small-mesh multispecies. Likewise, 19% of Category I boats, 7% of Category II boats, and 4% of non-qualifiers had over 50% of fish revenue derived from small mesh multispecies

Non-qualifiers' fisheries characteristics. Table 78 to Table 80 present the characteristics of non-qualifiers' fisheries by alternatives and management area. The types of fisheries that non-qualifiers vary by management areas, but are similar across alternatives. Non-qualifiers in the Northern management are primarily into other large-mesh groundfish fishery (about 50%) followed by Haddock (about 12%) and Atlantic herring (about 10-13%) fisheries. In the other hand, Non-qualifiers in the Southern management are primarily into Loligo squid (about 13-21%), Atlantic herring (about 15-23%), skates (about 10-30%) and northern shrimp (about 2-5%) fisheries. They also catch yellowtail flounder and monkfish in both management areas in small quantities (about 1% each). The landings of these species, however, varies with landing ports. In Alternative 1, the share of whiting value relative to all fish value is 3.3% in the Northern area and <1% in Southern area. Share of red hake value to total fish value is negligible in both management areas. Non-qualifiers' per trip fishing revenue averaged to about $13,266 in the Northern Area and $5,363 in the Southern Area recently in Alternative 1. Revenues per trip for both management area are lesser than of Alternative 3 and 2, but higher than Alternative 4, and 5.

Community impacts on major ports. Across the Action 1 limited access alternatives, the vessels in Category I account for 77 to 90% of the small-mesh multispecies landings. A core set of 20 vessels would qualify for a Category I permit under any of the five alternatives and account for 85 to 100% of small-mesh multispecies landings by Category I vessels in other alternatives, in 2014-2016.[30] The remainder of landings have been by vessels that would qualify for a Category I permit under a subset of alternatives, Category II vessels, and non-qualifiers. The 20 core vessels have home ports mainly in Point Judith, RI (45%) and Montauk, NY (30%). Table 82 presents a balance sheet or flow of small-mesh multispecies landing in major landing and home ports during 2014-2016. New Bedford, Point Judith, Gloucester, Montauk, and New London are the top landing ports in recent years. Vessels with home ports in Gloucester, New London, and New Bedford land nearly all of their small-mesh multispecies catches in the same ports. Some vessels from Point Judith and Montauk take their catches to New Bedford, i.e., New Bedford receives very large volume of small-mesh multispecies from vessels whose home ports are in Point Judith and Montauk. Thus, in the short-term, impacts to landing ports across the five alternatives are likely neutral to very minor, in terms of disrupting current port economics. In the long-term, transitioning to a limited access program would preclude non-qualifiers from the directed fishery. Non-qualifying vessels have landing ports across the region.

A few home ports (particularly Gloucester, MA) may be affected by the choice of this limited access alternative in a way that they will have fewer Category I vessels had it chosen another limited access alternative (Table 81). However, that wouldn't affect the home port economies either. In Alternative 1, Point Judith (RI) and Montauk (NY) are the major ports that are home to the largest number of Category I vessels. Similarly, Point Judith (RI) is the single port that home to a large number of Category II vessels followed by Gloucester (MA), Provincetown (MA). Many non-qualifiers have home ports in Gloucester, New Bedford and Boston in MA compared to other ports in Alternative 1. Under Alternative 1, the non-qualifying "no history" vessels (those with landings in 2014-2016, but no landings during the qualifying period) are largely from New Bedford, Boston, and Gloucester, Massachusetts. Gloucester has the largest number of non-qualifiers than in other home ports.

[30] Alternative 2 has 20 Category I vessels. They are also the core set of Category I vessels which represent about 85% to 92% of small-mesh multispecies landings by Category I fleet in other alternatives (Alt 1, 3-5).

Table 83 presents community impacts in home ports from the small-mesh multispecies directed landings by vessels in the limited access alternatives during 2014-16. The impacts are assessed in terms of landing, ex-vessel revenues from small-mesh multispecies as well as revenue dependencies from these species relative to all landed fishes by qualifier (Category I and II) and non-qualifier (non-qualifier and no-history) vessels. Qualifiers across home ports have varying degrees of revenue dependencies. In Alternative 1, the qualifier vessels in New London (CT), Gloucester (MA), Montauk (NY) and Point Judith (RI) have revenue dependencies from small-mesh multispecies relative to all fish landings at about 50%, 33%, 33% and 23%, respectively. But for other home ports, the dependencies ranged from 2 to 9%. Also, the revenue share from small-multispecies is overwhelmingly large for qualifiers compared to non-qualifiers' except in Massachusetts's other home ports.

6.6.3.1.2 Alternative 2

Alternative 2 would establish a limited access program, with vessels having ≥ 1,000,000 lbs. of whiting and/or red hake landings from 2008 to 2012 qualifying for a Category I permit and those landing ≥ 20,000 lbs. qualifying for a Category II permit.

Qualifying vessels. Alternative 2 is expected to qualify 20 Category I and 203 Category II vessels. It has the smallest Category I fleet relative to all alternatives, due to its more restrictive qualifying threshold requirement. But, has largest Category II fleet due to least restrictive qualifying threshold requirement. In 2014-2016, 19 Category I and 69 Category II vessels had at least one trip that landed 2,000 lbs. or more small-mesh multispecies. Under Alternative 2, there would be 40 non-qualifying vessels, including 15 no-history vessels that had at least one trip that landed 2,000 lbs. or more of small-mesh multispecies in 2014-2016.

Active and latent vessels. Alternative 2 has largest number of Category II vessels, but least number of Category I vessels. Category I in Alternative 2 has least latent effort compared to all other alternatives in the category. The latent effort for Category II vessels in Alternative 2 is lower than that of Alternative 4 and 5, but higher than that of Alternative 1 and 3.

Vessel size. Vessels that would qualifying for Category I permits under Alternative 2 have the highest average vessel size of 190 GRT relative to the other alternatives. For the Category II vessels, the average vessel size is also highest, at 71 GRT, though the range in vessel size is much narrower across alternatives (65-71 GRT) than for Category I.

Landings. Category I vessels in Alternative 2 landed least amount of small-mesh multispecies compared to Category I vessels in the other alternatives. However, Category II vessels in Alternative 2 landed more small-mesh multispecies compared to Category II vessels in other alternatives. The average annual landing of small-mesh multispecies in recent years by Category I and Category II vessels in Alternative 2 were 10.8 M and 2.7 M lbs., respectively. Category I vessels in Alternative 2 landed about 77% of total landed small-mesh multispecies, lowest of all alternatives. Similarly, Category II vessels in Alternative 2 landed about 19% of total landed small-mesh multispecies, which is higher than all other alternatives.

Table 75 characterizes whiting landings in the Northern and Southern Management Areas in 2014-2016. For all limited access categories across all alternatives, annual and per trip whiting landings per boat on whiting directed trips are generally higher in the Northern management area than in the Southern area. However, aggregate volume of whiting landings and trip value (revenue from all species) per trip are higher in the Southern management area. Vessels in the northern management area have a higher dependency on revenue from whiting.

Revenues. Compared to Alternatives 1 and 3-5, the currently active vessels (w/ trips landing 2,000 lbs. or more small-mesh multispecies) under Alternative 2 expected to generate similar aggregate landings and revenues although there are differences in landings by qualifying categories across alternatives.

Per boat revenue. Annual per boat revenue from small-mesh multispecies for the Category I and Category II vessels in Alternative 2 are highest than rest other alternatives. Per boat revenue from small-mesh multispecies averaged at about $419,222 and $28,880 for Category I and Category II vessels, respectively, from small-mesh multispecies directed trips.

Per trip revenue. Per trip revenue from small-mesh multispecies for the Category I vessels in Alternative 2 highest than rest other alternatives. Similarly, per trip revenue from small-mesh multispecies for the Category II vessels in Alternative 2 is higher than Alternative 3, but slightly lower than all other alternatives. Per trip revenue from small-mesh multispecies averaged at about $16,911 and $5,884 for Category I and Category II vessels, respectively, from small-mesh multispecies directed trips.

Dependence on small-mesh multispecies. The Alternative 2, Category I vessels had a ratio of small-mesh multispecies to total fish pound of 0.44. Thus, the dependency on small-mesh multispecies is highest compared to all other alternatives.

Revenue dependency on small-mesh multispecies. Table 76 and Table 77 detail the distribution of boats that derived different levels of revenues from small-mesh multispecies. In Alternative 2, majority of boats (i.e., 38% of Category I boats, 79% of Category II boats, and 79% of non-qualifiers) had less than 10% of revenue derived from small mesh multispecies. About 29% of Category I boats, 16% of Category II boats, and 18% of non-qualifiers had their 10-50% of revenue derived from small-mesh multispecies. Likewise, 33% of Category I boats, 5% of Category II boats, and 3% of non-qualifiers had over 50% of fish revenue derived from small mesh multispecies.

Non-qualifiers' fisheries characteristics. Table 78 to Table 80 present the characteristics of non-qualifiers' fisheries by alternatives and management area. The types of fisheries that non-qualifiers vary by management areas, but are similar across alternatives. Non-qualifiers in the Northern management are primarily into other large-mesh groundfish fishery (about 50%) followed by Haddock (about 12%) and Atlantic herring (about 10-13%) fisheries. In the other hand, Non-qualifiers in the Southern management are primarily into Loligo squid (about 13-21%), Atlantic herring (about 15-23%), skates (about 10-30%) and northern shrimp (about 2-5%) fisheries. They also catch Yellowtail flounder and Monkfish in both management areas in small quantities (about 1% each). In Alternative 2, the share of whiting value relative to all fish value is 3.4% in the Northern area and <1% in Southern area. Share of red hake value to total fish value is negligible in both management area. Non-qualifiers' per trip fishing revenue averaged to about $15,480 in the Northern area and $6,926 in the Southern area recently in Alternative 2. Revenues per trip for both management area are lesser than of Alternative 3, but higher than Alternative 1, 4, and 5.

Community impacts on major ports. Across the Action 1 limited access alternatives, the vessels in Category I account for 77 to 90% of the small-mesh multispecies landings. A core set of 20 vessels would qualify for a Category I permit under any of the five alternatives and account for 85 to 100% of small-mesh multispecies landings by Category I vessels in other alternatives, in 2014-2016. The remainder of landings have been by vessels that would qualify for a Category I permit under a subset of alternatives, Category II vessels, and non-qualifiers. The 20 core vessels have home ports mainly in Point Judith, RI (45%) and Montauk, NY (30%). Table 82 presents a balance sheet or flow of small-mesh multispecies landing in major landing and home ports during 2014-2016. New Bedford, Point Judith, Gloucester, Montauk, and New London are the top landing ports in recent years. While vessels with home ports in Gloucester, New London, and New Bedford land nearly all of their small-mesh

multispecies catches in the same ports, but some vessels from Point Judith and Montauk take their catches to New Bedford, i.e., New Bedford receives very large volume of small-mesh multispecies from vessels whose home ports are in Point Judith and Montauk. Thus, in the short-term, impacts to landing ports across the five alternatives are likely neutral to very minor, in terms of disrupting current port economics. In the long-term, transitioning to a limited access program would preclude non-qualifiers from the directed fishery.

A few home ports (particularly Gloucester, MA) may be affected by the choice of this limited access alternative in a way that they will have fewer Category I vessels had it chosen another limited access alternative (Table 81). However, that wouldn't affect the home port economies either. In Alternative 2, Point Judith (RI) and Montauk (NY) are the major ports that are home to the largest number of Category I vessels although they also experience significant decline in Category I vessels in Alternative 2 relative to other alternatives. Similarly, Point Judith (RI) is the single port that home to a large number of Category II vessels followed by Montauk (NY) and Gloucester (MA). Many non-qualifiers have home ports in Gloucester, New Bedford and Boston in MA compared to other ports in Alternative 2. Under Alternative 2, the non-qualifying "no history" vessels (those with landings in 2014-2016, but no landings during the qualifying period) are largely from New Bedford, Boston, and Gloucester, Massachusetts. Gloucester has the largest number of non-qualifiers than in other home ports.

Table 83 presents community impacts in home ports from the small-mesh multispecies directed landings by vessels in the limited access alternatives during 2014-16. The impacts are assessed in terms of landing, ex-vessel revenues from small-mesh multispecies as well as revenue dependencies from these species relative to all landed fishes by qualifier (Category I and II) and non-qualifier (non-qualifier and no-history) vessels. Qualifiers across home ports have varying degrees of revenue dependencies. In Alternative 2, the qualifier vessels in New London (CT), Gloucester (MA), Montauk (NY) and Point Judith (RI) have revenue dependencies from small-mesh multispecies relative to all fish landings at about 50%, 34%, 33% and 23%, respectively. But for other home ports, the dependencies ranged from 4 to 11%. Also, the revenue share from small-multispecies is overwhelmingly large for qualifiers compared to non-qualifiers, except in Massachusetts's other home ports.

6.6.3.1.3 Alternative 3

Alternative 3 would establish a limited access program, with vessels having >500,000 lbs. of whiting and/or red hake landings from 2008 to 2016 qualifying for a Category I permit and those landing ≥100,000 lbs. qualifying for a Category II permit.

Qualifying vessels. Alternative 2 is expected to quality 51 Category I and 90 Category II vessels. Nineteen (44) Category I and 46 Category II vessels had at least one trip that landed 2,000 lbs. or more small-mesh multispecies in 2014-2016 (the current incidental limits). Under Alternative 3, there were 38 non-qualifying vessels that had at least one trip that landed 2,000 lbs. or more of small-mesh multispecies in 2014-2016.

Active and latent vessels. Alternate 3 has highest number of Category I vessels, but moderate number of Category II vessels. Alternative 3 has lesser degree of latent effort under the Category I compared Alternatives 1, 4 and 5. In the other hand, Alternative 3 has least latent effort on Category II fleet compared to all other alternatives in Category II.

Vessel size. Vessels that would qualifying for Category I permits under Alternative 3 have the lowest vessel size of 132 GRT relative to the other alternatives. For the Category II vessels, the average vessel size is also at lowest range at 65 GRT, though the range in vessel size is much narrower across alternatives (65-71 GRT) than for Category I.

Landings. Under Alternative 3, Category I vessels landed largest volume of small-mesh multispecies compared to rest other alternatives. However, Category II vessels in Alternative 3 landed less volume of small-mesh multispecies compared to Alternatives 1, 2, and 4. Including the landing by non-qualifier vessels, Alternative 3 landed highest volume of small-mesh multispecies compared to all other alternatives. The recent annual average landing of small-mesh multispecies by Category I and Category II vessels in Alternative 3 were 12.6 M and 1.2 M lbs., respectively. Category I vessels in Alternative 3 landed about 90% of total landed small-mesh multispecies, which is highest compared to all other alternatives. Similarly, Category II vessels in Alternative 3 landed about 9% of total landed small-mesh multispecies, which is lowest compared to all other alternatives.

Table 75 characterizes whiting landings in the Northern and Southern Management Areas in 2014-2016. For all limited access categories across all alternatives, annual and per trip whiting landings per boat on whiting directed trips are generally higher in the Northern management area than in the Southern area. However, aggregate volume of whiting landings and trip value (revenue from all species) per trip are higher in the Southern management area. Vessels fishing in the northern management area typically have a higher dependency on revenue from whiting.

Revenue. Compared to other alternatives, the currently active vessels (w/ trips landing 2,000 lbs. or more whiting) under Alternative 3 is expected to generate similar aggregate landings and revenues although there are differences in landing by qualifying categories across alternatives.

Per boat revenue. For the trips that landed 2,000 lbs. or more of small-mesh multispecies, annual per boat revenue from small-mesh multispecies for the Category I vessels in Alternative 3 is at $21,2383, which is higher than Alternative 5, but lower than Alternative 1, 2, and 4. Similarly, annual per boat revenue from small-mesh multispecies for the Category II vessels in Alternative 3 is lowest ($19,351) than all other alternatives.

Per trip revenue. Per trip revenue from small-mesh multispecies for the Category I and Category II vessels in Alternative 3 is lowest at $212,383 and $19,351, respectively, than all other alternatives in the same categories.

Dependence on small-mesh multispecies. The vessels in Category I in Alternative 3 had a ratio of small-mesh multispecies to total fish pound at 0.38. The dependency on small-mesh multispecies is lower compared to the Alt 1 and 2, but marginally higher than Alt 4.

Revenue dependency on small-mesh multispecies. Table 76 and Table 77 detail the distribution of boats that derived different levels of revenues from small-mesh multispecies. In Alternative 3, majority of boats (i.e., 50% of Category I boats, 78% of Category II boats, and 93% of non-qualifiers) had less than 10% of revenue derived from small mesh multispecies. About 29% of Category I boats, 17% of Category II boats, and 5% of non-qualifiers had their 10-50% of revenue derived from small-mesh multispecies. Likewise, 21% of Category I boats, 5% of Category II boats, and 2% of non-qualifiers had over 50% of fish revenue derived from small mesh multispecies.

Non-qualifiers' fisheries characteristics. Table 78 and Table 80 present the characteristics of non-qualifiers' fisheries by alternatives and management area. The types of fisheries that non-qualifiers vary by management areas, but are similar across alternatives. Non-qualifiers in the Northern management are primarily into other large-mesh groundfish fishery (about 50%) followed by Haddock (about 12%) and Atlantic herring (about 10-13%) fisheries. In the other hand, Non-qualifiers in the Southern management are primarily into Loligo squid (about 13-21%), Atlantic herring (about 15-23%), skates (about 10-30%) and northern shrimp (about 2-5%) fisheries. They also catch Yellowtail flounder and Monkfish in both

management areas in small quantities (about 1% each). In Alternative 3, the share of whiting value relative to all fish value is 2.1% in the Northern area and <1% in Southern area. Share of red hake value to total fish value is negligible in both management area. Non-qualifiers' per trip fishing revenue averaged to about $17,111 in the Northern area and $7,629 in the Southern area recently in Alternative 3. Revenues per trip for both management area are most with Alternative 3.

Community impacts on major ports. Across the Action 1 limited access alternatives, the vessels in Category I account for 77 to 90% of the small-mesh multispecies landings. A core set of 20 vessels would qualify for a Category I permit under any of the five alternatives and account for 85 to 100% of small-mesh multispecies landings by Category I vessels in other alternatives, in 2014-16. The remainder of landings have been by vessels that would qualify for a Category I permit under a subset of alternatives, Category II vessels, and non-qualifiers. The 20 core vessels have home ports mainly in Point Judith, RI (45%) and Montauk, NY (30%). Table 82 presents a balance sheet or flow of small-mesh multispecies landing in major landing and home ports during 2014-2016. New Bedford, Point Judith, Gloucester, Montauk, and New London are the top landing ports in recent years. While vessels with home ports in Gloucester, New London, and New Bedford land nearly all of their small-mesh multispecies catches in the same ports, but some vessels from Point Judith and Montauk take their catches to New Bedford, i.e., New Bedford receives very large volume of small-mesh multispecies from vessels whose home ports are in Point Judith and Montauk. Thus, in the short-term, impacts to landing ports across the five alternatives are likely neutral to very minor, in terms of disrupting current port economics. In the long-term, transitioning to a limited access program would preclude non-qualifiers from the directed fishery.

A few home ports (particularly Gloucester, MA) may be affected by the choice of this limited access alternative in a way that they will have fewer Category I vessels had it chosen another limited access alternative (Table 81). However, that wouldn't affect the home port economies either. Moreover, Alternative 3 has the most number of currently active Category I vessels. In Alternative 3, Point Judith (RI) and Montauk (NY) are the major ports that are home to the largest number of Category I vessels followed by Gloucester (MA). Similarly, Point Judith (RI) is the single port that home to a large number of Category II vessels followed by Gloucester (MA) and Montauk (NY). Many non-qualifiers have home ports in Gloucester, New Bedford and Boston in MA compared to other ports in Alternative 3. Gloucester has the largest number of non-qualifiers than in other home ports.

Table 83 presents community impacts in home ports from the small-mesh multispecies directed landings by vessels in the limited access alternatives during 2014-16. The impacts are assessed in terms of landing, ex-vessel revenues from small-mesh multispecies as well as revenue dependencies from these species relative to all landed fishes by qualifier (Category I and II) and non-qualifier (non-qualifier and no-history) vessels. Qualifiers across home ports have varying degrees of revenue dependencies. In Alternative 3, the qualifier vessels in New London (CT), Gloucester (MA), Montauk (NY) and Point Judith (RI) have revenue dependencies from small-mesh multispecies relative to all fish landings at about 50%, 36%, 33% and 24%, respectively. But for other home ports, the dependencies ranged from 4 to 12%. Also, the revenue share from small-multispecies is overwhelmingly large for qualifiers compared to non-qualifiers.

6.6.3.1.4 Alternative 4

Alternative 4 would establish a limited access program, with vessels having >500,000 lbs. of whiting and/or red hake landings from 2000 to 2016 qualifying for a Category I permit and those landing ≥100,000 lbs. qualifying for a Category II permit.

Qualifying vessels. Alternative 4 is expected to quality 55 Category I and 124 Category II vessels. Forty-two (42) Category I and 38 Category II vessels had at least one trip that landed 2,000 lbs. or more small-

mesh multispecies in 2014-16. Under Alternative 4, there were 48 non-qualifying vessels that had at least one trip that landed more than 2,000 lbs. of small-mesh multispecies in 2014-2016.

Active and latent vessels. Alternative 4 has lesser degree of latent effort under the Category I and Category II compared Alternatives 5, but higher than Alt 1, 2 and 3.

Vessel size. Vessels that would qualifying for Category I permits under Alternative 4 have the average vessel size of 143 GRT and is lower than Alternative 2 and Alternative 1. For the Category II vessels, the average vessel size is at lower range at 65 GRT, though the range in vessel size is much narrower across alternatives (65-71 GRT) than for Category I.

Landings. In Alternative 4, the average annual landing of small-mesh multispecies in recent years by Category I and Category II vessels in Alternative 4 were 12.1 M and 1.4 M lbs., respectively. Category I vessels in Alternative 4 landed about 86% of total landed small-mesh multispecies, which is higher than Alternative 2, but is lower than Alternative 1 and 3. Similarly, Category II vessels in Alternative 4 landed about 10% of total landed small-mesh multispecies, which is higher than Alternative 4 but is lower than Alternative 2.

Table 75 characterizes whiting landings in the Northern and Southern Management Areas in 2014-2016. For all limited access categories across all alternatives, annual and per trip whiting landings per boat on whiting directed trips are generally higher in the Northern management area than in the Southern area. However, aggregate volume of whiting landings and trip value (revenue from all species) per trip are higher in the Southern management area. Vessels fishing in the northern management area typically have a higher dependency on revenue from whiting.

Revenues. Compared to other alternatives, the currently active vessels (w/ trips landing 2,000 lbs. or more of small-mesh multispecies) under Alternative 4 is expected to generate similar aggregate landings and revenues, although there are differences in landing by qualifying categories across alternatives.

Per boat revenues. Annual per boat revenue from small-mesh multispecies for the Category I vessels in Alternative 4 is $213,349 and is higher than Alternative 3 and 5, but lower than Alternative 1, and 2. Similarly, annual per boat revenue from small-mesh multispecies for the Category II vessels in Alternative 4 is $27,705 and is higher than Alternative 3 but less than Alternative 1, 2, and 5.

Per trip revenues. Per trip revenue from small-mesh multispecies for the Category I vessels in Alternative 3 is higher than Alternative 3, but lower than Alternative 1, 2 and 5. Similarly, per trip revenue from hake for the Category II vessels in Alternative 4 is higher than Alternatives 2 and 3 but less than Alternatives 1 and 5.

Dependence on small-mesh multispecies. The vessels in Category I in Alternative 4 had a ratio of small-mesh multispecies to total fish pound at 0.37. The dependency on small-mesh multispecies is lowest compared to other alternatives.

Revenue dependency on small-mesh multispecies. Table 76 and Table 77 detail the distribution of boats that derived different levels of revenues from small-mesh multispecies. In Alternative 4, majority of boats (i.e., 58% of Category I boats, 75% of Category II boats, and 86% of non-qualifiers) had less than 10% of revenue derived from small mesh multispecies. About 26% of Category I boats, 16% of Category II boats, and 11% of non-qualifiers had their 10-50% of revenue derived from small-mesh multispecies. Likewise, 16% of Category I boats, 9% of Category II boats, and 2% of non-qualifiers had over 50% of fish revenue derived from small mesh multispecies

Non-qualifiers' fisheries characteristics. Table 78 and Table 80 present the characteristics of non-qualifiers' fisheries by alternatives and management area. The types of fisheries that non-qualifiers vary by management areas, but are similar across alternatives. Non-qualifiers in the Northern management are primarily into other large-mesh groundfish fishery (about 50%) followed by Haddock (about 12%) and Atlantic herring (about 10-13%) fisheries. In the other hand, Non-qualifiers in the Southern management are primarily into Loligo squid (about 13-21%), Atlantic herring (about 15-23%), skates (about 10-30%) and northern shrimp (about 2-5%) fisheries. They also catch Yellowtail flounder and Monkfish in both management areas in small quantities (about 1% each). In Alternative 4, the share of whiting value relative to all fish value is 2.3% in the Northern area and <1% in Southern area. Share of red hake value to total fish value is negligible in both management area. Non-qualifiers' per trip fishing revenue averaged to about $10,331 in the Northern area and $5,310 in the Southern area recently in Alternative 4. Revenues per trips for both management area are least and is similar to Alternative 5.

Community impacts on major ports. Across the Action 1 limited access alternatives, the vessels in Category I account for 77 to 90% of the small-mesh multispecies landings. A core set of 20 vessels would qualify for a Category I permit under any of the five alternatives and account for 85 to 100% of small-mesh multispecies landings by Category I vessels in other alternatives, in 2014-16. The remainder of landings have been by vessels that would qualify for a Category I permit under a subset of alternatives, Category II vessels, and non-qualifiers. The 20 core vessels have home ports mainly in Point Judith, RI (45%) and Montauk, NY (30%). Table 82 presents a balance sheet or flow of small-mesh multispecies landing in major landing and home ports during 2014-2016. New Bedford, Point Judith, Gloucester, Montauk, and New London are the top landing ports in recent years. While vessels with home ports in Gloucester, New London, and New Bedford land nearly all of their small-mesh multispecies catches in the same ports, but some vessels from Point Judith and Montauk take their catches to New Bedford, i.e., New Bedford receives very large volume of small-mesh multispecies from vessels whose home ports are in Point Judith and Montauk. Thus, in the short-term, impacts to landing ports across the five alternatives are likely neutral to very minor, in terms of disrupting current port economics. In the long-term, transitioning to a limited access program would preclude non-qualifiers from the directed fishery.

A few home ports (particularly Gloucester, MA) may be affected by the choice of this limited access alternative in a way that they will have fewer Category I vessels had it chosen another limited access alternative (Table 81). However, that wouldn't affect the home port economies either. In Alternative 4, Point Judith (RI) and Montauk (NY) are the major ports that are home to the largest number of Category I vessels. Similarly, Point Judith (RI) and Montauk (NY) are the major ports that home to large number of Category II vessels followed by Gloucester (MA). Many non-qualifiers have home ports in Gloucester, New Bedford and Boston in MA compared to other ports in Alternative 4. Gloucester has the largest number of non-qualifiers than in other home ports.

Table 83 presents community impacts in home ports from the small-mesh multispecies directed landings by vessels in the limited access alternatives during 2014-16. The impacts are assessed in terms of landing, ex-vessel revenues from small-mesh multispecies as well as revenue dependencies from these species relative to all landed fishes by qualifier (Category I and II) and non-qualifier (non-qualifier and no-history) vessels. Qualifiers across home ports have varying degrees of revenue dependencies. In Alternative 4, the qualifier vessels in New London (CT), Gloucester (MA), Montauk (NY) and Point Judith (RI) have revenue dependencies from small-mesh multispecies relative to all fish landings at about 50%, 34%, 33% and 24%, respectively. But for other home ports, the dependencies ranged from 4 to 10%. Also, the revenue share from small-multispecies is overwhelmingly large for qualifiers compared to non-qualifiers'.

6.6.3.1.5 Alternative 5

Alternative 5 would establish a limited access program, with vessels having >1,000,000 lbs. of whiting and/or red hake landings from 1996-2012 qualifying for a Category I permit and those landing ≥200,000 lbs. qualifying for a Category II permit.

Qualifying vessels. Alternative 5 is expected to quality 84 Category I and 159 Category II vessels. Forty-three (43) Category I and 30 Category II had at least one trip that landed 2,000 lbs. or more small-mesh multispecies in 2014-2016. Additionally, there were 45 non-qualifying vessels and 10 vessels with no history during the qualification period that had at least one trip that landed 2,000 lbs. or more of small-mesh multispecies in 2014-2016.

Active and latent vessels. Alternative 5 would qualify the largest number of limited access permits (n=243) relative to other alternatives. Alternative 5 also has the most latent effort under the Category I and Category II compared other alternatives.

Vessel size. Vessels that would qualifying for Category I permits under Alternative 5 have an average vessel size of 139 GRT is higher than Alternative 3 but smaller relative to rest other alternatives. For the Category II vessels, the average vessel size is at lower range at 68 GRT, though the range in vessel size is much narrower across alternatives (65-71 GRT) than for Category I.

Landings. The average annual landing of small-mesh multispecies in recent years by Category I and Category II vessels in Alternative 5 were 12.0 M and 1.2 M lbs., respectively. Category I vessels in Alternative 5 landed about 86% of total landed small-mesh multispecies, which is higher than Alternative 2, but is lower than Alternative 1 and 3. Similarly, Category II vessels in Alternative 5 landed about 8% of total landed small-mesh multispecies, higher than Alternative 3, but lower than Alternative 2.

Table 75 characterizes whiting landings in the Northern and Southern Management Areas in 2014-2016. For all limited access categories across all alternatives, annual and per trip whiting landings per boat on whiting directed trips are generally higher in the Northern management area than in the Southern area. However, aggregate volume of whiting landings and trip value (revenue from all species) per trip are higher in the Southern management area. Vessels fishing in the northern management area typically have a higher dependency on revenue from whiting.

Revenues. Compared to other alternatives, the recently active vessels (w/ trips landing ≥ 2,000 lbs. of whiting) under Alternative 5 are expected to generate similar aggregate landings and revenues though there are differences in landing by qualifying categories across alternatives.

Per boat revenue. Annual per boat revenue from small-mesh multispecies for the Category I vessels in Alternative 5 is $207,109 and is lowest than all other alternatives. Similarly, per boat revenue from small-mesh multispecies for the Category II vessels in Alternative 5 is $28,470, higher than Alternative 2 and 3, but lower than Alternative 1 and 2.

Per trip revenues. Per trip revenue from small-mesh multispecies for the Category I vessels in Alternative 5 is higher than Alternative 4, but lower than Alternative 1, 2, and 3. Similarly, per trip revenue from hake for the Category II vessels in Alternative 5 is higher than Alternative 2, 3 and 4, but lower than Alternative 1.

Dependence on small-mesh multispecies. The vessels in Category I in Alternative 5 had a ratio of small-mesh multispecies to total fish pound at 0.38. The dependency on small-mesh multispecies is lower compared to the Alternative 1 and 2, but marginally higher than Alternative 4.

Revenue dependency on small-mesh multispecies. Table 76 and Table 77 detail the distribution of boats that derived different levels of revenues from small-mesh multispecies. In Alternative 5, majority of

boats (i.e., 60% of Category I boats, 79% of Category II boats, and 80% of non-qualifiers) had less than 10% of revenue derived from small mesh multispecies. About 25% of Category I boats, 13% of Category II boats, and 16% of non-qualifiers had their 10-50% of revenue derived from small-mesh multispecies. Likewise, 15% of Category I boats, 8% of Category II boats, and 4% of non-qualifiers had over 50% of fish revenue derived from small mesh multispecies.

Non-qualifiers' fisheries characteristics. Table 78 and Table 80 present the characteristics of non-qualifiers' fisheries by alternatives and management area. The types of fisheries that non-qualifiers vary by management areas, but are similar across alternatives. Non-qualifiers in the Northern management are primarily into other large-mesh groundfish fishery (about 50%) followed by haddock (about 12%) and Atlantic herring (about 10-13%) fisheries. In the other hand, Non-qualifiers in the Southern management are primarily into Loligo squid (about 13-21%), Atlantic herring (about 15-23%), skates (about 10-30%) and northern shrimp (about 2-5%) fisheries. They also catch Yellowtail flounder and Monkfish in both management areas in small quantities (about 1% each). In Alternative 5, the share of whiting value relative to all fish value is 3.8% in the Northern area and <1% in Southern area. Share of red hake value to total fish value is negligible in both management area. Non-qualifiers' per trip fishing revenue averaged to about $10,661 in the Northern area and $5,316 in the Southern area recently in Alternative 5. Revenues per trips for both management area are least and is similar to Alternative 4.

Community impacts on major ports. Across the Action 1 limited access alternatives, the vessels in Category I account for 77 to 90% of the small-mesh multispecies landings. A core set of 20 vessels would qualify for a Category I permit under any of the five alternatives and account for 85 to 100% of small-mesh multispecies landings by Category I vessels in other alternatives. The remainder of landings have been by vessels that would qualify for a Category I permit under a subset of alternatives, Category II vessels, and non-qualifiers. The 20 core vessels have home ports mainly in Point Judith, RI (45%) and Montauk, NY (30%). Table 82 presents a balance sheet or flow of small-mesh multispecies landing in major landing and home ports during 2014-2016. New Bedford, Point Judith, Gloucester, Montauk, and New London are the top landing ports in recent years. While vessels with home ports in Gloucester, New London, and New Bedford land nearly all of their small-mesh multispecies catches in the same ports, but some vessels from Point Judith and Montauk take their catches to New Bedford, i.e., New Bedford receives very large volume of small-mesh multispecies from vessels whose home ports are in Point Judith and Montauk. Thus, in the short-term, impacts to landing ports across the five alternatives are likely neutral to very minor, in terms of disrupting current port economics. In the long-term, transitioning to a limited access program would preclude non-qualifiers from the directed fishery.

A few home ports (particularly Gloucester, MA) may be affected by the choice of this limited access alternative in a way that they will have fewer Category I vessels had it chosen another limited access alternative (Table 81). However, that wouldn't affect the home port economies either. In Alternative 5, Point Judith (RI) and Montauk (NY) are the major ports that are home to the largest number of Category I vessels followed by Gloucester (MA). Similarly, Point Judith (RI) is the single most major port that homes to large number of Category II vessels. Many non-qualifiers have home ports in Gloucester, New Bedford and Boston in MA compared to other ports in Alternative 5. Gloucester has the largest number of non-qualifiers than in other home ports.

Table 82 presents community impacts in home ports from the small-mesh multispecies directed landings by vessels in the limited access alternatives during 2014-16. The impacts are assessed in terms of landing, ex-vessel revenues from small-mesh multispecies as well as revenue dependencies from these species relative to all landed fishes by qualifier (Category I and II) and non-qualifier (non-qualifier and no-history) vessels. Qualifiers across home ports have varying degrees of revenue dependencies. In Alternative 5, the qualifier vessels in New London (CT), Gloucester (MA), Montauk (NY) and Point Judith (RI) have revenue dependencies from small-mesh multispecies relative to all fish landings at about

49%, 33%, 33% and 23%, respectively. But for other home ports, the dependencies ranged from 2 to 9%. Also, the revenue share from small-multispecies is overwhelmingly large for qualifiers compared to non-qualifiers'.

6.6.3.2 Action 2 - Possession limit alternatives

The alternatives in Action 2 propose adjustments to the whiting possession limits, primarily to adjust the capacity of the small-mesh multispecies fleet to land whiting and to minimize negative effects on price. These possession limits would apply to either vessels qualifying for a Category I or II permit, or to both (i.e. the same possession limit would apply to both permit categories.

In addition, Action 2 includes an alternative that would establish an incidental possession limit for whiting and an incidental limit for red hake. These incidental possession limits would apply to all fishing activity by vessels that do not have a Category I or II permit, regardless of mesh or gear in use. Depending on the final alternatives selected in Action 3 (Section 4.3.3), vessels with an incidental permit may be able to exceed the incidental possession limits if they are participating in another limited access small-mesh fishery, such as herring or squid.

6.6.3.2.1 Whiting Possession Limit for Vessels with a Category I Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category I limited access permit.

6.6.3.2.1.1 Alternative 1 (Preferred; Status quo)

For vessels holding a Category I limited access permit, Alternative 1 would not change the existing small-mesh multispecies possession limits. When fishing with 3-inch mesh trawls, the current whiting possession limits are 30,000 lbs. in the northern area and 40,000 lb. in the southern area. Whiting possession limits are less when vessels use trawls with mesh less than 3-inches, usually to target other species. Possession limits for red hake are 3,000 lbs. in the northern area and 5,000 lb. in the southern area. In season accountability measures reduce these limits to 2,000 lbs. for whiting and 400 lbs. for red hake when landings exceed the in-season accountability measure trigger.

The impacts of Alternative 1 on the vessels that qualify for a Category I permit under Action 1 are expected to be neutral, as there would be no change to the possession limits for these vessels (although potentially applying to a smaller number of vessels than are currently fishing, depending on the Action 1 alternative selected). Fishing effort for these vessels is not expected to change under Alternative 1. With in-season accountability measure trigger, landings of small-mesh multispecies would continue per the accountability measure.

6.6.3.2.1.2 Alternative 2

For vessels holding a Category I limited access permit, Alternative 2 would increase the whiting possession limit from 40,000 lbs. to 50,000 lbs. during the winter/spring season, only in the southern management area. Alternative 2 may be selected if No Action for Action 1 is chosen.

The impacts of Alternative 2 on the vessels that qualify for a Category I permit under Action 1 are expected to be ***neutral to positive relative to Alternative 1, and positive relative to Alternative 3***. Because the Alternative 2 possession limit is higher in the southern area relative to No Action, vessels

would be able to increase their trip landings, if operationally feasible. Vessels may do so by taking the same number of trips, but of longer duration. This could potentially increase total landings per vessel. Alternatively, vessels could take fewer, longer trips, keeping total annual landings the same. Because the whiting possession limit has not been over 40,000 lbs. in almost two decades, there is little quantitative information to further identify how fishing behavior might change.

Alternative 2 could provide an incentive to fish in the southern area during January 1-June 14, and fish in the area and season that has been underutilized. Thus, Alternative 2 may help the fishery achieve Optimum Yield more readily than under Alternative 1, a positive impact on the fishery and its fishing communities.

Alternative 2 is expected to have a positive impact on the Category I vessels of very large capacities relative to Alternative 1, because they could land more whiting when there are opportunities to catch very high volume of whiting while avoiding bycatch. There will be an incentive to fish in southern management area during winter and spring. An increase in the volume of whiting landings due to higher possession limit may potentially lower price slightly in the short run, however, when many vessels land increased volume of landing around same time and space (port).

6.6.3.2.1.3 Alternative 3

For vessels holding a Category I limited access permit, Alternative 3 would decrease the whiting possession limit for about half of the year in the southern management area. From June 15 – December 31, a 30,000 lbs. whiting possession limit would be in effect in both management areas. The intent is to reduce the effect of southern area landings on market prices for whiting in all areas. Alternative 3 may also be selected if No Action for Action 1 is chosen.

The impact of Alternative 3 on the vessels that qualify for a Category I permit under Action 1 are expected to be ***neutral relative to Alternative 1, and negative relative to Alternative 2***. Landings could be reduced by as much as 340,000 lbs. of whiting catch (valued at about $289,000) by Category I vessels when a limited access alternative in Action 1 is chosen together with this possession limit. About 45 trips in Alternative 1-3 to 106 trips in Alternative 4-5 by Category I vessels in Action 1 could, thus, be affected annually. Alternative 3 has several potential impacts, changing the number and duration of trips taken or changing the location or season when small-mesh multispecies trips are taken. It may induce more vessels to fish additional trips to catch and land the same amount as they do under the existing limit. In this case, total fishing effort would remain the same as it is now.

Trips during the summer and fall would be less profitable than they are presently, thus potentially causing vessels to take more trips during the winter when a higher possession limit applies if it is advantageous for the vessel to do so. A reduction in trip possession limit will have a negative impact on landing and income from whiting unless any loss in landing is compensated by increasing trip frequencies. Further, taking frequent trips for the same landing volume of whiting is also inefficient affecting the profitability unless rise in cost of fishing operation is offset by an increase in price.

Table 84 summarizes the characteristics of Action 2 (Category I) alternatives and their potential economic impacts.

Table 84. Action 2 summary (Category I)

Action 2 Alts.	Whiting possession limit alternatives for vessels with a Category I permit	Affected areas	Affected categories	Affected seasons	Potential economic impact of the action alternatives.
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs. • Accountability Measures at 2,000 lbs. (whiting) and 400 lbs. (red hake).		Cat I	All	Neutral
2	Increase whiting possession limit from 40,000 lbs. to 50,000 lbs.	South	Cat I	Winter, Spring	Neutral to positive re. Alternative 1. Positive re. Alternative 3. • May reduce the number of trips, making trips be more cost effective. • Incentive to fish in South in Winter/Spring. • Whiting price may go lower when many vessels land increased volumes of landings as a result of higher possession limit.
3	Decrease whiting possession limit to 30,000 lbs.	South	Cat I	Summer, Fall (Jun 15-Dec 31)	Negative for Cat I boats fishing in South. • Landings could be reduced by as much as 340,000 lbs. of whiting catch (valued at about $289,000) unless vessels take more frequent trips to compensate for reduced possession limit in a trip during the seasons. Depending upon the alternative in Action 1 chosen, about 45 trips in Alt 1-3 to 106 trips in Alt 4-5 could be affected annually by Cat I vessels when Alternative 3 is implemented. • The decreased supply may increase whiting prices (decreased CS). • Potential to increase trip freq. in South during summer and fall. • May stabilize price for vessels fishing in northern areas. • Negative for vessels fishing offshore in GB and SNE.

6.6.3.2.2 Whiting Possession Limit for Vessels with a Category II Limited Access Small-Mesh Multispecies Permit

The possession limits in this set of three alternatives would apply to any vessel with a Category II limited access permit. None of these alternatives would be applicable if No Action for Action 1 is chosen.

6.6.3.2.2.1 Alternative 1 (Status quo)

For vessels holding a Category II limited access permit, Alternative 1 would not change the existing small-mesh multispecies possession limits. These limits are summarized under Alternative 1 in the previous section.

The impacts of Alternative 1 on the vessels that would qualify for a Category II permit under Action 1 are expected to be ***neutral***, as there would be no change to the possession limits for these vessels (although potentially applying to a smaller number of vessels than are currently fishing, depending on the Action 1 alternative selected). Fishing effort for these vessels is not expected to change under Alternative 1.

6.6.3.2.2.2 Alternative 2

Alternative 2 would decrease the whiting possession limit in all management areas from 30,000 lbs. to 15,000 lbs. It is intended to create a whiting possession limit that is more consistent with the usual catches made by Category II vessels (Table 74). During 2014-2016, no trips by vessels that are expected to qualify for a Category II permit had whiting landings that exceeded 15,000 lbs.

The impacts of Alternative 2 on the vessels that would qualify for a Category II permit under Action 1 are expected to be ***neutral to low negative***. For most vessels, Alternative 2 would have no effect on their fishing activity. They would fish as they previously did. The alternative may have a neutral effect on Category II vessels since many of them land less than 15,000 lbs. in a trip, and any effect from the reduced possession limit may be overcome by taking few more frequent trips by the affected vessels.

Table 85 summarizes the characteristics of Action 2 (Category II) alternatives and their potential economic impacts.

Table 85. Action 2 summary (Category II)

Action 2 Alts.	**Whiting possession limit alternatives for vessels with a Category II permit**	**Affected areas**	**Affected categories**	**Affected seasons**	**Potential economic impact of the action alternatives.**
1	Status quo— • Whiting possession limit in North at 30,000 lbs. and in South at 40,000 lbs. • Red hake possession limit in North at 3,000 lbs. and in South at 5,000 lbs.		Cat II	All	Neutral

Action 2 Alts.	Whiting possession limit alternatives for vessels with a Category II permit	Affected areas	Affected categories	Affected seasons	Potential economic impact of the action alternatives.
2	15,0000 whiting possession limit and no change to the red hake possession limits.	All	Cat II	All	Neutral. Many Cat II vessels land <15,000 lbs. • Depending on the choice of Action 1 limited access alternative, it would result in a potential loss of landings of about 45,000 to 109,300 lbs. whiting annually, unless more trips are taken to compensate. • About 5 to 15 trips for the fleet annually could be affected with Alternative 2 depending upon the choice of Action 1 limited access alternative. • The alternative may have a neutral effect on Cat II vessels since many Cat II vessels land <15,000 lbs. and any reduction in landing due to the reduced possession limit may be reconciled by taking few more frequent trips by the affected vessels.

6.6.3.2.3 Incidental possession limits

Vessels that did not qualify for a Category I or II limited access permit would be regulated by the possession limits in the two alternatives below, regardless of the type of gear in use or the species that the vessel is targeting.

6.6.3.2.3.1 Alternative 1 (Status quo)

Alternative 1 would retain the existing whiting possession limits, even if an action alternative was chosen in Action 1 (limited access qualification). It might seem counter-intuitive at first, but choosing Alternative 1 with a limited access qualification alternative would allow whiting and red hake possession limits to be adjusted by permit category when needed in the future.

The impacts of Alternative 1 on the vessels that would not qualify for a Category I or II permit under Action 1 are expected to be ***neutral to low negative***. The direct impact on non-qualifiers vessels would be unchanged from the status quo, but it could reduce the potential for increases in small-mesh multispecies fishing effort by additional non-qualified vessels. Indirectly, Alternative 1 would have a positive effect on Category I and Category II vessels, because it is expected to limit increases in fishing effort by new entrants.

6.6.3.2.3.2 Alternative 2

Alternative 2 would reduce the whiting and red hake possession limits to 2,000 lbs. and 400 lbs., respectively, for vessels that do not qualify for a small-mesh multispecies limited access permit (see Action 1).

The impacts of Alternative 2 on the vessels that would not qualify for a Category I or II permit under Action 1 are expected to be ***low negative***. Due to relatively low prices for whiting and red hake, it is

highly unlikely that non-qualifying vessels would take trips to target small-mesh multispecies. They may, however, continue or increase fishing effort into other fisheries. Many non-qualifying vessels have permits for and experience with alternative fisheries (Table 78 to Table 80). Most fish in another trawl fishery for squids or herring, large-mesh groundfish, monkfish, or skates. Some also participated in the groundfish gillnet fishery.

This alternative would affect only non-qualifying vessels that land over 2,000 lbs. whiting and affects less than 1% of the trips by non-qualifiers. Some of these trips are however targeting whiting and red hake, affecting a small number of vessels much more than the average. Depending on the choice of Action 1 limited access alternative, Alternative 2 could increase discards of about 3,346 to 312,228 lbs. whiting and 283 to 37,926 lbs. red hake, annually, by non-qualifiers. Thus, about 3 to 91 whiting trips in a fleet potentially could be affected annually. However, the alternative may have a neutral effect on non-qualifiers, as they will redirect to other fisheries to make up the loss due to such discards. While non-qualifying vessels will potentially be able to make up income loss from discards of whiting from other targets, any discards in excess of 2,000 lbs. possession limit will likely to have some positive effect on human communities.

Alternative 2 is expected to have a positive effect on Human Communities, because the incidental limits of 2,000 lbs. of whiting and 400 lbs. of red hake will allow vessels to land most or all of their normal catches of these species when they are targeting other species.

Table 86 summarizes the characteristics of Action 2 (Non-qualifiers) alternatives and their potential economic impacts.

Table 86. Action 2 summary (non-qualifiers)

Action 2 Alts.	**Whiting possession limit alternatives**	**Affected areas**	**Affected categories**	**Affected seasons**	**Potential economic impact of the action alternatives.**
1	Retain existing whiting and red hake possession limits for non-qualifying vessels in Action 1	All	Non-qualifiers	All	Neutral
2	Reduce possession limit for whiting at 2,000 lbs. and red hake at 400 lbs. for non-qualifiers in Action 1.	All	Non-qualifier	All	Neutral on Cat I and Cat II, and negative on non-qualifiers. • Depending on the choice of Action 1 limited access alternative, Alternative 2 would result in a potential loss of landings of about 3,300 to 312,000 lbs. whiting and 283 to 38,000 lbs. red hake, annually, by non-qualifiers. Annually, about 3 to 91 whiting trips in a fleet potentially affected. • May have a neutral effect on non-qualifiers, if they redirect to other fisheries and fishermen's income not affected.

6.6.3.3 Action 3 – Permit allowances

Alternatives in Action 3 only apply if an action alternative in Action 1 is chosen. Thus, there is not a No Action alternative specifically for Action 3.

6.6.3.3.1 Limited access permit characteristics and conditions

The alternatives in Action 3 would affect the characteristics and allowances of a small-mesh multispecies limited access permit. In most cases, the effects are purely administrative but could change compliance costs for vessels that have limited access permits in other fisheries. Small-mesh multispecies limited access permits that are most consistent with the existing permits held by the vessel would minimize costs and maximize opportunity. Many vessels that would potentially qualify for a Category I or II permit in the Action 1 alternatives have one or more of a large-mesh groundfish, an Atlantic herring permit, or a squid/mackerel/butterfish limited access permit (Table 87). Table 7 summarizes the similarities and differences among other limited access permits frequently held by vessels currently targeting small-mesh multispecies.

Table 87. Most frequently held permit types by different categories of small mesh vessels

Category I & II	Non-qualifiers	No History
A	A	A, B, D, H
FLS-1	FLS-1, FLS-2	FLS-1, FLS-2
-	HB	HB
HRG-D	HRG-D,	HRG-D,
-	I	I
-	K	K
LO-1	LO-1, LO-A1, LO-A2, LO-A4	LO-1, LO-(A1 to A4), LO-AOC
RCB-A	RCB-A	RCB-A
-	MNK-C, MNK-D, MNK-E	MNK-C, MNK-D, MNK-E
SCP-1	SCP-1, SCP-2	SCP-1, SCP-2
SF-1	SF-1	SF-1
SMB(1 to 4)	SMB (1 to 4)	SMB (1 to 4)

A Individual Limited Access; **B** Fleet Limited Access; **D** Hook; **H** Open hand gear;
HB
FLS Summer Flounder (1=comm 2=charter party); **HRG-D** Herring Open Access
LO Lobster (1=comm, 2=charter party); **LO** Lobster (Trap Area A1-A5; AOC Outer Cape)
RCBA (Red Crap Incidental Bycatch); **MNK** Monkfish (Category A-H)
SCP Scup (1=comm 2=charter party); **SF1** Surf Calm/Ocean Quahog
SMB Squid Mackerel Butterfish (1=comm 2= charter 3=incidental 4=Atlantic mack)

6.6.3.3.1.1 Alternative 1 (Preferred)

Alternative 1 would apply the limited access permit characteristics of the Northeast (large mesh) Multispecies fishery to Category I and II permits for the small-mesh multispecies fishery (see Table 7). These include a 5% permit accumulation limit, upgrade restrictions, and consideration of construction during the last year of a qualification period. Although there is no existing limited access small-mesh multispecies permit, Alternative 1 serves as a proxy for status quo for analytical comparison, since it is difficult to evaluate effects with respect to an open access Category K groundfish permit.

General impacts of accumulation limits. An accumulation limit is a management tool generally used to prevent consolidation within a fishery, thereby sustaining opportunities to participate in the fishery for more participants than market efficiency alone might enable. Limits on consolidation can be used to ensure adequate levels of market competition, facilitate entry to the fishery, protect labor markets, and ensure that the resource supports several participants. It is typically the participation of smaller-scale, part-time, and/or entry-level fishermen that is reduced without an accumulation limit in place.

While consolidation might be favorable for economic efficiency (e.g., for exploiting economies of scale), concentration of shareholdings by relatively few individuals or entities can result in market power. Exercising market power can affect working conditions, prices, and wages, and can harm smaller-scale participants in a fishery. Although accumulation limits on shareholdings are generally viewed as means to prevent excessive concentration, the level of caps vary among fisheries depending on the particular nature of the fishery and objectives of the cap. To date, an analysis of excessive shares has not been performed for the small-mesh fishery.

There are many social and economic studies around the world that can help provide a full picture of potential consequences from consolidation (see Olson 2011 for literature review). The primary social impacts documented in empirical cases include employment loss, decreased income, decreased quality of life, changing relations of production, structural disadvantages to smaller vessels and firms, dependency and debt patronage, concentration of capital and market power, inequitable gains, reduced stewardship,

decreased community stability, and loss of cultural values (e.g., Brandt & Ding 2008; Carothers et al. 2010; Copes & Charles 2004). Assuming that these impacts are negative, the social impacts of establishing accumulation limits are expected to generally be positive for the fishery as a whole, to the degree that the accumulation limit mitigates these impacts. Negative impacts may be acute to any larger-scale fishery participants that may be constrained by the specific accumulation limit established. The tradeoffs between social objectives and market efficiency are common dilemmas for fishery managers.

Permit holdings data. In developing Amendment 18 to the Northeast Multispecies FMP, through which a 5% permit cap was established on Northeast multispecies limited access permits (in addition to a cap on Potential Sector Contribution), the ability to query the permit holdings data has improved substantially.

There continues to be forward progress on improving the data provided. Much effort has been spent to troubleshoot queries and provide the Council with robust data. Absolute determinations of permit holdings are ultimately the responsibility of the Analysis and Program Support Division (APSD) at the NMFS Greater Atlantic Fisheries Office (GARFO). Just as limited entry programs estimate potential permit qualifications, until those records are scrutinized after final action, often including a multiphase appeals process, there are changes in the data. The PDT is confident that the data herein portray the holdings in the fishery to within 1-2% of the true values.

Because the alternatives considered in this action would apply an accumulation limit to individuals, permit banks, or other entities, the fishery holdings data in this section are presented at the individual person ("Person_ID") and business ("Business_ID") levels. Each permit has at least one person and one business associated with it. NMFS does not have data on percent interest in fishery permits of the individuals associated with them. Thus, partial or proportional ownership is counted as if it were whole ownership for the purposes of determining compliance (i.e., it is assumed that each individual has 100% interest in a given permit).

The DRAFT data in this document are the PDT's best estimate of small-mesh multispecies permit holdings by an individual or entity as of October 27, 2017. However, permit holdings as of the implementation date of this action would likely be used to enforce this permit cap.

There are 344 permits that qualify for at least one small-mesh multispecies limited access permit. As of October 27, 2017, these permits were held by 294 individual people (Person IDs) associated with 215 businesses (Business IDs; Table 88). Of the 215 businesses, 111 have qualifying permits held by just one person. Thus, it is assumed that 52% of these businesses have sole ownership. Of the 104 multi-person businesses, most (86%) consist of two people, but they range to having up to 25 people. The last names of the people were also examined. Of the multi-person businesses, most (72%) have only people with the same last name associated with it, likely indicating that the business is owned by a family. Of the 215 total businesses, 205 (95%) hold one qualifying permit, and the most any business holds is three (Table 89). Of the 294 total people, 256 (87%) hold one qualifying permit, and the most any person holds is 11 (Table 89).

Table 88. Permit holdings of the permits qualifying for a limited access small-mesh permit under any alternative

	Business IDs	
	Count	**Percent**
Business ID	215	100%
1 person	111	52%
Multi-person	104	48%
2 people	90	86%
3 people	8	8%
4 people	4	4%
5-25 people	2	2%
Multi-families	29	28%
In-family	74	72%

Table 89. Number of qualifying permits held by businesses

	Permits							**Total**
	1	**2**	**3**	**4**	**7**	**8**	**11**	
Businesses	205 (95%)	9 (4%)	1 (0.5%)	0	0	0	0	**215 (100%)**
People	256 (87%)	29 (10%)	4 (1%)	2 (1%)	1 (0.3%)	1 (0.3%)	1 (0.3%)	**294 (100%)**

Impacts of a 5% permit cap on small mesh limited access permits. The holdings data were examined, for the 344 permits that would qualify for a limited access small-mesh permit under at least one alternative, to identify, under any alternative, if and how a 5% permit cap would constrain any individual person ("Person_ID") or business ("Business_ID"). Alternative 1 qualifies the least number of permits, 114, and a 5% permit cap (5.7) would constrain holdings to no more than 5 permits (Table 90). Alternative 5 qualifies the greatest number of permits, 243, and a 5% (12.15) permit cap would constrain holdings to no more than 12 permits.

For the businesses, since the most any one business holds is three qualifying permits (Table 89), there would be no businesses constrained by a 5% permit cap, since the most constraining alternative (Alternative 1) would limit holdings to five permits.

For individual people, since the most any one person holds is eleven qualifying permits (Table 89), the permit holdings data needed to be examined further to determine if and how the holdings of individual people may be constrained. Under Alternative 1, one person would hold six qualifying permits, which is greater than the permit cap of five permits (Table 90). ***Therefore, Alternative 1 would constrain current holdings for one person. For Alternatives 2 to 5, the greatest number of permits held by any one person is less than or equal to the permit cap, so the current holdings of any person would not be constrained.***

Table 90 - Number of qualifying permits under each alternative

	Alternative				
	1	**2**	**3**	**4**	**5**
# qualifying permits	114	224	141	179	243
5% cap	5.7	11.2	7.05	8.95	12.15
Most permits held by person	6	7	6	8	8

In the short-term, the economic and social impacts of Alternative 1 are expected to be ***neutral***. It is likely that divestiture would only be required under Qualification Criteria Alternative 1. There would be substantial opportunity for permit consolidation, which would eventually be limited by the cap.

The long-term economic impacts of the accumulation limit on fishery-related businesses and communities are expected to be ***neutral***. The permit cap would restrain fishing activity of certain permit holders, but the benefits would be distributed across the fishery. The social impacts are expected to be ***positive*** for the fishery as a whole relative to No Action, because consolidation would be constrained. This would help retain the *Size and Demographic Characteristics*, as well as its *Historical Dependence on and Participation* in the fishery. Given that there are 114-243 qualifying permits under each alternative, a 5% permit cap could, in theory, allow permit consolidation down substantially fewer permit holders, 20-30, negatively impacting the *Size and Demographic Characteristics* of the fishery. Consolidation may be considered by some stakeholders to be a negative impact on the *Attitudes, Beliefs, and Values* of stakeholders towards management. Practically, it would be very difficult to consolidate down to just 20-25 individuals or entities holding permits.

The rationale for a cap of 5% is to be consistent with the large mesh multispecies limited access permit cap. Given that there are about 1,300-1,400 large mesh permits, a 5% permit cap is far less constraining than one would be for the small-mesh limited access fishery, which would have about 114-243 permits. The small-mesh permit cap may impose constraints on large-mesh permit holders, but that has not been quantitatively analyzed in this action.

6.6.3.3.1.2 Alternative 2

Alternative 2 would not establish any limits on holdings of limited access permits for the small-mesh multispecies fishery.

The economic and social impacts of Alternative 2 are expected to be neutral in the short-term. All individuals and entities would continue to not be restrained in their ability to accumulate permits. However, the possibility exists for negative long-term economic and social impacts as the accumulation of excessive shares would not be prevented. The long-term impacts of Alternative 2 on fishery-related businesses and communities are expected to be ***negative*** for the fishery as a whole relative to No Action, because consolidation would not be constrained. All individuals and entities would continue to not be restrained in their ability to accumulate permits, with potentially short-term neutral impact. However, the possibility of high negative impacts exists in the long-term. Alternative 2 does not implement any safeguard from the negative scenarios described above in the discussion of *General socioeconomic impacts of accumulation limits*. Without an accumulation limit, there may be negative long-term social impacts if the industry consolidates without restraint. The *Size and Demographic Characteristics* of the

fishery-related workforce and fishing communities may change if permit holdings become more concentrated.

6.6.3.3.1.3 Alternative 3

Alternative 3 would not allow consideration of construction or repair of vessels for the year preceding the end of the qualification period. Relative to Alternative 1, the number of vessels that qualify for small-mesh multispecies limited access permits could be lower, if due to construction/repair, the landings of a vessel(s) did not meet the qualification threshold..

The impacts of Alternative 3 relative to Alternative 1 are expected to be ***negative*** for the fishery-related businesses and communities, because fewer vessels would be active in the fishery and there could be less revenue generated from the target species. The ability to achieve the TALs would not be impacted, as having fewer vessels in the directed fishery may enable effort to increase for the qualifying vessels - a positive impact for the fishery component that qualifies for limited access. Alternative 3 is expected to have negative impacts for the individual vessel(s) that do not meet the qualification criteria due to vessel construction/repair. They would not be able to participate in the directed small-mesh fishery, and may direct more effort into other fisheries.

6.6.3.3.1.4 Alternative 4 (Preferred)

Alternative 4 would allow only one vessel to qualify based on a single history. In other words, a history could not be transferred to a replacement vessel AND qualify the original vessel (which may have been sold or transferred to a new owner). Thus, this alternative would qualify fewer vessels than the Alternative 1 baseline.

The impacts of Alternative 4 relative to Alternative 1 are expected to be ***neutral*** for fishery-related businesses and communities. The ability to achieve the TALs would not be impacted, as having fewer vessels in the directed fishery may enable effort to increase for the qualifying vessels - a positive impact for the fishery component that qualifies for limited access. Alternative 4 is expected to have negative impacts for the individual vessel(s) that do not meet the qualification criteria. They would not be able to participate in the directed small-mesh fishery, and may direct more effort into other fisheries.

6.6.3.3.1.5 Alternative 5

Alternative 5 would allow upgrades of vessels that hold a limited access small-mesh multispecies fishery permit. It could allow, for example, a vessel to be more capable of fishing offshore or take more frequent trips (vessel becomes more seaworthy), increase hold capacity to take longer trips, or to tow larger trawls.

Although the fishery is limited by ACLs, there is room for increases in whiting catches and more fishing effort by qualifying vessels. Fishing offshore could affect the types of bottom where fishing occurs or the type and amount of bycatch. Fishing longer or more frequent trips implies an increase in fishing effort.

The impacts of Alternative 5 relative to Alternative 1 are expected to be ***low positive*** for fishery-related businesses and communities. This may increase capacity to achieve the TALs and allow for more flexibility in business planning decisions. Vessels holding a Northeast (large-mesh) Multispecies permit would be prohibited from upgrading at the present time, so the benefits of Alternative 5 would be limited.

Table 91 summarizes the limited access permit characteristics of the Action 3 alternatives and their potential economic impacts.

Table 91. Action 3 limited access permit alternatives summary (permit allowances)

Alts.	Permit allowances	Potential economic impact
1	Status quo. 5% cap on permits + upgrade restriction + consideration for construction at t_{-1} of qualification period.	Neutral to positive. Permit cap has neutral economic impacts, but generally positive social impacts. Upgrade restrictions could have a negative economic impact. Consideration for construction has a positive impact.
2	No limits on holdings of limited access permits for the small-mesh multispecies.	Neutral to negative. Consolidation and excessive shares would not be prevented.
3	No consideration for construction or repair of vessels for the year preceding the qualification period.	Negative. If there are many vessels under construction, resulting in reduced effort level. This would allow fewer vessels to qualify for limited access relative to status quo. • Fewer vessels would be active in the fishery and there could be less revenue generated from the target species
4	Only one vessel based on single history, i.e., history couldn't be transferred to a replacement vessel AND qualify the original vessel.	Negative. This would allow fewer vessels to qualify for limited access relative to status quo, but potentially more than Alternative 3.
5	Allow upgrade of vessels that hold limited access multi-species fishery permit. (Upgrading is intended for distant fishing, fish frequently, more hold capacity, longer duration trips, and capability for taking more/large tows).	Low Positive. Any provisions of upgrades will help achieve higher ACL utilization.

6.6.3.3.2 Incidental permit conditions

Vessels holding an incidental permit would be able to land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, regardless of the type of gear in use or species targeted, unless one of the following alternatives is chosen. These alternatives only apply if an action alternative is selected from Action 1, hence there is no relevant status quo for Action 3.

6.6.3.3.2.1 Alternative 1

In addition to the incidental small-mesh multispecies fishery possession limits, vessels with an incidental possession limit permit would be prohibited from using small mesh trawls in small-mesh multispecies exemption areas.

The impacts of Alternative 1 are expected to be negative for incidental permit vessels, as it would prevent them from targeting small-mesh multispecies on short, inshore trips despite not having a limited access small-mesh multispecies permit. Non-qualifiers may have to relinquish any excess catches above the possession limit. They could potentially have discards of about 3,346 to 308,895 lbs. whiting and 283 to 37,926 lbs. red hake, annually, depending on the choice of Action 1 limited access alternative. About 3 to

91 whiting trips annually would, thus, be affected. However, non-qualifying vessels would be likely to replenish the loss in value by targeting other species.

It is impossible to quantify the potential to target small-mesh multispecies with an incidental permit under current or future regulatory or market conditions. This potential is thought to be currently limited by the relatively low whiting and red hake prices, although some vessels may otherwise use the incidental permit to fish for bait and sell the catch through the transfer at sea provision.

6.6.3.3.2.2 Alternative 2a (Preferred)

Alternative 2a would allow vessels using large mesh on a groundfish or monkfish DAS to exceed the proposed incidental whiting and red hake possession limits. The impacts of Alternative 2a are expected to be ***positive*** for incidental permit vessels, as this provision will reduce the potential for regulatory discards to some degree while non-qualifying vessels are using large-mesh trawls to target groundfish.

6.6.3.3.2.3 Alternative 2b

Alternative 2b would prohibit fishing for small-mesh multispecies on a groundfish DAS. While fishing on a groundfish DAS, the vessel could land no more than 2,000 lbs. of whiting and 400 lbs. of red hake, even if the vessel holds a small-mesh multispecies fishery limited access permit. The impacts of Alternative 2b are expected to be ***negative*** for incidental permit vessels, as that could lead to some degree of regulatory discards of whiting and red hake on a groundfish DAS.

6.6.3.3.2.4 Alternative 3

Like Alternative 2a, Alternative 3 would allow vessels fishing for Atlantic herring or squid with a limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits. The impacts of Alternative 3 are expected to be ***positive*** for incidental permit vessels, as the alternative allows to continue landings that are in excess of possession limits in these fisheries (Atlantic herring and squids).

6.6.3.3.2.5 Alternative 4

Alternative 4 would exempt vessels using small-mesh trawls in specific exemption areas from the Incidental Permit possession limits. The existing whiting and red hake possession limits would apply. These exemption areas require the use a more selective raised footrope trawl.

The impacts of Alternative 4 on the small-mesh multispecies fishery are expected to be ***neutral to positive***. For vessels that qualify for an incidental permit, there could be positive impacts, as they would continue to be able to fish in certain exemption areas under the current possession limits, rather than the more constraining incidental possession limit considered in this action This alternative could allow continued expansion of the fishery in the Gulf of Maine, where the exemption areas require vessels to use a raised footrope trawl, designed to be more selective particularly effective for excluding flounders, skates, and monkfish. Vessels that do not qualify for a limited access permit may travel to these specific exemption areas to target whiting and red hake, depending on the potential economic return and fishing opportunities that exist elsewhere. Not only could non-qualifying vessels shift fishing effort from other areas, but total small-mesh multispecies fishing in the Gulf of Maine could increase from entry by new or existing vessels that target other species.

Table 92 summarizes the incidental permit characteristics of the Action 3 alternatives and their potential economic impacts.

Table 92. Action 3 incidental permit alternatives summary (permit conditions)

Alts.	Permit allowances	Economic impact
1	Prevents vessels that do not qualify for limited access from targeting whiting and red hake in the exemption areas.	Negative. • Lead to a potential loss of landings of about 6,913 to 187,111 lbs. whiting, annually, by non-qualifiers depending on the choice of Action 1 limited access alternative. About 17 to 73 whiting trips annually would, thus, be affected in the northern area.
2a	Allow large-mesh on monkfish DAS or groundfish to exceed incidental whiting and red hake possession limits.	Positive. • Reduces potential regulatory discards of whiting and red hake on a groundfish or monkfish DAS, and potentially increases revenue per trip.
2b	Prohibit fishing for small-mesh multispecies on groundfish DAS. If fishing on groundfish DAS, the possession limit be 2,000 lbs. (whiting) and 400 lbs. (red hake).	Negative. • May lead to regulatory discards on a groundfish or monkfish DAS, potentially resulting in less revenue per trip.
3	Allow fishing for Atlantic herring or squids with limited access permit issued for those fisheries to exceed the proposed incidental whiting and red hake possession limits.	Positive. • Avoids regulatory discards of whiting and red hake in the Atlantic herring and squid fisheries, potentially resulting in more revenue per trip.
4	Allows vessels to fish in exemption areas requiring a raised footrope trawl.	Neutral to Positive. • Continued participation for limited access vessels. Same to higher landing with a minimal effect on red hake bycatches.

6.7 Cumulative Effects (FEIS)

A cumulative effects analysis (CEA) is required by the Council on Environmental Quality (CEQ) (40 CFR part 1508.7). The purpose of CEA is to consider the combined effects of many actions on the human environment over time that would be missed if each action were evaluated separately. CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action from every conceivable perspective, but rather, the intent is to focus on those effects that are truly meaningful. A formal cumulative impact assessment is not necessarily required as part of an EA under NEPA as long as the significance of cumulative impacts have been considered (U.S. EPA 1999). The following remarks address the significance of the expected cumulative impacts as they relate to the federally-managed small-mesh multispecies fishery.

6.7.1 Consideration of VECs

In Section 5.0 (Environmental Consequences), the VECs that exist within the small-mesh multispecies fishery environment are identified. Therefore, the significance of the cumulative effects will be discussed in relation to the VECs listed below.

1. Target species: i.e. Red, Silver, and Offshore Hake Stocks
2. Non-target species and Bycatch
3. Physical Environment and Essential Fish Habitat
4. Protected Resources
5. Human Communities

6.7.2 Geographic Boundaries

The analysis of impacts focuses on actions related to the small-mesh multispecies fishery, which targets red, silver, and offshore hakes. The core geographic scope for each of the VECs is focused on the Western Atlantic Ocean (Section 5.0). The core geographic scopes for the managed resources are the range of the management units (Section 5.1). For non-target species, those ranges may be expanded and would depend on the biological range of each individual non-target species in the Western Atlantic Ocean. For habitat, the core geographic scope is focused on EFH within the EEZ but includes all habitat utilized by red, silver, and offshore hakes and other non-target species in the Western Atlantic Ocean. The core geographic scope for protected resources can be considered the overall range of these VECs in the Western Atlantic Ocean. For fishery-related businesses and communities, the core geographic boundaries are defined as those U.S. fishing communities directly involved in the harvest or processing of the managed resources, which were found to occur in coastal states from Maine through North Carolina (Section 5.4).

6.7.3 Temporal Boundaries

The temporal scope of past and present actions for VECs is primarily focused on actions that have occurred after FMP implementation (Section 3.3.4). For endangered and other protected resources, the scope of past and present actions is on a species-by-species basis (Section 5.2) and is largely focused on the 1980s and 1990s through the present, when NMFS began generating stock assessments for marine mammals and sea turtles that inhabit waters of the U.S. EEZ. The temporal scope of future actions for all five VECs extends to the end of the 2017 fishing year, when specifications would be re-evaluated. This period was chosen because it is the effective length of the action, and because the dynamic nature of resource management for these three species and lack of information on projects that may occur in the future make it very difficult to predict impacts beyond this timeframe with any certainty.

6.7.4 Actions Other Than Those Proposed by this Plan Amendment

The impacts of each of the alternatives considered in this specifications document are given in Sections 6.2 through 6.6. Table 93 presents meaningful past (P), present (Pr), or reasonably foreseeable future (RFF) actions to be considered other than those actions being considered in this specifications document. These impacts are described in chronological order and qualitatively, as the actual impacts of these actions are too complex to be quantified in a meaningful way. When any of these abbreviations occur together (i.e., P, Pr, RFF), it indicates that some past actions are still relevant to the present and/or future actions.

Table 93. Impacts of Past (P), Present (Pr), and Reasonably Foreseeable Future (RFF) Actions on the five VECs (not including those actions considered in this specifications document).

Action	Description	Impacts on Red, Silver, and Offshore Hake Stocks	Impacts on Non-target Species and Bycatch	Impacts on the Physical Environment and EFH	Impacts on Protected Species	Impacts on Fishery-related Businesses and Communities
P, Pr Original FMP and subsequent Amendments and Frameworks to the FMP	Established commercial fishery management measures	**Indirect Positive** Regulatory tool available to rebuild and manage stocks	**Indirect Positive** Reduced fishing effort	**Indirect Positive** Reduced fishing effort	**Indirect Positive** Reduced fishing effort	**Indirect Positive** Benefited domestic businesses
P, Pr Amendment 12 (2000)	Defined overfishing thresholds and optimum yield (OY). Established the Cultivator Shoals Area, possession limits and gear specifications	**Direct Positive** Measures prevent overfishing and produce MSY.	**Direct Positive** Specific area, seasonal, and gear measures to minimize bycatch, particularly of regulated groundfish.	**Direct Positive** Measures limit the amount and extent of fishing effort.	**Direct Positive** Measures limit the amount and extent of fishing effort	**Direct Positive** Allows a fishery to continue by minimizing bycatch of regulated multispecies.
P, Pr Framework Adjustment 38 (2000)	Establishes an exempted small mesh fishery in the inshore Gulf of Maine, from Jul 1 to Nov 30; requires exempted grate or raised footrope trawl gear; includes incidental catch restrictions.	**Neutral** Measures do not regulate catches of target species.	**Direct Positive** Specific area, seasonal, and gear measures to minimize bycatch, particularly of regulated groundfish.	**Direct Positive** Measures limit the amount and extent of fishing effort. Raised footrope trawl reduces bottom impacts.	**Direct Positive** Measures limit the amount and extent of fishing effort	**Direct Positive** Allows a fishery to continue by minimizing bycatch of regulated multispecies.

Action	Description	Impacts on Red, Silver, and Offshore Hake Stocks	Impacts on Non-target Species and Bycatch	Impacts on the Physical Environment and EFH	Impacts on Protected Species	Impacts on Fishery-related Businesses and Communities
[P, Pr] Amendment 19 (2013)	Revised overfishing definitions and established specification and catch monitoring framework and accountability measures.	**Direct Positive** Specifications and adjustments change in response to stock biomass and discarding to prevent overfishing and produce MSY.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Direct Positive** Ensures that overfishing does not occur or becomes persistent, producing OY.
[P, Pr] 2015-2017 Specifications Package (2015)	Adjusted catch specifications to be consistent with recent changes in stock biomass and discarding.	**Direct Positive** Prevents overfishing and produces MSY.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Direct Positive** Ensures that overfishing does not occur or becomes persistent, producing OY.
[P, Pr] 2016-2017 Specifications Package for red hake (2016)	Adjusted catch specifications to be consistent with large year class of northern red hake and a decline in southern red hake biomass.	**Direct Positive** Reduces discarding of northern red hake and prevents catch of southern red hake from causing overfishing.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Direct Positive** Ensures that overfishing does not occur or becomes persistent, producing OY. Allows higher landings of northern red hake.
[P, Pr] Summer Flounder, Scup, and Black Sea Bass Specifications	Establish quotas, RHLs, other fishery regulations (commercial and recreational)	**Indirect Positive** Regulatory tool to specify catch limits, and other regulation; allows response to annual stock updates	**Indirect Positive** Reduced effort levels; gear requirements	**Indirect Positive** Reduced effort levels; gear requirements	**Indirect Positive** Reduced effort levels; gear requirements	**Indirect Positive** Benefited domestic businesses

Action	Description	Impacts on Red, Silver, and Offshore Hake Stocks	Impacts on Non-target Species and Bycatch	Impacts on the Physical Environment and EFH	Impacts on Protected Species	Impacts on Fishery-related Businesses and Communities
[P, Pr] Squid, Mackerel, and Butterfish Amendments (5 to 15) and Specifications	Establish limited access, seasonal quotas and accountability measures, other fishery regulations	**Indirect Negative** Potentially increased fishing effort on southern whiting and red hakes.	**Indirect Positive** Reduced effort levels; gear requirements	**Indirect Positive** Reduced effort levels; gear requirements	**Indirect Positive** Reduced effort levels; gear requirements	**Indirect Negative** Seasonal closures and redirected effort can depress whiting prices.
[P, Pr, RFF] Development, Application, and Revision of Standardized Bycatch Reporting Methodology	Established acceptable level of precision and accuracy for monitoring of bycatch in fisheries	**Neutral** May improve data quality for monitoring total removals of managed resource	**Neutral** May improve data quality for monitoring removals of non-target species	**Neutral** Will not affect distribution of effort	**Neutral** May increase observer coverage and will not affect distribution of effort	**Potentially Indirect Negative** May impose an inconvenience on vessel operations
[P,Pr] Omnibus Amendment ACLs/AMs Implemented	Establish and apply ACLs and AMs for all three plan species	**Potentially Indirect Positive** Pending full analysis	**Potentially Indirect Positive** Pending full analysis	**Potentially Indirect Positive** Pending full analysis	**Potentially Indirect Positive** Pending full analysis	**Potentially Indirect Positive** Pending full analysis
[P] Multispecies Amendment 13 (2003), Framework Adjustments 40A, 40B, 41, and 42	Splits and allocates Category A and B DAS to allow fishing on healthy stocks while rebuilding other stocks; adopted Georges Bank yellowtail flounder rebuilding strategy.	**Indirect Negative** Greater restrictions on groundfish fishing makes small-mesh multispecies an attractive option, potentially increasing mortality.	**Indirect Positive** Addresses mortality and bycatch of depleted groundfish stocks, but no specific measures for the small-mesh multispecies fishery.	**Indirect Positive** Small-mesh fishery typically occurs in areas with less vulnerable substrate than that where groundfishing occurs.	**Neutral** May shift effort into the small-mesh multispecies fishery, but could increase or decrease protected species interactions.	**Indirect Positive** Potentially allows the Georges Bank small-mesh multispecies fishery to continue, accounting for bycatch of a regulated species.

Action	Description	Impacts on Red, Silver, and Offshore Hake Stocks	Impacts on Non-target Species and Bycatch	Impacts on the Physical Environment and EFH	Impacts on Protected Species	Impacts on Fishery-related Businesses and Communities
[P,Pr] Multispecies Amendment 16 (2009)	Implementation of sector management catch shares and monitoring. Groundfish catches of sector vessels declared out of the fishery attributed to the "Other" fishery category. Many small-mesh multispecies vessels are also enrolled in a groundfish sector.	**Indirect positive** Sector vessels without a groundfish allocation may not fish if they cannot account for their bycatch.	**Direct Positive** Bycatch of regulated groundfish are monitored. Catches count against a sector Annual Catch Entitlement (ACE).	**Indirect Positive** Sector vessels without a groundfish allocation may not fish if they cannot account for their bycatch.	**Indirect Positive** Sector vessels without a groundfish allocation may not fish if they cannot account for their bycatch.	**Indirect Negative** Potentially increases small-mesh fishing costs.
[P,Pr] Multispecies FMP Framework 48 (2013)	Established a Georges Bank yellowtail flounder sub-ACL for the small-mesh multispecies and other fisheries, as a fixed percentage of the US ABC.	**Neutral** Does not change mortality of small-mesh multispecies stocks.	**Direct Positive** Limits bycatch of Georges Bank yellowtail flounder in the fishery.	**Neutral** Unlikely to change fishing effort amount or distribution.	**Neutral** Unlikely to change fishing effort amount or distribution.	**Indirect Positive** Potentially allows the Georges Bank small-mesh multispecies fishery to continue, accounting for bycatch of a regulated species.
[P,Pr] Multispecies FMP Framework 51 (2014)	Established a gear-based reactive accountability measure (AM) for GB yellowtail flounder require a small-mesh vessel to use approved selective trawl gear; implemented Gulf of Maine cod rebuilding strategy.	**Potentially Indirect Negative** Restrictions on Gulf of Maine cod fishing causing effort shift into the small-mesh multispecies fishery.	**Direct Positive** Requires more selective gear when GB yellowtail flounder bycatch exceeds acceptable level.	**Indirect Negative** May reduce effort in Cultivator Shoals Area and Georges Bank, shifting to areas with more vulnerable habitat.	**Neutral** Could shift effort to areas with higher or lower protected species interactions.	**Indirect Positive or Direct Negative** Measure allows fishery to operate without a payback provision, but increases gear costs.

Action	Description	Impacts on Red, Silver, and Offshore Hake Stocks	Impacts on Non-target Species and Bycatch	Impacts on the Physical Environment and EFH	Impacts on Protected Species	Impacts on Fishery-related Businesses and Communities
[P,Pr] Monkfish Amendment 2/MSB Amendment 9 Areas	Prohibits fishing for monkfish, squid, mackerel, and butterfish in Lydonia and Oceanographer Canyons (Map 9). Does not apply to trips targeting only small-mesh multispecies	**Neutral** Curtails effort in some areas but effort shifts occur. Some prohibited trips target both squid and small-mesh multispecies.	**Potentially Direct Positive or Direct Negative** Area closures may reduce bycatch of some species, while effort shifts may increase bycatch of other species	**Direct Positive** Reduces impacts of bottom-tending small-mesh multispecies trawls on deep-sea corals and other benthos.	**Neutral** Trips partially targeting small-mesh multispecies may shift to locations where protected species are equally vulnerable.	**Direct Negative and Indirect Positive** Increases fishing costs by causing effort shifts to potentially sub-optimal locations, but long-term benefits accrue from undisturbed habitat.
[P,Pr] Tilefish Amendment 1 Areas	Prohibits the use of bottom-tending mobile gear around tilefish habitat and clay outcrops of Lydonia, Oceanographer, Veatch, and Norfolk Canyons (Map 9).	**Neutral** Curtails effort in some areas but effort shifts occur.	**Potentially Direct Positive or Direct Negative** Same as above.	**Direct Positive** Reduces impacts on clay outcrops associated with Tilefish HAPCs.	**Neutral** Same as above.	**Direct Negative** Increases fishing costs by causing effort shifts to potentially sub-optimal locations.
[P,Pr] Northeast Canyons and Seamounts Marine National Monument	Closes to fishing the shelf-slope region from Oceanographer to Lydonia Canyons and an area surrounding four deep-sea seamounts (Map 9).	**Neutral** Small-mesh multispecies fishing trips occur in the Canyons portion and relocated to the east and west along the shelf edge.	**Potentially Direct Positive or Direct Negative** Same as above.	**Direct Positive** Reduces impacts on a broad range of corals and other benthos for about 40 miles of the shelf edge.	**Neutral** Same as above.	**Direct Negative** Increases fishing costs by causing effort shifts to potentially sub-optimal locations. Some increase in steaming costs

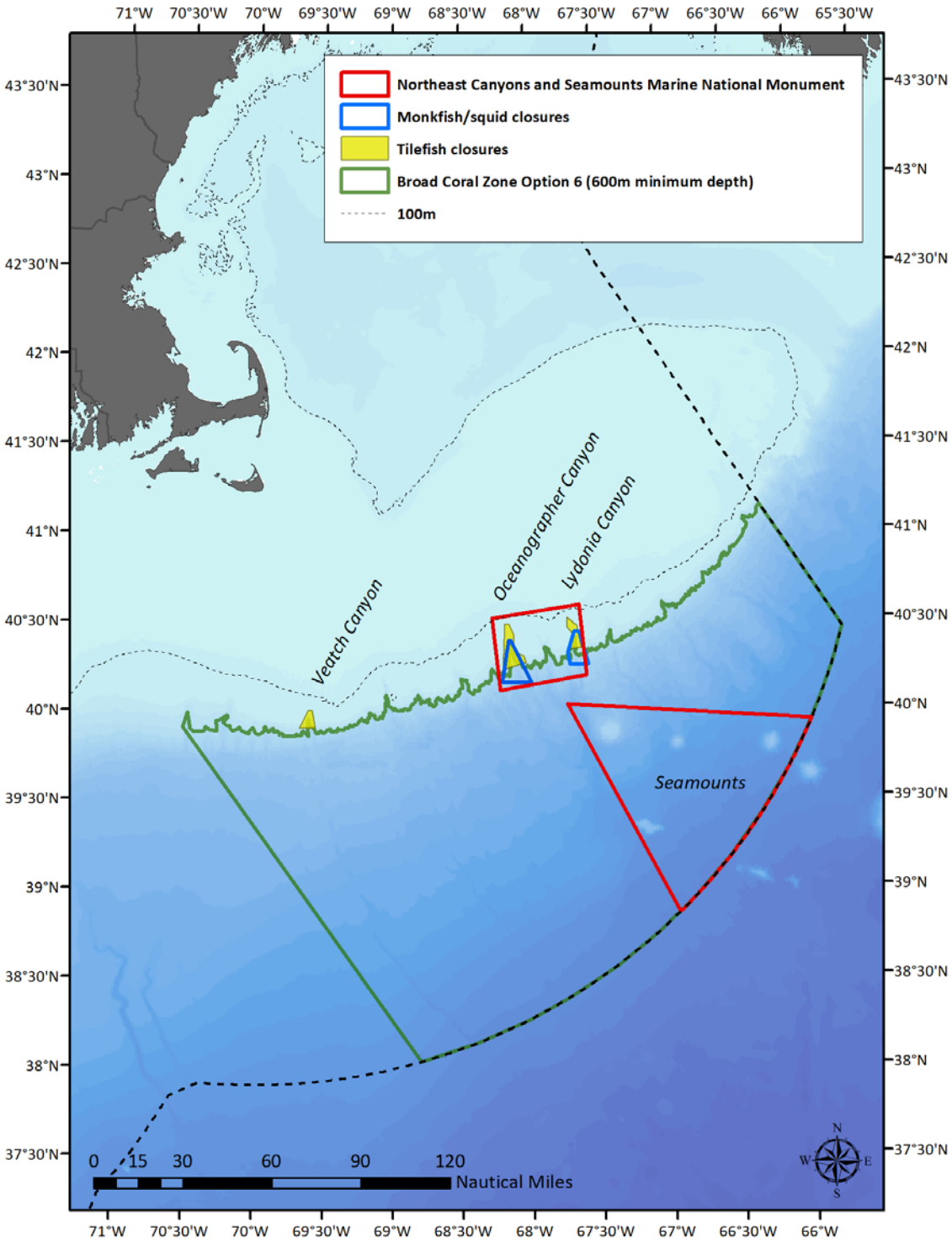
Action	Description	Impacts on Red, Silver, and Offshore Hake Stocks	Impacts on Non-target Species and Bycatch	Impacts on the Physical Environment and EFH	Impacts on Protected Species	Impacts on Fishery-related Businesses and Communities
RFF Northeast Canyons and Seamounts Marine National Monument	Authority over fishing activity in the Monument is proposed to be turned back over to the FMCs.	**Neutral** Fishing trips that were dislocated by the designation could return, but increases in fishing mortality are not expected.	**Potentially Direct Positive or Direct Negative** Opposite as above.	**Direct Positive** NEFMC is considering closing a larger area (Map 9) to mobile-tending gears that would have less impact on certain types of fishing.	**Neutral** Opposite as above.	**Direct Positive** Reduces costs by allowing more fishing in optimum locations. Some reduction in steaming costs.
RFF Multispecies FMP Framework 57	Specifies 2018 Georges Bank yellowtail flounder sub-ACL and prohibits possession of Atlantic halibut	**Neutral** Unlikely to change effort and fishing mortality on target species	**Potentially Direct Positive** Limits mortality on overfished stocks.	**Neutral** Unlikely to change the amount or distribution of small-mesh fishing	**Neutral** Unlikely to change the amount or distribution of small-mesh fishing	**Potentially Indirect Negative** Measures to reduce mortality on bycatch species could increase fishing cost.
RFF 2018-2020 Specifications Package	Adjusts catch specifications to be consistent with recent changes in resource conditions and overfishing of southern red hake.	**Direct Positive** Prevents overfishing and produces MSY.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Neutral** Measures do not reduce effort or require more selective gear and do not change exemption areas.	**Direct Positive** Ensures that overfishing does not occur or becomes persistent, producing OY.

Action	Description	Impacts on Red, Silver, and Offshore Hake Stocks	Impacts on Non-target Species and Bycatch	Impacts on the Physical Environment and EFH	Impacts on Protected Species	Impacts on Fishery-related Businesses and Communities
[RFF] MAFMC Squid, Mackerel, and Butterfish Amendment 20	Removes latent limited access permits from the directed fishery and allows vessels to qualify for an incidental permit with a 5,000 pound longfin squid limit. Reduces the trimester closure from 2,500 to 250 pounds per day.	**Indirect Negative** Non-qualifying vessels may increase fishing effort on small-mesh multispecies.	**Direct Positive** Shifts in effort will use larger, more selective mesh to fish for whiting, which has a graduated possession limit.	**Neutral** Measures are unlikely to increase total small-mesh trawl effort, but only change the target species. Gears used in squid and whiting fisheries are similar but use different size mesh.	**Direct Positive** May reduce squid fishing in summer in favor of winter/spring whiting fishing when protected species are less available.	**Potentially Direct Negative** Minor increase in fishing costs to target a difference species. Some boats may need modification, or larger boats may be required in the winter/spring whiting fishery. Negative impact on whiting prices when Squid Trimester 2 closes.
[RFF] MAFMC Squid Specifications for 2018-2020	Adjustments to specifications to prevent overfishing and achieve OY. The proposed DAH is 2% higher than 2015-2017 because of lower squid discards. A squid buffer for the summer season may also be considered.	**Indirect Negative** Squid effort in the summer (during Trimester 2) may be redirected to target southern whiting.	**Indirect Positive** Effort shifts into the whiting fishery would mean that most vessels would be using more selective (i.e. 3-inch instead of 2-inch) mesh.	**Neutral** Shifts in effort into the whiting fishery are unlikely to encounter more vulnerable habitat or change impacts of gear on habitat.	**Neutral to Low Positive** Squid and whiting fishery often occurs in the same area, but some vessels may fish on Georges Bank rather than Southern New England waters.	**Potentially Indirect Negative** Earlier closure of the Trimester 2 squid fishery could increase landings of southern whiting when vessels redirect, reducing prices for whiting from the northern exemption areas.
[RFF] Deep-sea Coral Amendment	Considers closure of broad zones to mobile-tending bottom gears to protect deep-sea corals and other species	**Neutral** Analysis shows a very low impact on small-mesh multispecies fishing.	**Potentially Direct Negative** Minor increase in bycatch of continental shelf species like yellowtail flounder.	**Direct Positive** NEFMC is considering closing a larger area (Map 9) to mobile-tending gears that would have less impact on certain types of fishing.	**Neutral** Effects are uncertain.	**Neutral** Analysis shows a very low impact on small-mesh multispecies fishing.

Action	Description	Impacts on Red, Silver, and Offshore Hake Stocks	Impacts on Non-target Species and Bycatch	Impacts on the Physical Environment and EFH	Impacts on Protected Species	Impacts on Fishery-related Businesses and Communities
P, Pr, RFF Agricultural runoff	Nutrients applied to agricultural land are introduced into aquatic systems	**Indirect Negative** Reduced habitat quality	**Indirect Negative** Reduced habitat quality	**Direct Negative** Reduced habitat quality	**Indirect Negative** Reduced habitat quality	**Indirect Negative** Reduced habitat quality negatively affects resource
P, Pr, RFF Port maintenance	Dredging of coastal, port and harbor areas for port maintenance	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Uncertain – Likely Direct Negative** Dependent on mitigation effects	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Uncertain – Likely Mixed** Dependent on mitigation effects
P, Pr, RFF Beach nourishment	Offshore mining of sand for beaches	**Indirect Negative** Localized decreases in habitat quality	**Indirect Negative** Localized decreases in habitat quality	**Direct Negative** Reduced habitat quality	**Indirect Negative** Localized decreases in habitat quality	**Mixed** Positive for mining companies, possibly negative for fishing industry
	Placement of sand to nourish beach shorelines	**Indirect Negative** Localized decreases in habitat quality	**Indirect Negative** Localized decreases in habitat quality	**Direct Negative** Reduced habitat quality	**Indirect Negative** Localized decreases in habitat quality	**Positive** Beachgoers like sand; positive for tourism
P, Pr, RFF Marine transportation	Expansion of port facilities, vessel operations and recreational marinas	**Indirect Negative** Localized decreases in habitat quality	**Indirect Negative** Localized decreases in habitat quality	**Direct Negative** Reduced habitat quality	**Indirect Negative** Localized decreases in habitat quality	**Mixed** Positive for some interests, potential displacement for others
P, Pr, RFF Installation of pipelines, utility lines and cables	Transportation of oil, gas and energy through pipelines, utility lines and cables	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Uncertain – Likely Direct Negative** Reduced habitat quality	**Potentially Direct Negative** Dependent on mitigation effects	**Uncertain – Likely Mixed** Dependent on mitigation effects
P, Pr, RFF Offshore disposal of dredged materials	Disposal of dredged materials	**Indirect Negative** Reduced habitat quality	**Indirect Negative** Reduced habitat quality	**Direct Negative** Reduced habitat quality	**Indirect Negative** Reduced habitat quality	**Indirect Negative** Reduced habitat quality negatively affects resource viability

Action	Description	Impacts on Red, Silver, and Offshore Hake Stocks	Impacts on Non-target Species and Bycatch	Impacts on the Physical Environment and EFH	Impacts on Protected Species	Impacts on Fishery-related Businesses and Communities
[RFF] Offshore Wind Energy Facilities (within 3 years)	Construction of wind turbines to harness electrical power (Several proposed from ME through NC, including NY/NJ, DE, and VA)	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Potentially Direct Negative** Localized decreases in habitat quality possible	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Uncertain – Likely Mixed** Dependent on mitigation effects
[Pr, RFF] Liquefied Natural Gas (LNG) terminals (within 3 years)	Transport natural gas via tanker to terminals offshore and onshore (1 terminal built in MA; 1 under construction; proposed in RI, NY, NJ and DE)	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Potentially Direct Negative** Localized decreases in habitat quality possible	**Uncertain – Likely Indirect Negative** Dependent on mitigation effects	**Uncertain – Likely Mixed** Dependent on mitigation effects

Map 9. Relationship between Present and Reasonable Foreseeable Future actions that close or would close areas to small-mesh multispecies fishing. Option 6 is the NEFMC's preferred alternative in the Deep-sea Corals Amendment.



6.7.4.1 Past and Present Actions

The historical management practices of the Council have resulted in positive impacts on the health of the red, silver, and offshore hakes stocks (Sections 6.1 to 6.6). Numerous actions have been taken to manage the commercial and recreational fisheries for these three species through amendment and framework adjustment actions. In addition, the specifications process is intended to provide the opportunity for the Council and NMFS to regularly assess the status of the fishery and to make necessary adjustments to ensure that there is a reasonable expectation of meeting the objectives of the FMP and the targets associated with any rebuilding programs under the FMP. The statutory basis for Federal fisheries management is the MSA. To the degree with which this regulatory regime is complied, the cumulative impacts of past, present, and reasonably foreseeable future federal fishery management actions on the VECs should generally be associated with positive long-term outcomes. Constraining fishing effort through regulatory actions can often have negative short-term socioeconomic impacts. These impacts are usually necessary to bring about long-term sustainability of a given resource, and as such, should, in the long-term, promote positive effects on human communities, especially those that are economically dependent upon the small-mesh multispecies and other related fisheries that have incidental catches of red, silver, and offshore hakes.

Non-fishing activities were considered when determining the combined effects from past, present, and reasonably foreseeable future actions. Each activity that has been considered as part of this cumulative impact analysis is weighted the same as any other. We lack the resources to quantify whether any one non-fishing activity would result in greater impacts to a particular VEC versus any other (this includes global climate change). Non-fishing activities that introduce chemical pollutants, sewage, changes in water temperature, salinity, dissolved oxygen, and suspended sediment into the marine environment pose a risk to all of the identified VECs. Human-induced non-fishing activities tend to be localized in near-shore areas and marine project areas where they occur. Examples of these activities include, but are not limited to agriculture, port maintenance, beach nourishment, coastal development, marine transportation, marine mining, dredging and the disposal of dredged material. Wherever these activities co-occur, they are likely to work additively or synergistically to decrease habitat quality and, as such, may indirectly constrain the sustainability of the managed resources, non-target species, and protected resources. Decreased habitat suitability would tend to reduce the tolerance of these VECs to the impacts of fishing effort. Mitigation of this outcome through regulations that would reduce fishing effort could then negatively impact human communities. The overall impact to the affected species and their habitats on a population level is unknown, but likely neutral to low negative, since a large portion of these species have a limited or minor exposure to these local non-fishing perturbations.

In addition to guidelines mandated by the MSA, NMFS reviews these types of effects through the review processes required by Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for certain activities that are regulated by federal, state, and local authorities. The jurisdiction of these activities is in "waters of the U.S." and includes both riverine and marine habitats.

6.7.4.2 Reasonably foreseeable future actions

In fishing year 2012, ACLs and AMs were first implemented for red, silver, and offshore hake stocks (as well as other Council managed species) to ensure that catch and landings limits are not exceeded and overfishing does not occur. Monitoring of catch since 2012 was completed and summarized in NEFMC 2014 and NEFMC 2017, indicating that catches of red, silver, and offshore hakes stocks were generally well below the ABCs and overfishing was not occurring.

In the 2016 assessment update (summarized in NEFMC 2017), the southern red hake stock biomass has been declining and stable catches appear to have caused overfishing for the first time in 2016. Also the biomass has sunk below the threshold and the stock has appeared to have become overfished. If this finding does not change, the Council will initiate an amendment to address the overfished status and begin a rebuilding program. Measures to rebuild southern red hake are likely going to be difficult to develop because around 70% of the catch comes from estimated discards in both the whiting and squid fisheries.

In 2014 catches of northern red hake were 27.5% above the ABC and the in-season AM (a reduction in possession limit to discourage targeting and encourage fishing where red hake are less abundant) was adjusted post hoc to reduce future risk of overfishing. Since then, the northern red hake catches also exceeded the ACL and the TAL trigger was lowered to 37.9% of the TAL to account for those overages. These in-season AMs applied to the 2014-2016 fishing years and will continue into the future subject to future revisions, if needed. In 2016, the catches did not exceed the ACL, possibly indicating that the most recent TAL trigger adjustment from 45% of the TAL to 37.9% of the TAL was not needed to prevent the catch from exceeding the ACL. Coupled with the increase in the proposed northern red hake specifications for 2018-2020, the low TAL trigger may not be needed in the near future either. If the northern red hake catch remains below the ACL, the Council may include an appropriate adjustment to raise the northern red hake TAL trigger in a future action.

As a result, the Reasonably Foreseeable Future Actions over the next three years may include the adjusted northern red hake AM and potential implementation or adjustment of accountability measures and other Council recommended adaptive adjustments to the way this new system of catch limits and accountability functions and interacts with the fishery regulations in place.

The Council has developed and will be submitting for approval and implementation new catch specifications for fishing years 2018-2020. Part of a regular procedure, this change in 3-year specifications responds to changes in resource conditions (i.e. changes in stock biomass) and fishing practices (i.e. those that result in resource utilization and discarding). The new specifications are not expected to have a large impact on the amount or distribution of small-mesh multispecies fishing effort mainly because the existing landings and discards are below the respective proposed specifications of Allowable Biological Catches (ABCs), Annual Catch Limits (ACLs), and Total Allowable Landings (TALs). The proposed specifications are expected to have positive effects on the Target Species and on the Human Environment, with low negative impacts on Non-target Species, Protected Species, and on the Physical Environment and Essential Fish Habitat.

For many of the proposed non-fishing activities to be permitted under other federal agencies (such as beach nourishment, offshore wind facilities, etc.), those agencies would conduct examinations of potential impacts on the VECs. The MSA (50 CFR §600.930) imposes an obligation on other federal agencies to consult with the Secretary of Commerce on actions that may adversely affect EFH. The eight Fishery Management Councils are engaged in this review process by making comments and recommendations on any federal or state action that may affect habitat, including EFH, for their managed species and by commenting on actions likely to substantially affect habitat, including EFH.

In addition, under the Fish and Wildlife Coordination Act (Section 662), “whenever the waters of any stream or other body of water are proposed or authorized to be impounded, diverted, the channel deepened, or the stream or other body of water otherwise controlled or modified for any purpose whatever, including navigation and drainage, by any department or agency of the U.S., or by any public or private agency under federal permit or license, such department or agency first shall consult with the U.S. Fish and Wildlife Service (USFWS), Department of the Interior, and with the head of the agency

exercising administration over the wildlife resources of the particular state wherein the" activity is taking place. This act provides another avenue for review of actions by other federal and state agencies that may impact resources that NMFS manages in the reasonably foreseeable future.

In addition, NMFS and the USFWS share responsibility for implementing the ESA. ESA requires NMFS to designate "critical habitat" for any species it lists under the ESA (i.e., areas that contain physical or biological features essential to conservation, which may require special management considerations or protection) and to develop and implement recovery plans for threatened and endangered species. The ESA provides another avenue for NMFS to review actions by other entities that may impact endangered and protected resources whose management units are under NMFS' jurisdiction.

6.7.5 Magnitude and Significance of Cumulative Effects

In determining the magnitude and significance of the cumulative effects, the additive and synergistic effects of the proposed action, as well as past, present, and future actions, must be taken into account. The following section discusses the effects of these actions on each of the VECs.

6.7.5.1 Red, silver, and offshore hake stocks

Those past, present, and reasonably foreseeable future actions, whose effects may impact the managed resources and the direction of those potential impacts, are summarized in Table 93. The indirectly negative actions described in this table are localized in near-shore areas and marine project areas where they occur. Therefore, the magnitude of those impacts on the managed resources is expected to be limited due to a lack of exposure to the population at large. Agricultural runoff may be much broader in scope, and the impacts of nutrient inputs to the coastal system may be of a larger magnitude, although the impact on productivity of the managed resources is unquantifiable. As described above (Section 6.7.4.2), NMFS has several means under which it can review non-fishing actions of other federal or state agencies that may impact NMFS' managed resources prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of indirect negative impacts those actions could have on resources under NMFS' jurisdiction.

Climate change is already impacting fishery resources by shifting distributions, abundances, and phenology of species and the communities that depend on them. For example, cold water species are shifting northward. Some of these shifts are in response to warming waters and some are in response to changes in population abundance and age-structure. Water temperatures are known to exert significant influence different life stages, on reproductive and developmental processes, growth rates, and increase the likelihood of disease. Shifts in red and silver hake distribution in surveyed areas was evaluated and documented by Nye et al. 2009 and Nye et al. 2011. With shifting species distribution, loss of habitat, and changes in mortality, the ability of some fish stocks to respond to harvesting pressure may be reduced, while the ability of other fish stocks may be increased.

These impacts are expected to intensify in the future, increasing the need for a better understanding of which fishery resources are the most vulnerable. NMFS has developed a tool for rapidly assessing and indexing the vulnerability of fish stocks to climate change. The index can help fishery managers identify high vulnerability stocks and more effectively target limited research and assessment resources on stocks of highest concern. The methodology combines a stock's exposure and sensitivity (which includes adaptive capacity) to estimate overall vulnerability. Pilot tests have found the methodology to be robust across temperate and tropical ecosystems. A full assessment has been developed in the northeast U.S. for all managed fish and shellfish species in the spring of 2014 (Nelson et al. in prep).

Past fishery management actions taken through the FMP and annual specification process have had a positive cumulative effect on the managed resources. It is anticipated that the future management actions, described in Table 94, will result in additional indirect positive effects on the managed resources through actions which reduce and monitor bycatch, protect habitat, and protect ecosystem services on which red, silver, and offshore hakes productivity depends. The 2012 fishing year was the first year of implementation for an amendment which requires specification of ACLs/AMs and catch accountability (77 FR 19138 and 78 FR 20260) and this process has been carried forward into the 2015-2017 proposed measures. Implementation of ACLs and AMs represents a major change to the current management program and is expected to lead to improvements in resource sustainability over the long-term. These impacts could be broad in scope, but the impacts were evaluated in the EIS for Amendment 19 (NEFMC 2013). Overall, the past, present, and reasonably foreseeable future actions that are truly meaningful to red, silver, and offshore hakes have had a positive cumulative effect.

Catch limits for each of the managed resources have been specified to ensure these stocks are managed in a sustainable manner, and measures are consistent with the objectives of the FMP under the guidance of the MSA. The impacts from annual specification of management measures established in previous years on the managed resources are largely dependent on how effective those measures were in meeting their intended objectives (i.e., preventing overfishing, achieve OY) and the extent to which mitigating measures were effective. The proposed action in this document would positively reinforce the past and anticipated positive cumulative effects on the red, silver, and offshore hakes stocks, by achieving the objectives specified in the FMP. Therefore, the proposed action would not have any significant effect on the managed resources individually or in conjunction with other anthropogenic activities (see the table below).

Table 94. Summary of the effects of past, present, and reasonably foreseeable future actions on red, silver, and offshore hake stocks.

Action	Past to the Present		Reasonably Foreseeable Future
Original FMP and subsequent Amendments and Frameworks to the FMP	**Direct Positive**		
Red, Silver, and Offshore Hakes Specifications	**Direct Positive**		
Developed, Apply, and Redo Standardized Bycatch Reporting Methodology	**Indirect Neutral**		
Amendment to address ACLs/AMs implemented	**Direct Positive**		
Agricultural runoff	**Indirect Negative**		
Port maintenance	**Uncertain – Likely Indirect Negative**		
Offshore disposal of dredged materials	**Indirect Negative**		
Beach nourishment – Offshore mining	**Indirect Negative**		
Beach nourishment – Sand placement	**Indirect Negative**		
Marine transportation	**Indirect Negative**		
Installation of pipelines, utility lines and cables	**Uncertain – Likely Indirect Negative**		
National Offshore Aquaculture Act of 2007	**Potentially Indirect Negative**		
Offshore Wind Energy Facilities (within 3 years)			**Uncertain – Likely Indirect Negative**
Liquefied Natural Gas (LNG) terminals (within 3 years)		**Uncertain – Likely Indirect Negative**	
Convening Gear Take Reduction Teams (within 3 years)			**Indirect Positive**
Strategy for Sea Turtle Conservation for the Atlantic Ocean and the Gulf of Mexico Fisheries (within next 3 years)			**Indirect Positive**
Summary of past, present, and future actions excluding those proposed in this specifications document	**Overall, actions have had, or will have, positive impacts on red, silver, and offshore hakes stocks**		

6.7.5.2 Non-target species and Bycatch

Those past, present, and reasonably foreseeable future actions, whose effects may impact non-target species and bycatch and the direction of those potential impacts, are summarized in Table 93. The effects of indirectly negative actions described in this table are localized in nears-shore areas and marine project areas where they occur. Therefore, the magnitude of those impacts on non-target species and bycatch is expected to be limited due to a lack of exposure to the population at large. Agricultural runoff may be much broader in scope, and the impacts of nutrient inputs to the coastal system may be of a larger magnitude, although the impact on productivity of non-target resources and the oceanic ecosystem is unquantifiable. As described above (Section 6.7.4.2), NMFS has several means under which it can review non-fishing actions of other federal or state agencies that may impact NMFS' managed resources prior to permitting or implementation of those projects. At this time, NMFS can consider impacts to non-target species and bycatch (federally-managed or otherwise) and comment on potential impacts. This serves to minimize the extent and magnitude of indirect negative impacts those actions could have on resources within NMFS' jurisdiction.

Past fishery management actions taken through the FMP and annual specification process have had a positive cumulative effect on non-target species and bycatch. In particular, the small-mesh multispecies fishery is managed through specific exemptions from large-mesh multispecies regulations in such a way to minimize interactions with non-target species and bycatch. Specifically, these regulations include exemption areas and seasons in the northern management area that through prior experimental fishing permits have been shown to have acceptably low bycatch rates of large-mesh groundfish. In the southern management area, vessels may target red, silver, and offshore hakes year round, but operate in areas where large mesh multispecies catches are low. Concern about these species is however changing, particularly for distressed or overfished species like yellowtail and windowpane flounders.

Implementation and application of a standardized bycatch reporting methodology (SBRM) would have a particular impact on non-target species by improving the methods which can be used to assess the magnitude and extent of a potential bycatch problem. The redevelopment of the SBRM will result in better assessment of potential bycatch issues and allow more effective and specific management measures to be developed to address a bycatch problem. On-going research is being conducted through cooperative research and other programs to improve selectivity characteristics of small-mesh nets used by vessels targeting whiting and squids, particularly focused on reducing bycatch of yellowtail and windowpane flounders, species with sub-ACLs and subject to AMs. Use of these gears may be approved as an AM or as a technical measure in future management actions if they are shown to be effective.

It is anticipated that future management actions, described in Table 95, will result in additional indirect positive effects on non-target species through actions which reduce and monitor bycatch, protect habitat, and protect ecosystem services on which the productivity of many of these non-target resources depend. The impacts of these future actions could be broad in scope, and it should be noted the managed resource and non-target species are often coupled in that they utilize similar habitat areas and ecosystem resources on which they depend. Overall, the past, present, and reasonably foreseeable future actions that are truly meaningful have had a positive cumulative effect on non-target species.

Catch limits for each of the managed resources have been specified to ensure these rebuilt stocks are managed in a sustainable manner, and measures are consistent with the objectives of the FMP under the guidance of the MSA. The proposed actions in this document have impacts that range from neutral to positive or negative impacts, and would not change the past and anticipated positive cumulative effects on non-target species and thus, would not have any significant effect on these species individually or in conjunction with other anthropogenic activities (see table below).

Table 95. Summary of the effects of past, present, and reasonably foreseeable future actions on the non-target species and bycatch.

Action	Past to the Present		Reasonably Foreseeable Future
Original FMP and subsequent Amendments and Frameworks to the FMP	**Direct Positive**		
Red, Silver, and Offshore Hakes Specifications	**Indirect Positive**		
Developed, Apply, and Redo Standardized Bycatch Reporting Methodology	**Neutral**		
Amendment to address ACLs/AMs implemented	**Potentially Indirect Positive**		
Agricultural runoff	**Indirect Negative**		
Port maintenance	**Uncertain – Likely Indirect Negative**		
Offshore disposal of dredged materials	**Indirect Negative**		
Beach nourishment – Offshore mining	**Indirect Negative**		
Beach nourishment – Sand placement	**Indirect Negative**		
Marine transportation	**Indirect Negative**		
Installation of pipelines, utility lines and cables	**Uncertain – Likely Indirect Negative**		
National Offshore Aquaculture Act of 2007	**Potentially Indirect Negative**		
Offshore Wind Energy Facilities (within 3 years)			**Uncertain – Likely Indirect Negative**
Liquefied Natural Gas (LNG) terminals (within 3 years)		**Uncertain – Likely Indirect Negative**	
Convening Gear Take Reduction Teams (within 3 years)			**Indirect Positive**
Strategy for Sea Turtle Conservation for the Atlantic Ocean and the Gulf of Mexico Fisheries (within next 3 years)			**Indirect Positive**
Summary of past, present, and future actions excluding those proposed in this specifications document	**Overall, actions have had, or will have, positive impacts on the non-target species.**		

6.7.5.3 Physical Environment and Essential Fish Habitat

Those past, present, and reasonably foreseeable future actions, whose effects may impact habitat (including EFH) and the direction of those potential impacts, are summarized in Table 93. The direct and indirect negative actions described in this table are localized in near-shore areas and marine project areas where they occur. Therefore, the magnitude of those impacts on habitat is expected to be limited due to a lack of exposure to habitat at large. Agricultural runoff may be much broader in scope, and the impacts of nutrient inputs to the coastal system may be of a larger magnitude, although the impact on habitat and EFH is unquantifiable. As described above (Section 6.7.4.2), NMFS has several means under which it can review non-fishing actions of other federal or state agencies that may impact NMFS' managed resources and the habitat on which they rely prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of direct and indirect negative impacts those actions could have on habitat utilized by resources under NMFS' jurisdiction.

Climate change is expected to have an impact on the physical characteristics and essential fish habitat aspects of marine ecosystems, and possibly change the very nature of these ecosystems. Increased frequency and intensity of extreme weather events, like hurricanes, may change the physical structure of coastal areas. Water circulation, currents, and the proportion of source waters/freshwater intrusion have been observed to be changing (Ecosystem Assessment Program, NEFSC, 2012) which influences salinity, water column stratification, transport of nutrients, and food web processes. All of these factors, in addition to others like ocean acidification and changes to water chemistry (Rebuck et al. in prep), threaten living elements of the marine environment, such as corals and shellfish, and may be related to the observed shifts in the planktonic community structure that forms the basis of the marine food web.

Past fishery management actions taken through the FMP and annual specification process have had a positive cumulative effect on habitat and EFH. The actions have constrained fishing effort at a large scale and locally, and have implemented gear requirements, which may reduce habitat impacts. As required under these FMP actions, EFH and HAPCs were designated for the managed resources. It is anticipated that the future management actions, described in Table 96, will result in additional direct or indirect positive effects on habitat through actions which protect EFH for federally-managed species and protect ecosystem services on which these species' productivity depends. These impacts could be broad in scope. All of the VECs are interrelated; therefore, the linkages among habitat quality and EFH, managed resources and non-target species productivity, and associated fishery yields should be considered. For habitat and EFH, there are direct and indirect negative effects from actions which may be localized or broad in scope; however, positive actions that have broad implications have been, and it is anticipated will continue to be, taken to improve the condition of habitat. There are some actions, which are beyond the scope of NMFS and Council management such as coastal population growth and climate changes, which may indirectly impact habitat and ecosystem productivity. Overall, the past, present, and reasonably foreseeable future actions that are truly meaningful to habitat have had a neutral to positive cumulative effect.

Catch limits for each of the managed resources have been specified to ensure that red, silver, and offshore hakes stocks are managed in a sustainable manner, and measures are consistent with the objectives of the FMP under the guidance of the MSA. The proposed actions in this document would not change the past and anticipated cumulative effects on habitat and thus, would not have any significant effect on habitat individually or in conjunction with other anthropogenic activities (see table below).

Table 96. Summary of the effects of past, present, and reasonably foreseeable future actions on the physical environment and EFH.

Action	Past to the Present	Reasonably Foreseeable Future
Original FMP and subsequent Amendments and Frameworks to the FMP	**Indirect Positive**	
Red, Silver, and Offshore Hakes Specifications	**Indirect Positive**	
Developed, Apply, and Redo Standardized Bycatch Reporting Methodology	**Neutral**	
Amendment to address ACLs/AMs implemented	**Potentially Indirect Positive**	
Agricultural runoff	**Direct Negative**	
Port maintenance	**Uncertain – Likely Direct Negative**	
Offshore disposal of dredged materials	**Direct Negative**	
Beach nourishment – Offshore mining	**Direct Negative**	
Beach nourishment – Sand placement	**Direct Negative**	
Marine transportation	**Direct Negative**	
Installation of pipelines, utility lines and cables	**Uncertain – Likely Direct Negative**	
National Offshore Aquaculture Act of 2007	**Direct Negative**	
Offshore Wind Energy Facilities (within 3 years)		**Potentially Direct Negative**
Liquefied Natural Gas (LNG) terminals (within 3 years)	**Potentially Direct Negative**	
Convening Gear Take Reduction Teams (within 3 years)		**Indirect Positive**
Strategy for Sea Turtle Conservation for the Atlantic Ocean and the Gulf of Mexico Fisheries (within next 3 years)		**Indirect Positive**
Summary of past, present, and future actions excluding those proposed in this specifications document	**Overall, actions have had, or will have, direct negative to indirect positive impacts on the physical environment and EFH.**	

6.7.5.4 Protected Resources

Those past, present, and reasonably foreseeable future actions, whose effects may impact the protected resources and the direction of those potential impacts, are summarized in Table 93. The indirectly negative actions described in this table are localized in near-shore areas and marine project areas where they occur. Therefore, the magnitude of those impacts on protected resources, relative to the range of many of the protected resources, is expected to be limited due to a lack of exposure to the population at large. Agricultural runoff may be much broader in scope, and the impacts of nutrient inputs to the coastal system may be of a larger magnitude, although the impact on protected resources either directly or indirectly is unquantifiable. As described above (Section 6.7.4.2), NMFS has several means, including ESA, under which it can review non-fishing actions of other federal or state agencies that may impact NMFS' protected resources prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of indirect negative impacts those actions could have on protected resources under NMFS' jurisdiction.

Past fishery management actions taken through the FMP and annual specification process have had a positive cumulative effect on ESA-listed and MMPA protected species through the reduction of fishing effort (potential interactions) and implementation of gear restrictions, open seasons, and exemption areas. It is anticipated that the future management actions, specifically those recommended by the ALWTRT and the development of strategies for sea turtle conservation described in Table 93, will result in additional indirect positive effects on the protected resources. These impacts could be broad in scope. Overall, the past, present, and reasonably foreseeable future actions that are truly meaningful to protected resources have had a positive cumulative effect.

Catch limits for each of the managed resources have been specified to ensure that red, silver, and offshore hakes stocks are managed in a sustainable manner, and measures are consistent with the objectives of the FMP under the guidance of the MSA. The proposed actions in this document would not change the past and anticipated cumulative effects on ESA-listed and MMPA protected species and thus, would not have any significant effect on protected resources individually or in conjunction with other anthropogenic activities (Table 97).

For sea turtles, changes to both their marine and terrestrial environment due to climate change pose a challenge. Recent studies suggest that warming temperatures at nesting beaches could have the strongest impacts on sea turtle populations due to reduced nest success and recruitment (Santidrian-Tomillo et al. 2012; Saba et al. 2012). Additionally, increased severity of extreme weather events may create erosion and damage to turtle nest and nesting sites (Goldenberg et al 2001; Webster et al 2005, IPCC 2013), resulting in a further reduction in nest success and recruitment. These potential declines in the success of nesting could have profound effects on the abundance and distribution of sea turtles. Moreover, warming air temperature can also affect the demography of sea turtle populations because the sex ratio of hatchling sea turtles is determined by the temperature during incubation in nesting beaches. Female offspring are produced at warmer temperatures and thus climate change could lead to a lower ratio of males in the population. Changes in water circulation near nesting beaches could affect the early life history stages of sea turtles by transporting passively-drifting hatchlings to waters that may have increased predation rates (Shillinger et al. 2012). Furthermore, prey availability and quality may also be affected by climate change but these projections are far less certain.

Marine mammals are subject to impacts from global climate change through climate variability, water temperature changes, changes to ocean currents, changes in impact primary productivity and prey species availability. For example, shifts in zooplankton patch formation, which have already been observed, could affect the feeding opportunities and therefore populations of North Atlantic Right Whales (NEQ

website). Susceptibility to disease, changes in toxicant exposure, and decreased reproductive success with rising ocean temperatures and related climate-ecosystem changes is also of concern (Burek et. al, 2008). Species that migrate to feeding grounds in polar regions (including many baleen whale populations) may be more susceptible to climate change in the near-term since conditions in the polar regions are changing more rapidly than in temperate regions.

Table 97. Summary of the effects of past, present, and reasonably foreseeable future actions on the protected resources.

Action	Past to the Present	Reasonably Foreseeable Future
Original FMP and subsequent Amendments and Frameworks to the FMP	**Indirect Positive**	
Red, Silver, and Offshore Hakes Specifications	**Indirect Positive**	
Developed, Apply, and Redo Standardized Bycatch Reporting Methodology	**Neutral**	
Amendment to address ACLs/AMs implemented	**Potentially Indirect Positive**	
Agricultural runoff	**Indirect Negative**	
Port maintenance	**Uncertain – Likely Indirect Negative**	
Offshore disposal of dredged materials	**Indirect Negative**	
Beach nourishment – Offshore mining	**Indirect Negative**	
Beach nourishment – Sand placement	**Indirect Negative**	
Marine transportation	**Indirect Negative**	
Installation of pipelines, utility lines and cables	**Potentially Direct Negative**	
National Offshore Aquaculture Act of 2007	**Potentially Indirect Negative**	
Offshore Wind Energy Facilities (within 3 years)		**Uncertain – Likely Indirect Negative**
Liquefied Natural Gas (LNG) terminals (within 3 years)	**Uncertain – Likely Indirect Negative**	
Convening Gear Take Reduction Teams (within 3 years)		**Indirect Positive**
Strategy for Sea Turtle Conservation for the Atlantic Ocean and the Gulf of Mexico Fisheries (within next 3 years)		**Indirect Positive**
Summary of past, present, and future actions excluding those proposed in this specifications document	**Overall, actions have had, or will have, positive impacts on protected resources.**	

6.7.5.5 Fishery-related businesses and communities

Those past, present, and reasonably foreseeable future actions, whose effects may impact human communities and the direction of those potential impacts, are summarized in Table 93. The indirectly negative actions described in this table are localized in near-shore areas and marine project areas where they occur. Therefore, the magnitude of those impacts on human communities is expected to be limited in scope. It may, however, displace fishermen from project areas. Agricultural runoff may be much broader in scope, and the impacts of nutrient inputs to the coastal system may be of a larger magnitude. This may result in indirect negative impacts on human communities by reducing resource availability; however, this effect is unquantifiable. As described above (Section 6.7.4.2), NMFS has several means under which it can review non-fishing actions of other federal or state agencies prior to permitting or implementation of those projects. This serves to minimize the extent and magnitude of indirect negative impacts those actions could have on human communities.

As both the physical and ecological elements of the coastal and marine environments change through the impacts described in this section, there will be increasing challenges for the communities and individuals that depend on healthy and productive coasts and marine fisheries. The dynamics of certain fisheries may change entirely. Fishing-related businesses and communities also face a variety of other threats from changing climate including to human health concerns, energy, transportation, water resources, and food production.

Past fishery management actions taken through the FMP and annual specification process have had both positive and negative cumulative effects by benefiting domestic fisheries through sustainable fishery management practices, while at the same time potentially reducing the availability of the resource to all participants. Sustainable management practices are, however, expected to yield broad positive impacts to fishermen, their communities, businesses, and the nation as a whole. It is anticipated that the future management actions, described in Table 98, will result in positive effects for fishing-related businesses and communities due to sustainable management practices, although additional indirect negative effects on some businesses and communities could occur through management actions that may implement gear requirements or area closures and thus, reduce revenues. Overall, the past, present, and reasonably foreseeable future actions that are truly meaningful to fishing-related businesses and communities have had an overall positive cumulative effect.

Catch limits and possession limits for each of the managed resources have been specified to ensure these rebuilt stocks are managed in a sustainable manner, and measures are consistent with the objectives of the FMP under the guidance of the MSA. The impacts from annual specification measures established in previous years on the managed resources are largely dependent on how effective those measures were in meeting their intended objectives and the extent to which mitigating measures were effective. Overages may alter the timing of commercial fishery revenues (revenues realized a year earlier), and there may be impacts on some fishermen caused by unexpected reductions in their opportunities to earn revenues in the commercial fisheries in the year during which the overages are mitigated.

Despite the potential for negative short-term effects on fishing-related businesses and communities, the expectation is that there would be a positive long-term effect on them due to the long-term sustainability of red, silver, and offshore hake stocks. Overall, the proposed actions in this document would not change the past and anticipated cumulative effects on fishing-related businesses and communities and thus, would not have any significant effect on them individually, or in conjunction with other anthropogenic activities (see table below).

Table 98. Summary of the effects of past, present, and reasonably foreseeable future actions on fishing-related businesses and communities.

Action	Past to the Present		Reasonably Foreseeable Future
Original FMP and subsequent Amendments and Frameworks to the FMP	**Direct Positive**		
Red, Silver, and Offshore Hakes Specifications	**Direct Positive**		
Developed, Apply, and Redo Standardized Bycatch Reporting Methodology	**Potentially Indirect Negative**		
Amendment to address ACL/AMs implemented	**Potentially Direct Positive**		
Agricultural runoff	**Indirect Negative**		
Port maintenance	**Uncertain – Likely Mixed**		
Offshore disposal of dredged materials	**Indirect Negative**		
Beach nourishment – Offshore mining	**Mixed**		
Beach nourishment – Sand placement	**Positive**		
Marine transportation	**Mixed**		
Installation of pipelines, utility lines and cables	**Uncertain – Likely Mixed**		
National Offshore Aquaculture Act of 2007	**Uncertain – Likely Mixed**		
Offshore Wind Energy Facilities (within 3 years)			**Uncertain – Likely Mixed**
Liquefied Natural Gas (LNG) terminals (within 3 years)		**Uncertain – Likely Mixed**	
Convening Gear Take Reduction Teams (within 3 years)			**Indirect Negative**
Strategy for Sea Turtle Conservation for the Atlantic Ocean and the Gulf of Mexico Fisheries (within next 3 years)			**Indirect Negative**
Summary of past, present, and future actions excluding those proposed in this specifications document	**Overall, actions have had, or will have, positive impacts on fishing-related businesses and communities.**		

6.7.6 Summary of Cumulative Effects of the Preferred Action

The Council has identified its preferred action alternatives in Section 4.0. No Action has been chosen as the preferred alternative to address the issues identified in the Purpose and Need (Section 3.1s) for the reasons given in the Alternative (Section 4.0) and in the Executive Summary (Section 1.0) The cumulative effects of the range of actions considered in this document can be considered to make a determination if significant cumulative effects are anticipated from the preferred alternatives. The direct and indirect impacts of the proposed action on the VECs are described in Section 6.0. The magnitude and significance of the cumulative effects, which include the additive and synergistic effects of the preferred alternatives, as well as past, present, and future actions, have been taken into account throughout Section 6.7.4 The action proposed in this annual specifications document builds off action taken in the original FMP and subsequent amendments and framework documents. When this action is considered in conjunction with all the other pressures placed on fisheries by past, present, and reasonably foreseeable future actions, it is not expected to result in any significant impacts, positive or negative. Based on the information and analyses presented in these past FMP documents and this document, there are no significant cumulative effects associated with the preferred alternatives in this document (Table 99).

Table 99. Magnitude and significance of the cumulative effects; the additive and synergistic effects of the preferred alternatives, as well as past, present, and future actions.

VEC	**Status in 2013 (for greater detail also see NEFMC 2014)**	**Net Impact of P, Pr, and RFF Actions**	**Impact of the Preferred Alternatives**	**Significant Cumulative Effects**
Target species: Red, Silver, and Offshore Hake Stocks	Complex and variable (Section ???)	Direct positive (Section 6.7.5.1)	Low negative	**None**
Non-target Species and Bycatch	Complex and variable (Section **???.**)	Direct positive (Section 6.7.5.2)	Negative	**None**
Physical Environment and EFH	Complex and variable (Section ???)	Indirect positive (Section6.7.5.3)	Low negative	**None**
Protected Resources	Complex and variable (Section ???)	Indirect positive (Section6.7.5.4)	Low negative to low positive	**None**
Fishery-related Businesses and Communities	Complex and variable (Section **???.**)	Direct positive (Section6.7.5.5)	Low negative to vessels in the fishery; Positive to new entrants to the fishery	**None**

6.8 Data and Research Needs

[To be developed by the PDT ???]

7.0 RELATIONSHIP TO APPLICABLE LAWS (To Be Updated and Modified)

7.1 Magnuson-Stevens Fishery Conservation and Management Act - Consistency with National Standards

Section 301 of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires that regulations implementing any fishery management plan or amendment be consistent with the ten national standards listed below.

7.1.1 National Standard 1

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

The proposed action is compliant with MSA National Standard 1 requirements for an acceptable biological catch (ABC) and interim ABC control rule, and ACL, and accountability measures (AMs). The proposed specifications for fishing years 2018-2020 are consistent with the ABC set through this process and are intended to ensure that overfishing will not take place in the small-mesh multispecies fishery and that the red, silver, and offshore hake stocks will not become overfished.

7.1.2 National Standard 2

Conservation and management measures shall be based on the best scientific information available.

The measures in this action are based on the best and most recent scientific information available including the red and silver hake stock assessments (NEFSC 2017), which includes an independent peer review, as updated by the NEFSC in NEFMC 2014, and recommendations from the Council's Science and Statistical Committee for setting ABCs for northern red and silver hake and southern red hake and whiting.

7.1.3 National Standard 3

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

The proposed action manages each individual small-mesh multispecies stock as a unit throughout its range. Management measures applied to one stock typically apply to the entire range of the stock. To the extent possible while achieving the management objectives and preventing overfishing on individual stocks, management measures in the proposed action and that exist in the FMP apply throughout the range and often throughout both stock areas. This consistency improves understanding, compliance and enforceability, which minimizes costs to the government.

7.1.4 National Standard 4

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

The proposed measures are the same for all vessels in the small-mesh multispecies fishery regardless of the state of residence of the owner or operator of the vessels. Although any fishing mortality control (including possession limits and quotas) result in the allocation of fishery resources, the measures in the proposed action are reasonably expected to promote conservation by continuing to prevent overfishing and rebuild overfished stocks.

7.1.5 National Standard 5

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

The proposed action maintains the efficiency of vessel operations under the total allowable landings (TAL). The TAL allows flexibility for business planning, operational safety and capability of the fleet to catch the ACL/TAL without exceeding it. None of the measures in this action directly allocates small-mesh fishery catches and, therefore, none has economic allocation as its sole purpose.

7.1.6 National Standard 6

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

The proposed action, developed with input of small-mesh multispecies fishermen and processors, accounts for the market-driven nature of the fishery by updating the TAL consistent with changes in the fishery, and allowing flexibility to reach the TAL without exceeding it.

7.1.7 National Standard 7

Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

The proposed action would simplify management regulations by adjusting the TAL for fishing years 2018-2020 to be consistent with the stocks' changes in biomass. The proposed action does not duplicate other fishing regulations or fishery management measures. The NE Multispecies FMP is the only management plan that sets harvest limits and fishing regulations for the small-mesh multispecies fishery.

7.1.8 National Standard 8

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

The proposed action was developed with the input of small-mesh multispecies fishery vessel owners and processors that supported the measures because the specifications would assist them economically by making harvesting operations efficient. This flexibility would keep the small-mesh multispecies fishery economically viable and sustainable. Due to the small size of the small-mesh multispecies fishery, there are a limited number of participants, and consequently a limited number of communities. This action is not expected to change the individuals or communities affected by this fishery.

7.1.9 National Standard 9

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

The proposed action is not expected to have any impact on bycatch of red, silver, or offshore hakes, or other species.

7.1.10 National Standard 10

Conservation and management measures shall, to the extent practicable, promote safety of human life at sea.

The proposed action allows flexibility for vessels to harvest when conditions are optimal, reducing exposure to safety hazards at sea. This management action does not change any of the measures designed to promote the safety of human life at sea, and no measure in the proposed action reduces the flexibility of vessel operators to respond to hazardous conditions at sea.

7.1.11 Magnuson-Stevens Act FMP Requirements

Section 303 (a) of FCMA contains 15 required provisions for FMPs that are listed below. The requirement applies to the FMP, and in some cases, the FMP as amended, and not the submission document for the proposed action.

(1) Contain the conservation and management measures, applicable to foreign fishing and fishing by vessels of the United States;

Foreign fishing is not allowed under this management plan or this action, so specific measures are not included to specify and control allowable foreign catch.

(2) Contain a description of the fishery;

An updated description of the fishery is included in the SAFE Report for Fishing Year 2016 (NEFMC 2017).

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

This proposed action would set specifications that are consistent with sustainable and optimum yield (Section 3.3.3.2). The information utilized to make this decision is summarized, along with an update assessment of northern red and silver hake and southern red and silver hake, is contained in the SAFE Report for Fishing Year 2016 (NEFMC 2017).

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

Vessels operating in the fishery and those that have been permitted to fish for small-mesh multispecies have the capacity to harvest optimum yield. Existing regulatory restrictions to manage large-mesh multispecies bycatch and limits on domestic and foreign market demand limit catch.

(5) Specify the pertinent data which shall be submitted to the Secretary with respect to commercial, recreational, and charter fishing in the fishery, including, but not limited to, information regarding the type and quantity of fishing gear used;

Vessels on small-mesh multispecies trips must submit Vessel Trip Reports (VTRs) for each fishing trip. Dealers are also required to submit reports on the purchases of small-mesh multispecies from permitted vessels. Current reporting requirements are detailed in 50 CFR 648.7.

(6) Consider and provide for temporary adjustments, after consultation with the Coast Guard and persons utilizing the fishery, regarding access to the fishery for vessels otherwise prevented from harvesting because of weather or other ocean conditions affecting the safe conduct of the fishery;

The proposed action does not contain any measures that would penalize vessels that were prevented from harvesting small-mesh multispecies because of weather of other ocean conditions.

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

Essential fish habitat for red, silver, and offshore hakes was defined in the Omnibus Essential Fish Habitat (EFH) Amendment 1 (NEFMC 1998, implemented in 1999). The designations were updated via Omnibus EFH Amendment 2 and will go into effect in January 2018[31]. Differences between the original and updated EFH designations are explained in Section 2.2.2 of Volume 2 of the Omnibus EFH Amendment 2 FEIS (NEFMC 2017). This action does not change the EFH designations.

(8) In the case of a fishery management plan that, after January 1, 1991, is submitted to the Secretary for review under section 304(a) (including any plan for which an amendment is

[31] Note that the EFH designations will be effective with the ROD on the amendment (1/4/2018) but the spatial management measures will not take effect until April or May with the final rule.

submitted to the Secretary for such review) or is prepared by the Secretary, assess and specify the nature and extent of scientific data which is needed for effective implementation of the plan;

Scientific needs are continuously reviewed and revised by the Council's Research Steering Committee and the Northeast Stock Assessment Workshop, which consult with NMFS, the Council and its Plan Development Teams, Science and Statistical Committee and species oversight committees about scientific data needs.

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

Impacts on fishing communities affected by this action can be found in Section 6.6 and 6.7.5.

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

The Amendment 19 to the NE Multispecies FMP (NEFMC 2011) established criteria to determine whether the small-mesh multispecies stocks were either in an overfished condition, subject to overfishing, or both. This action does not change those criteria.

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

This action does not include changes to the current Standardized Bycatch Reporting Methodology implemented under the Standardized Bycatch Reporting Methodology Omnibus Amendment (Amendment 15 to the NE Multispecies FMP; NEFMC 2007) implemented in February 2008 and the second Standardized Bycatch Reporting Methodology Omnibus Amendment (Amendment 20 to the NE Multispecies FMP; NEFMC 2015) implemented in June 2015 (CFR 80:125 p 37182-37199). This methodology is expected to assess the amount and type of bycatch in the small-mesh multispecies fishery and help identify ways the fishery can minimize bycatch and mortality of bycatch which cannot be avoided.

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

Recreational catches are a very small proportion of total catches of red and silver hakes and are almost non-existent for offshore hake. As such, the catches are accounted for within the 5% allowance for management uncertainty, but were estimated in the SAFE Report for Fishing Year 2016 (NEFMC 2017).

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

Amendment 19 as updated by the SAFE Report (NEFMC 2014) provides a description of the commercial small-mesh multispecies fishery. There is no recreational or charter fishing that target small-mesh multispecies, but red and silver hake are often captured for bait, particularly in the fishery that targets bluefin tuna.

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

No stocks are subject to catch restrictions to rebuild stocks and any vessel may currently enter the fishery by obtaining a Multispecies Category K permit.

(15) Establish a mechanism for specifying annual catch limits in the plan (including a multiyear plan), implementing regulations or annual specifications, at a level such that overfishing does not occur in the fishery, including measures to ensure accountability;

The proposed action maintains an ABC, annual catch limit, total allowable landings and accountability measures that would prevent overfishing and ensure accountability.

7.2 National Environmental Policy Act of 1969 (NEPA)

[To be drafted ???]

7.3 Marine Mammal Protection Act (MMPA)

None of the specifications proposed in this document are expected to alter fishing methods or activities. Therefore, this action is not expected to affect marine mammals or critical habitat in any manner not considered in previous consultations on the fisheries.

For further information on the potential impacts of the fishery and the proposed management action on marine mammals, see Sections 5.2 and 6.4.

7.4 Endangered Species Act (ESA)

Section 7 of the Endangered Species Act requires Federal agencies conducting, authorizing, or funding activities that affect threatened or endangered species to ensure that those effects do not jeopardize the continued existence of listed species. The proposed action is not expected to substantially change the amount of small-mesh fishing effort or the way the fishery is prosecuted, due to market limitations and restrictions on when and where vessels may use small-mesh trawls to target red hake and whiting.

Based on the information available at this time (Sections 5.2 and 6.4), the Council believes that NMFS will concur that the action proposed for the small-mesh multispecies fishery would not be likely to jeopardize any ESA-listed species or alter or modify any critical habitat.

7.5 Coastal Zone Management Act (CZMA)

Section 307(c)(1) of the Coastal Zone Management Act (CZMA) of 1972, as amended, requires that all Federal activities that directly affect the coastal zone be consistent with approved state coastal zone management programs to the maximum extent practicable. The CZMA provides measures for ensuring stability of productive fishery habitat while striving to balance development pressures with social, economic, cultural, and other impacts on the coastal zone. It is recognized that responsible management of both coastal zones and fish stocks must involve mutually supportive goals. The Council has developed this specification package and will submit it to NMFS; NMFS must determine whether this action is consistent to the maximum extent practicable with the CZM programs for each state (Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina). Letters documenting NMFS' determination will be sent to the coastal zone management program offices of each state.

7.6 Administrative Procedure Act (APA)

Section 553 of the APA establishes procedural requirements applicable to informal rulemaking by Federal agencies. The purpose of these requirements is to ensure public access to the Federal rulemaking process, and to give the public adequate notice and opportunity for comment. At this time, the NEFMC is not requesting any abridgement of the rulemaking process for this action.

7.7 Information Quality Act (IQA)

Utility of Information Product

The information presented in this document is helpful to the intended users (the affected public) by presenting a clear description of the purpose and need of the proposed action, the measures proposed, and the impacts of those measures. A discussion of the reasons for selecting the proposed action is included

so that intended users may have a full understanding of the proposed action and its implications. The intended users of the information contained in this document include individuals involved in the small-mesh multispecies fishery, (e.g., fishing vessels, processors, fishery managers), and other individuals interested in the management of the small-mesh multispecies fishery. The information contained in this document will be helpful and beneficial to owners of vessels holding limited access small-mesh multispecies permits since it will notify these individuals of the measures contained in this specification package. This information will enable these individuals to adjust their management practices and make appropriate business decisions. Until a proposed rule is prepared and published, this document is the principal means by which the information contained herein is available to the public. The information provided in this document is based on the most recent available information from the relevant data sources. The information contained in this document includes detailed and relatively recent information on the small-mesh multispecies resource and, therefore, represents an improvement over previously available information. This document will be subject to public comment through proposed rulemaking, as required under the Administrative Procedure Act and, therefore, may be improved based on comments received.

This document is available in several formats, including printed publication, and online through the NEFMC's web page (www.nefmc.org). The *Federal Register* notice that announces the proposed rule and the final rule and implementing regulations will be made available in printed publication, on the website for the Greater Atlantic Regional Fisheries Office (www.greateratlantic.fisheries.noaa.gov), and through the Regulations.gov website. The *Federal Register* documents will provide metric conversions for all measurements.

Integrity of Information Product

The information product meets the standards for integrity under the following types of documents:

Other/Discussion (e.g., Confidentiality of Statistics of the Magnuson-Stevens Fishery Conservation and Management Act; NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics; 50 CFR 229.11, Confidentiality of information collected under the Marine Mammal Protection Act.)

Prior to dissemination, information associated with this action, independent of the specific intended distribution mechanism, is safeguarded from improper access, modification, or destruction, to a degree commensurate with the risk and magnitude of harm that could result from the loss, misuse, or unauthorized access to or modification of such information. All electronic information disseminated by NMFS adheres to the standards set out in Appendix III, "Security of Automated Information Resources," of OMB Circular A-130; the Computer Security Act; and the Government Information Security Act. All confidential information (e.g., dealer purchase reports) is safeguarded pursuant to the Privacy Act; Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business, and financial information); the Confidentiality of Statistics provisions of the Magnuson-Stevens Act; and NOAA Administrative Order 216-100, Protection of Confidential Fisheries Statistics.

Objectivity of Information Product

For purposes of the Pre-Dissemination Review, this document is considered to be a "Natural Resource Plan." Accordingly, the document adheres to the published standards of the Magnuson-Stevens Act; the Operational Guidelines, Fishery Management Plan Process; the Essential Fish Habitat Guidelines; the National Standard Guidelines; and NOAA Administrative Order 216-6, Environmental Review Procedures for Implementing the National Environmental Policy Act. This information product uses information of known quality from sources acceptable to the relevant scientific and technical

communities. Several sources of data were used in the development of the specification package. These data sources included, but were not limited to, historical and current landings data from the Commercial Dealer database, vessel trip report (VTR) data, and fisheries independent data collected through the NMFS bottom trawl surveys. The analyses contained in this document were prepared using data from accepted sources. These analyses have been reviewed by members of the Whiting Plan Development Team (see Section ???) and by the SSC where appropriate.

Despite current data limitations, the conservation and management measures considered for this action were selected based upon the best scientific information available. The analyses important to this decision used information from the most recent complete calendar years, generally through 2016. The data used in the analyses provide the best available information on the number of permits, both active and inactive, in the fishery, the catch (including landings and discards) by those vessels, the landings per unit of effort (LPUE), and the revenue produced by the sale of those landings to dealers, as well as data about catch, bycatch, gear, and fishing effort from a subset of trips sampled at sea by government observers. Specialists (including professional members of plan development teams, technical teams, committees, and Council staff) who worked with these data are familiar with the most current analytical techniques and with the available data and information relevant to the small-mesh multispecies fishery. The policy choice is clearly articulated in Section ??? that being the management alternatives considered in this action.

The supporting science and analyses, upon which the policy choice was based, are summarized and described in the SAFE Report for Fishing Year 2016 (NEFMC 2017), Sections 3.3.3.1 of this document, and in the Amendment 19 EA. All supporting materials, information, data, and analyses within this document have been, to the maximum extent practicable, properly referenced according to commonly accepted standards for scientific literature to ensure transparency. The review process used in preparation of this document involves the responsible Council, the Northeast Fisheries Science Center, the Greater Atlantic Regional Fisheries Office, and NOAA Fisheries Service Headquarters. The Center's technical review is conducted by senior level scientists with specialties in population dynamics, stock assessment methods, population biology, and the social sciences.

The Council review process involves public meetings at which affected stakeholders have opportunity to provide comments on the document. Review by staff at the Regional Office is conducted by those with expertise in fisheries management and policy, habitat conservation, protected species, and compliance with the applicable law. The Council also utilizes its Scientific and Statistical Committee to review the background science and assessment to approve the Overfishing Limits (OFLs) and Allocable Biological Catch (ABCs), including the effects those limits would have on other specifications in this document. The Scientific and Statistical Committee, or SSC, serves as the primary scientific and technical advisory body to the Council and is made up of scientists that are independent of the Council. A list of current committee members can be found at https://www.nefmc.org/committees/scientific-and-statistical-committee.

Final approval of the action proposed in this document and clearance of any rules prepared to implement resulting regulations is conducted by staff at NOAA Fisheries Service Headquarters, the Department of Commerce, and the U.S. Office of Management and Budget. In preparing this action for the NE Multispecies FMP, NMFS, the Administrative Procedure Act, the Paperwork Reduction Act, the Coastal Zone Management Act, the Endangered Species Act, the Marine Mammal Protection Act, the Information Quality Act, and Executive Orders 12630 (Property Rights), 12866 (Regulatory Planning), 13132 (Federalism), and 13158 (Marine Protected Areas). The Council has determined that the proposed action is consistent with the National Standards of the Magnuson-Stevens Act and all other applicable laws.

7.8 Paperwork Reduction Act (PRA)

The Paperwork Reduction Act (PRA) concerns the collection of information. The intent of the PRA is to minimize the Federal paperwork burden for individuals, small businesses, state and local governments, and other persons, as well as to maximize the usefulness of information collected by the Federal government. There are no changes to the existing reporting requirements previously approved under this FMP for vessel permits, dealer reporting, or vessel logbooks. This action does not contain a collection-of-information requirement for purposes of PRA.

7.9 Regulatory Flexibility Act (RFA)

The purpose of the Regulatory Flexibility Analysis (RFA) is to establish a principle of regulatory issuance that agencies shall endeavor, consistent with the objectives of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of businesses, organizations, and governmental jurisdictions subject to regulation. To achieve this principle, agencies are required to solicit and consider flexible regulatory proposals and to explain the rationale for their actions to assure such proposals are given serious consideration. The RFA does not contain any decision criteria; instead the purpose of the RFA is to inform the agency, as well as the public, of the expected economic impacts of various alternatives contained in the FMP or amendment (including framework management measures and other regulatory actions) and to ensure the agency considers alternatives that minimize the expected impacts while meeting the goals and objectives of the FMP and applicable statutes.

With certain exceptions, the RFA requires agencies to conduct an Initial Regulatory Flexibility Analysis (IRFA) for each proposed rule. The IRFA is designed to assess the impacts various regulatory alternatives would have on small entities, including small businesses, and to determine ways to minimize those impacts. An IRFA is conducted to primarily determine whether the proposed action would have a "significant economic impact on a substantial number of small entities." In addition to analyses conducted for the RIR, the IRFA provides:

1) A description of the reasons why action by the agency is being considered;
2) A succinct statement of the objectives of, and legal basis for, the proposed rule;
3) A description and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
4) A description of the projected reporting, record-keeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirements of the report or record; and,
5) An identification, to the extent practicable, of all relevant federal rules, which may duplicate, overlap, or conflict with the proposed rule.

If it is clear that an action would not have adverse or disproportional impacts to small entities, the RFA allows Federal agencies to certify the proposed action(s) as not having a "significant impact on a substantial number of small entities", rather than preparing an IRFA. The agency must then prepare a certification memo to the Small Business Administration (SBA) that documents:

1) A statement of basis and purpose of the rule;
2) A description and estimate of the number of small entities to which the rule applies;
3) A description and estimate of economic impacts on small entities, by entity size and industry;
4) An explanation of the criteria used to evaluate whether the rule would impose significant economic impacts;

5) An explanation of the criteria used to evaluate whether the rule would impose impacts on a substantial number of small entities; and,
6) A description of, and explanation of the basis for, assumptions used.

The decision on whether or not to certify is generally made after the final decision on the preferred alternatives for the action and may be documented at either the proposed rule or the final rule stage.

Description of reasons why action by the agency is being considered

The purpose of the actions and need for management is described in Section ???. Briefly, the purpose of these actions is to set red and silver hake specifications for the 2018-2020 fishing years. The small-mesh multispecies specifications are intended to meet the goals and objectives for this fishery by establishing catch limits that promote sustainable yield and prevent overfishing.

Statement of the objectives of, and legal basis for, the proposed actions

The objective of the preferred alternatives and other alternatives, including No Action, are described in Section ???, as well as in Amendment 19 to the Northeast Multispecies FMP. Amendment 19 established a process and framework for setting annual catch limits (ACLs) and accountability measures (AMs), as required by the 2007 reauthorization of the MSA.

Description and estimate of the number of small entities to which the proposed rule will apply

Small entities include "small businesses," "small organizations," and "small governmental jurisdictions." The Small Business Administration (SBA) has established size standards for all major industry sectors in the U.S., including commercial finfish harvesters (NAICS code 114111), commercial shellfish harvesters (NAICS code 114112), other commercial marine harvesters (NAICS code 114119), for-hire businesses (NAICS code 487210), marinas (NAICS code 713930), seafood dealers/wholesalers (NAICS code 424460), and seafood processors (NAICS code 311710). A business primarily involved in finfish harvesting is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $20.5 million for all its affiliated operations worldwide. For commercial shellfish harvesters, the other qualifiers apply and the receipts threshold is $5.5 million. For other commercial marine harvesters, for-hire businesses, and marinas, the other qualifiers apply and the receipts threshold is $7.5 million. A business primarily involved in seafood processing is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual employment, counting all individuals employed on a full-time, part-time, or other basis not in excess of 500 employees[32] for all its affiliated operations worldwide. For seafood dealers/wholesalers, the other qualifiers apply and the employment threshold is 100 employees. A small organization is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

[32] In determining a concern's number of employees, SBA counts all individuals employed on a full-time, part-time, or other basis. This includes employees obtained from a temporary employee agency, professional employee organization or leasing concern. SBA will consider the totality of the circumstances, including criteria used by the IRS for Federal income tax purposes, in determining whether individuals are employees of a concern. Volunteers (i.e., individuals who receive no compensation, including no in-kind compensation, for work performed) are not considered employees. Where the size standard is number of employees, the method for determining a concern's size includes the following principles: (1) the average number of employees of the concern is used (including the employees of its domestic and foreign affiliates) based upon numbers of employees for each of the pay periods for the preceding completed 12 calendar months; (2) Part-time and temporary employees are counted the same as full-time employees. [*PART 121—SMALL BUSINESS SIZE REGULATIONS §121.106*]

Small governmental jurisdictions are governments of cities, boroughs, counties, towns, townships, villages, school districts, or special districts, with population of fewer than 50,000.

The proposed actions regulate commercial fish harvesting entities engaged in the Northeast multispecies limited access fishery and the small-mesh multispecies fishery. For the purposes of the RFA analysis, the ownership entities, not the individual vessels, are considered as regulated entities.

Ownership entities in regulated commercial harvesting businesses

Individually-permitted vessels may hold permits for several fisheries, harvesting species of fish that are regulated by several different fishery management plans, even beyond those impacted by the proposed actions. Furthermore, multiple permitted vessels and/or permits may be owned by entities affiliated by stock ownership, common management, identity of interest, contractual relationships, or economic dependency. For the purposes of this analysis, ownership entities are defined by those entities with common ownership personnel as listed on permit application documentation. Only permits with identical ownership personnel are categorized as an ownership entity. For example, if five permits have the same seven personnel listed as co-owners on their application paperwork, those seven personnel form one ownership entity, covering those five permits. If one or several of the seven owners also own additional vessels, with sub-sets of the original seven personnel or with new co-owners, those ownership arrangements are deemed to be separate ownership entities for the purpose of this analysis.

Ownership entities are identified on June 1st of each year based on the list of all permit numbers, for the most recent complete calendar year, that have applied for any type of Northeast Federal fishing permit. The current ownership data set is based on calendar year 2013 permits and contains gross sales associated with those permits for calendar years 2011 through 2013. Ownership entities are classified into the categories established by the SBA (primarily finfish, primarily shellfish, or primarily for-hire businesses) based on which activity generated the greatest gross revenue in calendar year 2013. The determination as to whether the entity is large or small is based on the average revenue from 2011 through 2013.

Directly regulated small-mesh multispecies fishing entities

The small-mesh exempted fishery allows vessels to harvest species in designated areas using mesh sizes smaller than the minimum mesh size required by Regulated Mesh Area (RMA) regulations. To participate in the small-mesh multispecies (whiting) exempted fishery, vessels must hold either a limited access multispecies permit (categories A, C, D, E or F) or an open access multispecies permit (category K). Note that a vessel cannot hold more than one of these Northeast multispecies permits at a time, but that a business entity that holds may hold multiple numbers of these permits. The current red hake possession limit at the start of the fishing season is 3,000 lbs. in the northern management area and 5,000 lbs. elsewhere. Initial possession limits for silver and offshore hake combined vary by exemption area, management area (north or south) and mesh size used.

Limited access multispecies permit holders can target small-mesh multispecies with mesh smaller than the minimum regulated mesh size when not fishing under a DAS and while declared out of the fishery using VMS. Limited access multispecies permit holders may land whiting or red hake on any DAS or sector trip, up to the possession limits for vessels using mesh greater than 3-inches specified at §648.86(d)(1)(iii), or the incidental possession limit specified at §648.86(d)(4), if triggered for that stock.

An open access, Category K permit holder may fish for small-mesh multispecies when participating in an exempted fishing program. This category includes all gear types. These permits are required to submit VTRs, but are not subject to VMS requirements. Vessels with open access category K permits are subject to the same possession limits and accountability measures for small-mesh multispecies that limited access permit holders are.

Therefore, entities holding one or more limited access multispecies permits or one or more open access Category K multispecies permits are the entities holding permits that are directly regulated by the proposed action – these are the permits that have the potential to land small-mesh multispecies for commercial sale. These include entities that could not be classified into a business type because they did not earn revenue from landing and selling fish in 2013 and so are considered to be small.

[??? Section to be Updated]

There were 1,087 distinct ownership entities based on calendar year 2013 permits that could potentially target small-mesh multispecies. Of these, 1,069 are categorized as small and 18 are categorized as large entities per the SBA guidelines (see tables below).

Table 100. Description of directly regulated small-mesh multispecies fishing entities by business type and size.

Business Type	Number of entities	Number of small entities
Primarily finfish	383	383
Primarily shellfish	433	415
Primarily for-hire	106	106
Not Classified (no revenue)	165	165
Total Number of Regulated Entities	**1,087**	**1,069**

Table 101. Description of directly regulated small-mesh multispecies fishing entities by gross sales.

Sales category	Number of entities	Number of small entities	Mean gross sales	Median gross sales	Mean permits per entity	Max permits per entity
<$50K	372	372	$ 11,144	$ 1,700	1.23	30
$50-100K	114	114	$ 73,398	$ 73,510	1.18	3
$100-500K	308	308	$ 243,720	$ 224,295	1.49	5
$500K-1mil	121	121	$ 702,378	$ 691,322	1.52	5
$1-5.5mil	154	151	$ 1,953,605	$ 1,599,791	2.10	13
$5.5-20.5mil	15	3	$ 9,851,628	$ 7,405,052	9.53	28
$20.5mil+	3	0	$ 22,115,947	$ 20,622,616	16.67	19

Directly regulated, active small-mesh multispecies fishing entities impacted

While 1,087 commercial entities are directly regulated by the proposed action, not all of these entities land small-mesh multispecies for commercial sale. Commercial entities that do not land small-mesh multispecies for sale, while regulated by the proposed action, will not be impacted by the proposed action. Commercial fishing harvesting entities that land small-mesh multispecies for sale are both directly regulated and possibly impacted by the proposed actions.

To estimate the number of commercial entities that may experience impacts from the proposed action, active small-mesh multispecies entities are defined as those entities containing permits that are directly regulated and that landed any silver hake or red hake in 2013 for commercial sale. These active small-mesh multispecies entities are described in the following three tables, and are a subset of those entities

described in the tables above. There are 298 potentially impacted, directly regulated commercial entities, 295 (99.0%) of which are classified as small entities.

Table 102. Description of potentially impacted, directly regulated active small-mesh multispecies fishing, by business type and size.

Business Type	Number of entities	Number of small entities
Primarily finfish	179	179
Primarily shellfish	80	77
Primarily for-hire	39	39
Total	**298**	**295**

Table 103. Description of potentially impacted, directly regulated, active small-mesh multispecies fishing entities, gross sales.

Sales category	Number of entities	Number of small entities	Mean gross sales	Median gross sales	Mean permits per entity	Max permits per entity
<$50K	37	37	$ 21,758	$ 21,132	1	3
$50-100K	32	32	$ 77,191	$ 79,737	1	2
$100-500K	129	129	$ 265,592	$ 244,317	1	5
$500K-1mil	58	58	$ 707,809	$ 702,582.50	2	4
$1-5.5mil	39	39	$ 1,768,741	$ 1,379,304	2	10
$5.5-20.5mil	4	1	$ 14,054,224	$ 15,076,518	17	28

Table 104. Total number of potentially impacted, directly regulated entities landing small-mesh multispecies by stock area and number classified as small.

Stock	Vessels and entities	Total	Small
Northern Red Hake	Number of business entities	32	32
Northern Silver Hake	Number of business entities	120	119
Southern Red Hake	Number of business entities	151	150
Southern Silver Hake	Number of business entities	123	120

Note: Entities may be landing more than one stock listed in the above table.

Description of the projected reporting, record-keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for the preparation of the report or records

The proposed actions do not introduce any new reporting, record keeping, or other compliance requirements.

Identification of all relevant Federal rules, which may duplicate, overlap or conflict with the proposed rule

The proposed actions do not duplicate, overlap or conflict with any other Federal Rules.

Significance of economic impacts on small entities

Substantial Number Criterion

In colloquial terms, substantial number refers to "more than a few." The vast majority of the regulated entities impacted by this action (99%) are considered small, and therefore preferred alternative will have impacts on a substantial number of small entities.

Significant Economic Impacts

The outcome of "significant economic impact" can be ascertained by examining two factors: disproportionality and profitability. Disproportionality refers to whether or not the regulations place small commercial entities at a significant competitive disadvantage to large commercial entities. Profitability refers to whether or not the regulations significantly reduce profits for a substantial number of small commercial entities.

Description of impacts on small entities

The proposed actions will impact all commercial entities, large and small, harvesting silver or red hake, in both the northern and southern management area. This section estimates impacts to all these entities-large and small; an analysis that was based only on small entities was not possible. However, 295 of 298 (995) of directly regulated commercial entities potentially impacted by the proposed action are small business entities. Small commercial entities are not placed at a significantly competitive disadvantage by either the proposed changes to the ACLs or by the proposed changes to the northern red hake possession limits and in-season accountability measures. All 32 of commercial entities harvesting red hake in the northern management area are small; therefore the preferred possession limit and accountability measures for the stock will not have disproportional impacts on the small entities that harvest northern red hake.

Overall, the net impact on profits from the preferred alternative for the proposed 2018-2020 specifications is expected to be neutral to low positive, compared to the No Action alternative. The preferred alternative is expected to be more effective at reducing the risk of overfishing, thereby increasing the likelihood that the fishery will remain a viable source of fishing revenues for small-mesh multispecies entities in the long term.

Impacts from the proposed actions are summarized separately below for 1) alternatives for the 2018-2020 ACLs for northern and southern stocks of silver and red hake. Detailed discussion of the analyses that estimated the impacts of these alternatives is included in Section ???.

Alternatives for 2018-2020 ACL specifications

Two alternatives are considered and described in detail in Section ???: the preferred alternative (updated specifications) and No Action (no change from the 2016 specifications). While the catch limits for silver hake and red hake in the southern management area are more restrictive in the preferred alternative than in the No Action alternative, the lower limits are not expected to be binding. Landings of southern silver hake and southern red hake in 2016 were well below both the 2016 TAL. The 2016 landings are below the proposed 2018-2020 specifications preferred alternative (see table below), but southern red hake landings would exceed the TAL trigger by a minor amount. Therefore, impact on profitability from the preferred alternative, which lowers the ACLs for the southern whiting and red hake stocks, is expected to be neutral, relative to the No Action alternative.

The specifications proposed by the preferred alternative for both red hake and silver hake in the northern management area are less restrictive than those under the No Action alternative. The less restrictive TAL proposed by the preferred alternative can be expected to have neutral or low positive impacts on profit relative to the TAL under the No Action alternative, depending on market conditions (whether the market price for these species remains constant or changes, which partially depends on the elasticity of demand for these species). Assuming that demand for these species is highly elastic and market price for these species remains constant, the ability to land additional amounts of stocks in the northern area would be expected to have a low positive, but likely small, impact on profitability, relative to the No Action alternative.

Overall, the expected impact from the proposed changes to the ACL specifications is neutral to low positive, relative to the no-action alternative.

Table 105. Landings of small-mesh multispecies stocks in fishing year 2016 compared to Total Annual Landings (TAL) limits for 2016 and those proposed for 2018-2020.

Stock	2016 Landings (mt)	2016 TAL (mt)	Proposed annual TAL (mt)	Percent change in annual TAL
Northern silver hake	3,085	19,949	26,604	+33%
Northern red hake	162	120	274	+128%
Southern whiting	3,843	23,833	14,465	-39%
Southern red hake	332	746	305	-59%

7.10 Regulatory Impact Review

Introduction

Executive Order 12866 requires a Regulatory Impact Review (RIR) in order to enhance planning and coordination with respect to new and existing regulations. This Executive Order requires the Office of Management and Budget (OMB) to review regulatory programs that are considered to be "significant."

A "significant" regulatory action for E.O. 12866 purposes is one that may:

1. Have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy, a sector of the economy, productivity, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Section 6.0 assesses of the costs and benefits of the proposed actions. The analysis included in this RIR and the IRFA above further demonstrates that the proposed actions are not "significant" because they will not have an annual effect on the economy of $100 million or more, or adversely affect in a material way the economy or a sector of the economy, productivity, jobs, the environment, public health, or safety, or State, local, or tribal governments or communities.

Objectives

The objectives of the Northeast Multispecies FMP, as they relate to small-mesh multispecies, are to manage fisheries catching red, silver, and offshore hake that maintain stock size at levels capable of sustaining MSY on a continuing basis. In addition to existing restrictions on fishing through exemption areas and seasons to minimize groundfish bycatch, other measures are intended to optimize size selectivity and keep landings from temporarily flooding limited market demand. These measures include red and silver hake possession limits. The silver hake possession limits are higher when a vessel uses large mesh, providing an incentive to avoid catching juvenile or small silver hake. Amendment 19 established and specified catch and landings limits which are deemed to be sustainable, including accountability measures which either reduce the risk that catches will exceed the ACL or to account for those overages in later seasons if they do occur.

Consistent with these objectives, this action seeks to update the catch limits, based on the best scientific information available, without increasing the probability of overfishing. There should be no adverse impacts on yield, management compatibility, or enforcement.

Affected Entities

Entities affected by this action are entities that fish for small-mesh multispecies, and therefore may be affected by a change in the ACLs for these species or a change in the possession limits and accountability measures for these species. The primary entities affected by this regulation are commercial fishing entities that target small-mesh multispecies. Some fishing entities may possess small-mesh multispecies for use as bait. However, these entities are not expected to be negatively impacted by the proposed actions. Recreational fishermen generally do not target small-mesh multispecies, and are not expected to be impacted the proposed action. Consumers of these species are not expected to be adversely affected by the proposed actions.

The number of affected entities was estimated by the number of entities that had trips that landed any amount of red or silver hake in 2013. These entities are described in the following three tables:

Table 106. Description of affected entities by business type.

Business Type	Number of entities
Primarily finfish	208
Primarily shellfish	95
Primarily for-hire	128

Not Classified (no revenue)	3
Total Number of Regulated Entities	**434**

Table 107. Description of affected entities by gross sales.

Sales category	Number of entities	Mean gross sales	Median gross sales	Mean permits per entity	Max permits per entity
<$50K	85	$ 18,722	$ 14,569	1.12	3
$50-100K	55	$ 76,104	$ 76,264	1.16	4
$100-500K	170	$ 264,565	$ 241,921	1.41	5
$500K-1mil	72	$ 698,048	$ 694,213	1.53	4
$1-5.5mil	48	$ 1,701,401	$ 1,358,191	2.27	10
$5.5-20.5mil	4	$ 14,054,224	$ 15,076,518	16.5	28

Table 108. Total number of entities landing small-mesh multispecies by stock area and number classified as small.

Stock	Vessels and entities	Total
Northern Red Hake	Number of business entities	41
Northern Silver Hake	Number of business entities	143
Southern Red Hake	Number of business entities	246
Southern Silver Hake	Number of business entities	146

Note: Entities may be landing more than one stock listed in the table above.

Problem statement

The purpose of the measures proposed in this action is set forth in Section 3.1.

Analysis of alternatives

Executive Order 12866 mandates that proposed measures be analyzed below in terms of:

1) Changes in net benefits and costs to stakeholders,
2) Changes to the distribution of benefits and costs within the industry,
3) Changes in income and employment,
4) Cumulative impacts of the regulation, and
5) Changes in other social concerns.

The preferred alternative for the proposed 2015-207 ACLs specifications is expected to result in neutral to low positive impacts to entities that land small-mesh multispecies for commercial sale. There are no expected negative impacts to entities related to commercial harvest of small-mesh multispecies (e.g. dealers, fishing gears suppliers) from the preferred alternative, relative to the no-action alternative.

The preferred alternative for the northern red hake possession limits and accountability measures is estimated to result in low positive impacts to affected entities. Compared to the no-action alternative, it is estimated that fewer trips that land northern red hake will have reduced northern red catch and revenue from landings. In addition, predicted revenues from landing northern red hake are higher under the preferred alternative than they are under the No Action alternative (Section 4.1). The non-preferred action alternative may yield higher landings and revenues in the short term, but it is not preferred because of the need to minimize the risk of exceeding the TAL from northern red hake, as occurred in 2012 and 2013. Finally, the preferred alternative for the northern red hake possession limits and accountability measures is expected to minimize the risk of exceeding the ACL and may yield positive long term benefits by maintaining a sustainable fishery for those entities that land small-mesh multispecies.

There are no expected substantial distributional issues, and neutral to low positive expected impacts on income and employment related to slightly increased fishing opportunities. The cumulative impacts of management and regulations are not expected to change from those described in the underlying 2015-2017 Specifications Environmental Assessment (EA) in this document and in the Environmental Impact Statement for Amendment 19 (NEMFC 2013). There are no other expected social concerns.

Determination of Executive Order 12866 significance

The proposed actions are not expected to have any adverse impact on fishing vessels, purchasers of seafood products, ports, recreational anglers, and operators of party/charter businesses. The proposed actions are expected to have neutral to low positive, but not significant, impacts for commercial fishermen and associated businesses. In addition, there should be no interactions with activities of other agencies and no impacts on entitlements, grants, user fees, or loan programs. The proposed actions are also similar to specification adjustments in this or other NEFMC-managed fisheries, and as such do not raise novel legal or policy issues. As such, the proposed actions are not considered significant as defined by Executive Order 12866.

8.0 GLOSSARY

ABC – "Acceptable biological catch" means a level of a stock or stock complex's annual catch that accounts for the scientific uncertainty in the estimate of OFL.

ACL – "Annual catch limit" is the level of annual catch of a stock or stock complex that serves as the basis for invoking accountability measures (AMs).

Adult stage – One of several marked phases or periods in the development and growth of many animals. In vertebrates, the life history stage where the animal is capable of reproducing, as opposed to the juvenile stage.

Adverse effect – Any impact that reduces quality and/or quantity of EFH. May include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include sites-specific of habitat wide impacts, including individual, cumulative, or synergistic consequences of actions.

Aggregation – A group of animals or plants occurring together in a particular location or region.

AMs – "Accountability measures" are management controls that prevents ACLs or sector ACLs from being exceeded, where possible, and correct or mitigate overages if they occur.

Amendment – a formal change to a fishery management plan (FMP). The Council prepares amendments and submits them to the Secretary of Commerce for review and approval. The Council may also change FMPs through a "framework adjustment procedure".

Availability – refers to the distribution of fish of different ages or sizes relative to that taken in the fishery.

Benthic community – Benthic means the bottom habitat of the ocean, and can mean anything as shallow as a salt marsh or the intertidal zone, to areas of the bottom that are several miles deep in the ocean. Benthic community refers to those organisms that live in and on the bottom.

Biological Reference Points – specific values for the variables that describe the state of a fishery system which are used to evaluate its status. Reference points are most often specified in terms of fishing mortality rate and/or spawning stock biomass.

Biomass – The total mass of living matter in a given unit area or the weight of a fish stock or portion thereof. Biomass can be listed for beginning of year (Jan-1), Mid-Year, or mean (average during the entire year). In addition, biomass can be listed by age group (numbers at age * average weight at age) or summarized by groupings (e.g., age 1+, ages 4+ 5). See also spawning stock biomass, exploitable biomass, and mean biomass.

Biota – All the plant and animal life of a particular region.

Bivalve – A class of mollusks having a soft body with platelike gills enclosed within two shells hinged together; e.g., clams, mussels.

Bottom tending mobile gear – All fishing gear that operates on or near the ocean bottom that is actively worked in order to capture fish or other marine species. Some examples of bottom tending mobile gear are otter trawls and dredges.

Bottom tending static gear – All fishing gear that operates on or near the ocean bottom that is not actively worked; instead, the effectiveness of this gear depends on species moving to the gear

which is set in a particular manner by a vessel, and later retrieved. Some examples of bottom tending static gear are gillnets, traps, and pots.

B_{MSY} – the stock biomass that would produce maximum sustainable yield (MSY) when fished at a level equal to F_{MSY}. For most stocks, B_{MSY} is about ½ of the carrying capacity.

Bycatch– (v.) the capture of non-target species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program; target species in directed fisheries which occurs because fishing gear and methods are not selective enough to catch only target species; (n.) fish which are harvested in a fishery but are not sold or kept for personal use, including economic discards and regulatory discards but not fish released alive under a recreational catch and release fishery management program.

Capacity – the level of output a fishing fleet is able to produce given specified conditions and constraints. Maximum fishing capacity results when all fishing capital is applied over the maximum amount of available (or permitted) fishing time, assuming that all variable inputs are utilized efficiently.

Catch – The sum total of fish killed in a fishery in a given period. Catch is given in either weight or number of fish and may include landings, unreported landings, discards, and incidental deaths.

Coarse sediment – Sediment generally of the sand and gravel classes; not sediment composed primarily of mud; but the meaning depends on the context, e.g. within the mud class, silt is coarser than clay.

Continental shelf waters – The waters overlying the continental shelf, which extends seaward from the shoreline and deepens gradually to the point where the sea floor begins a slightly steeper descent to the deep ocean floor; the depth of the shelf edge varies, but is approximately 200 meters in many regions.

Council – New England Fishery Management Council (NEFMC).

CPUE – Catch per unit effort. This measure includes landings and discards (live and dead), often expressed per hour of fishing time, per day fished, or per day-at-sea.

DAS – A day-at-sea is an allocation of time that a vessel may be at-sea on a fishing trip. For vessels with VMS equipment, it is the cumulative time that a vessel is seaward of the VMS demarcation line. For vessels without VMS equipment, it is the cumulative time between when a fisherman calls in to leave port to the time that the fisherman calls in to report that the vessel has returned to port.

Demersal species – Most often refers to fish that live on or near the ocean bottom. They are often called benthic fish, groundfish, or bottom fish.

Discards – animals returned to sea after being caught; see Bycatch (n.)

Environmental Assessment (EA) – an analysis of the expected impacts of a fishery management plan (or some other proposed federal action) on the environment and on people, initially prepared as a "Draft" (DEA) for public comment. The Final EA is referred to as the Final Environmental Assessment (FEA).

Essential Fish Habitat – Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. The EFH designation for most managed species in this region is based on a legal text definition and geographical area that are described in the Habitat Omnibus Amendment (1998).Those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to

maturity. The EFH designation for most managed species in this region is based on a legal text definition and geographical area that are described in the Habitat Omnibus Amendment (1998).

Exclusive Economic Zone (EEZ) – for the purposes of the Magnuson-Stevens Fishery Conservation and Management Act, the area from the seaward boundary of each of the coastal states to 200 nautical miles from the baseline.

Exempted fisheries – Any fishery determined by the Regional Director to have less than 5 percent regulated species as a bycatch (by weight) of total catch according to 50 CFR 648.80(a)(7).

Exploitation Rate – the percentage of catchable fish killed by fishing every year. If a fish stock has 1,000,000 fish large enough to be caught by fishing gear and 550,000 are killed by fishing during the year, the annual exploitation rate is 55%.

Fathom – A measure of length, containing six feet; the space to which a man can extend his arms; used chiefly in measuring cables, cordage, and the depth of navigable water by soundings.

Final preferred alternative – The management alternative chosen by the Council in the final amendment, submitted to the Secretary of Commerce for approval and if approved publication as a proposed rule.

Fishing effort – the amount of time and fishing power used to harvest fish. Fishing power is a function of gear size, boat size and horsepower.

Fishing Mortality (F) – (see also exploitation rate) a measurement of the rate of removal of fish from a population by fishing. F is that rate at which fish are harvested at any given point in time. ("Exploitation rate" is an annual rate of removal, "F" is an instantaneous rate.)

F_{MSY} – a fishing mortality rate that would produce the maximum sustainable yield from a stock when the stock biomass is at a level capable of producing MSY on a continuing basis.

F_{MAX} – the fishing mortality rate that produces the maximum level of yield per recruit. This is the point beyond which growth overfishing begins.

FMP (Fishery Management Plan) – a document that describes a fishery and establishes measures to manage it. This document forms the basis for federal regulations for fisheries managed under the regional Fishery Management Councils. The New England Fishery Management Council prepares FMPs and submits them to the Secretary of Commerce for approval and implementation.

Framework adjustments: adjustments within a range of measures previously specified in a fishery management plan (FMP). A change usually can be made more quickly and easily by a framework adjustment than through an amendment. For plans developed by the New England Council, the procedure requires at least two Council meetings including at least one public hearing and an evaluation of environmental impacts not already analyzed as part of the FMP.

$F_{threshold}$ – 1) The maximum fishing mortality rate allowed on a stock and used to define overfishing for status determination. 2) The maximum fishing mortality rate allowed for a given biomass as defined by a control rule.

Growth Overfishing – the situation existing when the rate of fishing mortality is above F_{MAX} and then the loss in fish weight due to mortality exceeds the gain in fish weight due to growth.

Individual Fishing Quota (IFQ) – A Federal permit under a limited access system to harvest a quantity of fish, expressed by a unit or units representing a percentage of the total allowable catch of a fishery that may be received or held for exclusive use by an individual person or entity

Landings – The portion of the catch that is harvested for personal use or sold.

Larvae (or Larval) stage – One of several marked phases or periods in the development and growth of many animals. The first stage of development after hatching from the egg for many fish and invertebrates. This life stage looks fundamentally different than the juvenile and adult stages, and is incapable of reproduction; it must undergo metamorphosis into the juvenile or adult shape or form.

Limited Access – a management system that limits the number of participants in a fishery. Usually, qualification for this system is based on historic participation, and the participants remain constant over time (with the exception of attrition).

Limited-access permit – A permit issued to vessels that met certain qualification criteria by a specified date (the "control date").

LPUE – Landings per unit effort. This measure is the same as CPUE, but excludes discards.

Maximum Sustainable Yield (MSY) – the largest average catch that can be taken from a stock under existing environmental conditions.

Mesh selectivity (ogive) – A mathematical model used to describe the selectivity of a mesh size (proportion of fish at a specific length retained by mesh) for the entire population. L25 is the length where 25% of the fish encountered are retained by the mesh. L50 is the length where 50% of the fish encountered are retained by the mesh.

Meter – A measure of length, equal to 39.37 English inches, the standard of linear measure in the metric system of weights and measures. It was intended to be, and is very nearly, the ten millionth part of the distance from the equator to the North Pole, as ascertained by actual measurement of an arc of a meridian.

Metric ton – A unit of weight equal to a thousand kilograms (1kgs = 2.2 lbs.). A metric ton is equivalent to 2,204.6 lbs. A thousand metric tons is equivalent to 2.204 million lbs.

Minimum Biomass Level – the minimum stock size (or biomass) below which there is a significantly lower chance that the stock will produce enough new fish to sustain itself over the long-term.

Mortality – Noun, either referring to fishing mortality (F) or total mortality (Z).

Multispecies – the group of species managed under the Northeast Multispecies Fishery Management Plan. This group includes whiting, red hake and ocean pout plus the regulated species (cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish).

Natural Mortality (M) – a measurement of the rate of fish deaths from all causes other than fishing such as predation, cannibalism, disease, starvation, and pollution; the rate of natural mortality may vary from species to species.

Non-preferred alternative - All alternatives in the final amendment that were not chosen as a "final preferred alternative" are by definition non-preferred alternatives.

Northeast Shelf Ecosystem – The Northeast U.S. Shelf Ecosystem has been described as including the area from the Gulf of Maine south to Cape Hatteras, extending from the coast seaward to the edge of the continental shelf, including the slope sea offshore to the Gulf Stream.

Northern stock area – for red and silver hake, fish are assumed to be in the southern stock area when the catches originate from fishing in statistical areas 464 to 515, or area 561. See map at http://www.nero.noaa.gov/nero/fishermen/charts/stat1.html.

Observer – Any person required or authorized to be carried on a vessel for conservation and management purposes by regulations or permits under this Act

OFL – "Overfishing limit" means the annual amount of catch that corresponds to the estimate of the maximum fishing mortality threshold applied to a stock or stock complex's abundance and is expressed in terms of numbers or weight of fish.

Open access – Describes a fishery or permit for which there is no qualification criteria to participate. Open-access permits may be issued with restrictions on fishing (for example, the type of gear that may be used or the amount of fish that may be caught).

Optimum Yield (OY) – the amount of fish which-

(a) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;

(b) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and

(c) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Overfished – A conditioned defined when stock biomass is below minimum biomass threshold and the probability of successful spawning production is low.

Overfishing – A level or rate of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis.

PDT (Plan Development Team) – a group of technical experts responsible for developing and analyzing management measures under the direction of the Council; the Council has a Whiting PDT that meets to discuss the development of this FMP.

Preferred alternative – An alternative that was favored by the Council in the draft amendment document and DEA based on analysis available at that time and based on input from the Whiting Advisory Panel.

Proposed Rule – a federal regulation is often published in the Federal Register as a proposed rule with a time period for public comment. After the comment period closes, the proposed regulation may be changed or withdrawn before it is published as a final rule, along with its date of implementation and response to comments.

Rebuilding Plan – a plan designed to increase stock biomass to the B_{MSY} level within no more than ten years (or 10 years plus one mean generation period) when a stock has been declared overfished.

Recruitment overfishing – fishing at an exploitation rate that reduces the population biomass to a point where recruitment is substantially reduced.

Recruitment – the amount of fish added to the fishery each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to fishing gear in

one year would be the recruitment to the fishery. "Recruitment" also refers to new yearclasses entering the population (prior to recruiting to the fishery).

Regulated groundfish species – cod, haddock, pollock, yellowtail flounder, winter flounder, witch flounder, American plaice, windowpane flounder, white hake and redfish. These species are usually targeted with large-mesh net gear.

Relative exploitation – an index of exploitation derived by dividing landings by trawl survey biomass. This variable does not provide an estimate of the proportion of removals from the stock due to fishing, but allows for general statements about trends in exploitation.

Sediment – Material deposited by water, wind, or glaciers.

Small-mesh multispecies – red hake, silver hake, and offshore hake

Small-mesh trawls – specified trawls that are exempt from large-mesh fishery regulations pertaining to trawl with cod end mesh greater than 5.5 or 6 inches square or diamond.

Southern stock area – for red and silver hake, fish are assumed to be in the southern stock area when the catches originate from fishing in statistical areas 521 to 543, area 562, or areas 611 to 639. See map at http://www.nero.noaa.gov/nero/fishermen/charts/stat1.html.

Spawning stock biomass (SSB) – the total weight of fish in a stock that sexually mature, i.e., are old enough to reproduce.

Status Determination Criteria – objective and measurable criteria used to determine if overfishing is occurring or if a stock is in an overfished condition according to the National Standard Guidelines.

Stock assessment – An analysis for determining the number (abundance/biomass) and status (life-history characteristics, including age distribution, natural mortality rate, age at maturity, fecundity as a function of age) of individuals in a stock

Stock – A grouping of fish usually based on genetic relationship, geographic distribution and movement patterns. A region may have more than one stock of a species (for example, Gulf of Maine cod and Georges Bank cod). A species, subspecies, geographical grouping, or other category of fish capable of management as a unit.

Surplus production models – A family of analytical models used to describe stock dynamics based on catch in weight and CPUE time series (fishery dependent or survey) to construct stock biomass history. These models do not require catch at age information. Model outputs may include trends in stock biomass, biomass weighted fishing mortality rates, MSY, FMSY, BMSY, K, (maximum population biomass where stock growth and natural deaths are balanced) and r (intrinsic rate of increase).

Surplus production – Production of new stock biomass defined by recruitment plus somatic growth minus biomass loss due to natural deaths. The rate of surplus production is directly proportional to stock biomass and its relative distance from the maximum stock size at carrying capacity (K). BMSY is often defined as the biomass that maximizes surplus production rate.

Survival rate (S) – Rate of survival expressed as the fraction of a cohort surviving the a period compared to number alive at the beginning of the period (# survivors at the end of the year / numbers alive at the beginning of the year). Pessimists convert survival rates into annual total mortality rate using the relationship A=1-S.

Survival ratio (R/SSB) – an index of the survivability from egg to age-of-recruitment. Declining ratios suggest that the survival rate from egg to age-of-recruitment is declining.

TAL – Total allowable landings, which for whiting management is equivalent to the ACL minus the dead discard rate. The Federal TAL pertains to landings taken by Federally permitted vessels and excludes landings made by vessel with no Federal permits that fish in state waters

Ten-minute- "squares" of latitude and longitude (TMS) – A measure of geographic space. The actual size of a ten-minute-square varies depending on where it is on the surface of the earth, but in general each square is approximately 70-80 square nautical miles at 40° of latitude. This is the spatial area that EFH designations, biomass data, and some of the effort data have been classified or grouped for analysis.

Total mortality – The rate of mortality from all sources (fishing, natural, pollution) Total mortality can be expressed as an instantaneous rate (called Z and equal to F + M) or Annual rate (called A and calculated as the ratio of total deaths in a year divided by number alive at the beginning of the year)

Yearclass (or cohort) – Fish that were spawned in the same year. By convention, the "birth date" is set to January 1st and a fish must experience a summer before turning 1. For example, winter flounder that were spawned in February-April 1997 are all part of the 1997 cohort (or year-class). They would be considered age 0 in 1997, age 1 in 1998, etc. A summer flounder spawned in October 1997 would have its birth date set to the following January 1 and would be considered age 0 in 1998, age 1 in 1999, etc.

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??? Needs work - Complete before document submission

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10.0 INDEX

11.0 Appendix I: Bycatch Analysis

Observer (sea sampling; NE Fisheries Observer Program) and At-Sea Monitoring data were analyzed for trends in and differences between bycatch rates of 20 species commonly caught in the small-mesh multispecies fishery. These species include (from most to least amounts) silver hake, red hake, haddock, winter skate, spiny dogfish, butterfish, little skate, barndoor skate, Atlantic herring, monkfish, summer flounder, yellowtail flounder, witch flounder, winter flounder, ocean pout, American plaice, cod, windowpane flounder, smooth skate, and thorny skate. Trips in the data set included only those using small-mesh otter trawls (SBRM fleets 5 and 7) that landed at least 2000 lbs. of whiting or 400 lbs. of red hake, large-mesh otter trawls (SBRM fleets 6 and 8), haddock separator trawls (SBRM fleet 18), shrimp trawls (SBRM fleet 19), sink, anchor, and drift gillnets (SBRM fleet 27), purse seine (SBRM fleet 30), and mid-water paired and single trawls (SBRM fleet 42).

These observed trips were sampled from the fishery that would be affected by proposed alternatives in Amendment 22 and therefore the bycatch estimates will vary from those estimated for SBRM fleets 5 and 7 which were analyzed for a greater range of target species using small-mesh trawls using the trip as the basic sampling unit. In addition, the data were stratified based on small-mesh multispecies management units which do not correspond exactly with the New England and Mid-Atlantic stratification that was applied for SBRM-based estimation. As with other discard estimators for assessments, the data were stratified by calendar quarter.

An added layer of post-stratification, i.e. qualification for a Category I and II, was also applied to evaluate whether qualifying vessels in either category have different bycatch rates between them and from vessels that are not expected to qualify for a limited access permit. Some qualification classes, particularly non-qualifiers, were not present in the observed haul data because no trips by such vessels were observed for a specific management area/qualification status qualification, particularly for non-qualifiers.

Trends in bycatch rates were compiled and plotted from 1989 to 2016, but significant differences were examined by gear and qualification status (for each of five qualification alternatives) for observed hauls during 2014-2016. The haul was treated as the sampling frame (trips are used to estimate discards in assessments) and hauls with no catch for a species were assigned a 'zero' such that standard statistical treatment could be applied to estimate standard deviations, variances, and coefficients of variation. Control variables included small-mesh multispecies management area (north or south) and quarter. This post-stratification and treatment differs from that used for estimating total discards in assessments, but has many similarities in that the statistic of interest is the biomass of discards divided by the biomass of kept fish (aka "D/Kall"). Because this analysis retains the variation in catch rates between hauls made on a trip and includes zero catches when a species was not observed, the total variance is likewise likely to be higher but the number of observations will be higher (hauls vs. trips sampled) than that calculated to estimate total discards. All observed hauls in SBRM fleets 5 and 7 were included in the data set, even hauls with no catch.

The Plan Development Team (PDT) first visually examined box plots of the data summarized in Table 109 to evaluate trends and outliers. Total D/Kall ratios by haul for the 20 most common discarded species were plotted by whiting management area, quarter, and gear, showing the median, 95% confidence interval and interquartile range. The ratio data were $\log_{10}$ transformed due to the highly skewed ratios.

In the northern management area (Table 109), most observed hauls occurred during quarters 3 and 4, when the exemption areas are open to fishing with small-mesh trawls. Total discards for small-mesh

trawls trips (SBRM fleet 7) averaged 0.786±2.832 pounds per pound of landings in quarter 3 on 398 observed hauls and 0.734±1.128 pounds per pound of landing in quarter 4 on 113 observed hauls.

In the southern management area (Table 109), small-mesh trawls trips occur during the winter and spring along the southern edge of Georges Bank (SBRM fleet 7) and in the Mid-Atlantic primarily during all year (SBRM fleet 5). The total bycatch rate for Fleet 7 trips in the southern management area ranged were 2.718±4.143 in quarter 1 on 65 observed hauls and 1.157±1.737 in quarter 2 on 94 observed hauls. In the Mid-Atlantic (Fleet 5), the total bycatch rate was 1.578±1.793 in quarter 1 on 142 observed hauls, 1.578±6.648 in quarter 2 on 138 observed hauls, 1.156±1.796 in quarter 3 on 124 observed hauls, 1.456±3.919 in quarter 4 on 172 observed hauls.

Table 109. Discard to kept ratio (D/Kall) statistics (average and standard deviation) and number of sampled hauls for trips fishing with otter trawls and other gears on trips landing greater than or equal to 2000 lbs. of whiting or 400 lbs. of red hake.

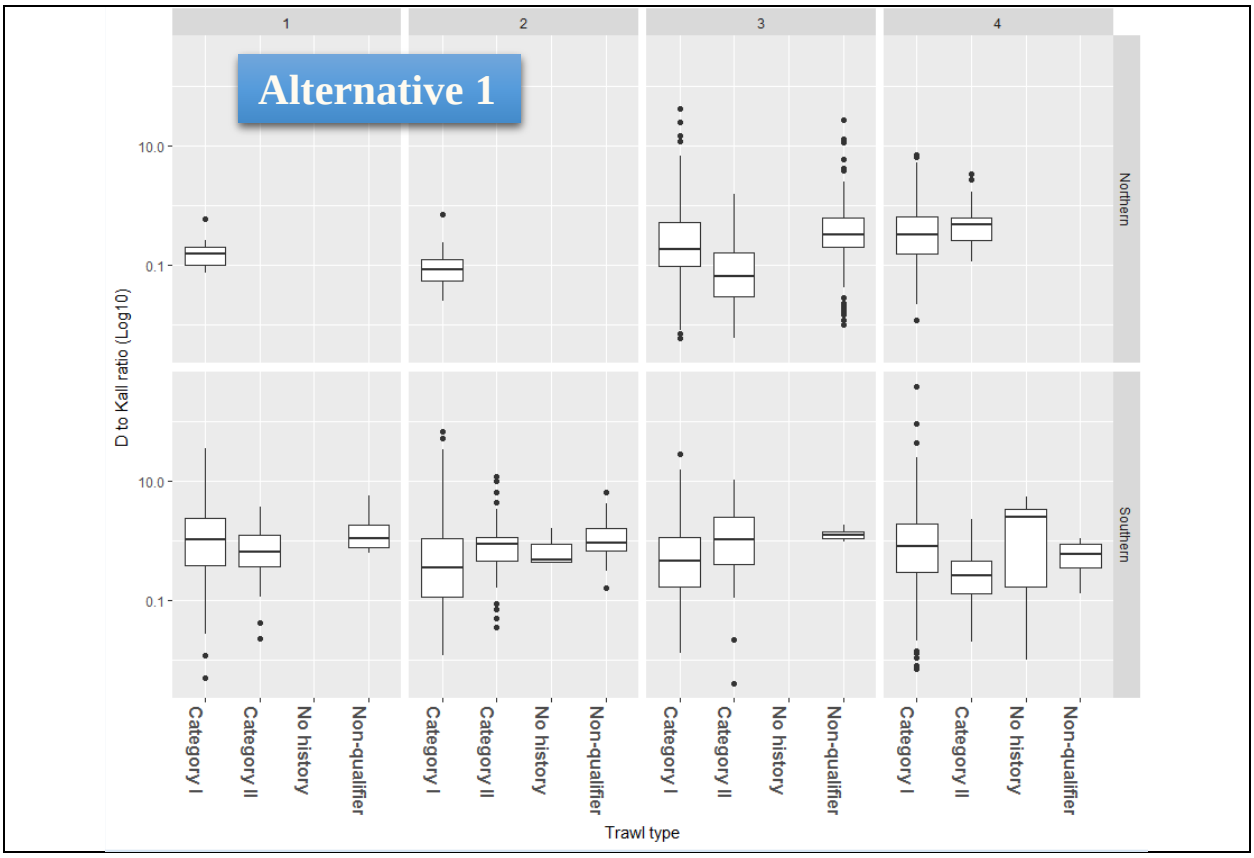
QTR	SBRM_FLEE	MESH_GROU	GEAR_TYPE	MGMT_AR Values Northern			Southern			Total Hauls	Total Ave D/I	Total Stddev
				Hauls	Ave D/Kall	Stddev	Hauls	Ave D/Kall	Stddev			
1	5	sm	Otter Trawl				65	2.718	4.143	65	2.718	4.143
	6	lg	Otter Trawl				12	1.331	1.006	12	1.331	1.006
		unk	Otter Trawl				18	0.577	0.610	18	0.577	0.610
	7	sm	Otter Trawl	7	0.205	0.181	142	1.578	1.793	149	1.514	1.775
	8	lg	Otter Trawl	58	1.036	2.009	41	1.735	1.966	99	1.326	2.011
1 Total				65	0.947	1.915	278	1.792	2.560	343	1.632	2.471
2	5	sm	Otter Trawl				94	1.157	1.737	94	1.157	1.737
	6	lg	Otter Trawl				34	1.843	2.194	34	1.843	2.194
	7	sm	Otter Trawl				138	1.423	6.648	138	1.423	6.648
	8	lg	Otter Trawl	77	0.363	0.499	19	4.493	4.286	96	1.180	2.533
		unk	Otter Trawl				1	0.157		1	0.157	
	18	lg	Otter Trawl, Haddock Separator	2	0.805	0.459				2	0.805	0.459
	19	lg	Shrimp Trawl				7	1.374	0.435	7	1.374	0.435
		sm	Shrimp Trawl				11	0.574	0.288	11	0.574	0.288
	27	lg	Sink, Anchor, Drift Gillnet	18	0.541	0.413				18	0.541	0.413
	42	unk	Mid-water Paired and Single Trawl	3	0.000	0.001				3	0.000	0.001
2 Total				100	0.393	0.485	304	1.544	4.815	404	1.259	4.211
3	5	sm	Otter Trawl				38	0.505	0.346	38	0.505	0.346
	6	unk	Otter Trawl				6	0.681	0.339	6	0.681	0.339
	7	sm	Otter Trawl	398	0.786	2.832	124	1.156	1.796	522	0.874	2.626
	8	lg	Otter Trawl	110	0.187	0.265	38	4.261	11.714	148	1.233	6.147
		unk	Otter Trawl	23	0.808	0.995	9	0.639	0.591	32	0.760	0.894
	19	lg	Otter Trawl				8	1.699	0.685	8	1.699	0.685
	30	unk	Purse Seine	4	0.001	0.001				4	0.001	0.001
	42	unk	Mid-water Paired and Single Trawl	46	0.060	0.404				46	0.060	0.404
3 Total				581	0.611	2.374	223	1.560	5.128	804	0.874	3.394
4	5	sm	Otter Trawl				24	1.119	1.166	24	1.119	1.166
	7	sm	Otter Trawl	113	0.734	1.128	172	1.456	3.919	285	1.170	3.142
	8	lg	Otter Trawl	59	0.301	0.409	38	2.319	2.527	97	1.092	1.882
		unk	Otter Trawl	23	0.427	0.703	2	0.216	0.146	25	0.410	0.676
	42	unk	Mid-water Paired and Single Trawl	10	0.153	0.473				10	0.153	0.473
4 Total				205	0.546	0.925	236	1.550	3.528	441	1.084	2.701
Grand Total				**951**	**0.597**	**1.977**	**1041**	**1.615**	**4.115**	**1992**	**1.129**	**3.312**

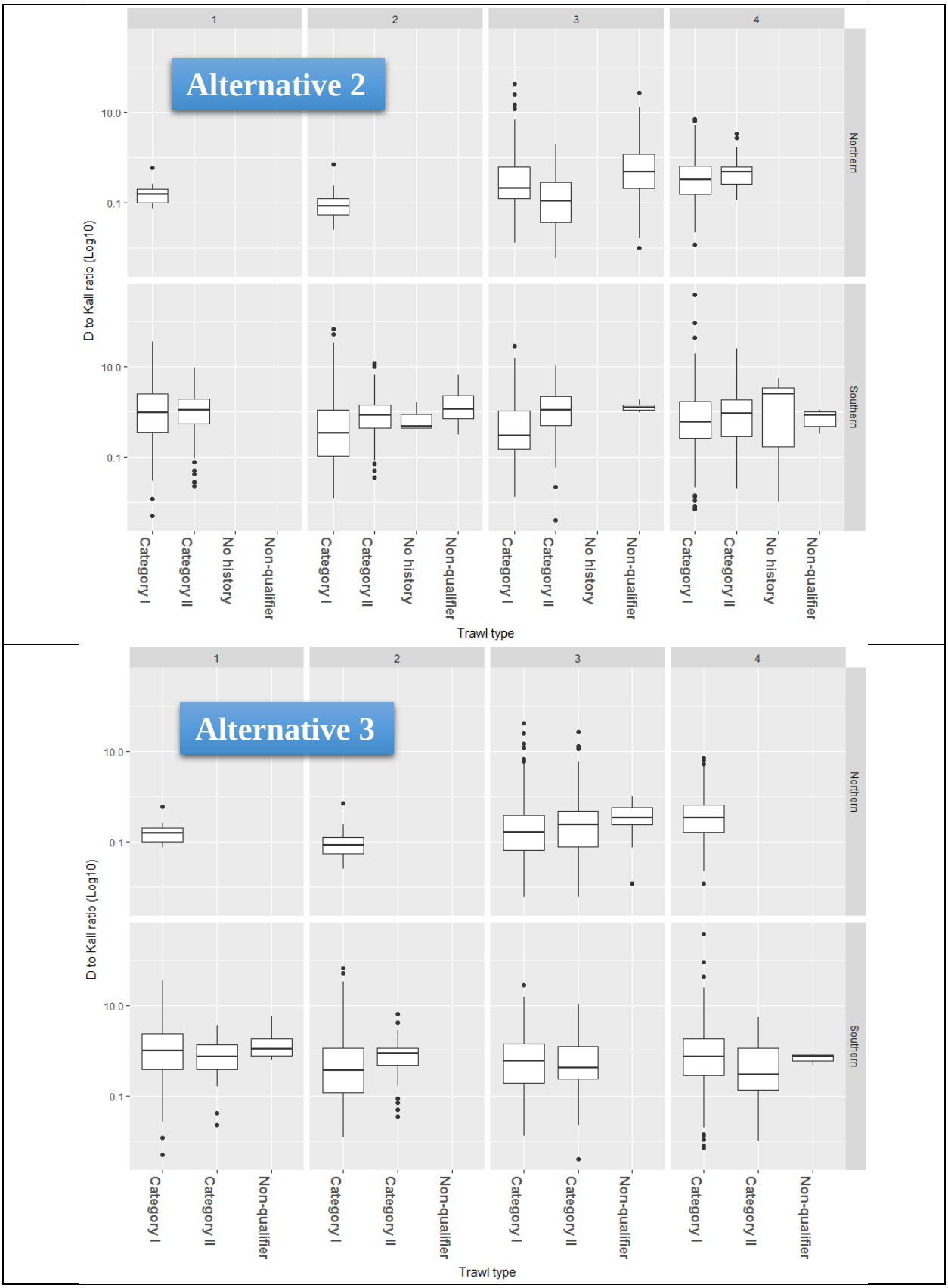
11.1 Bycatch rates by qualification status

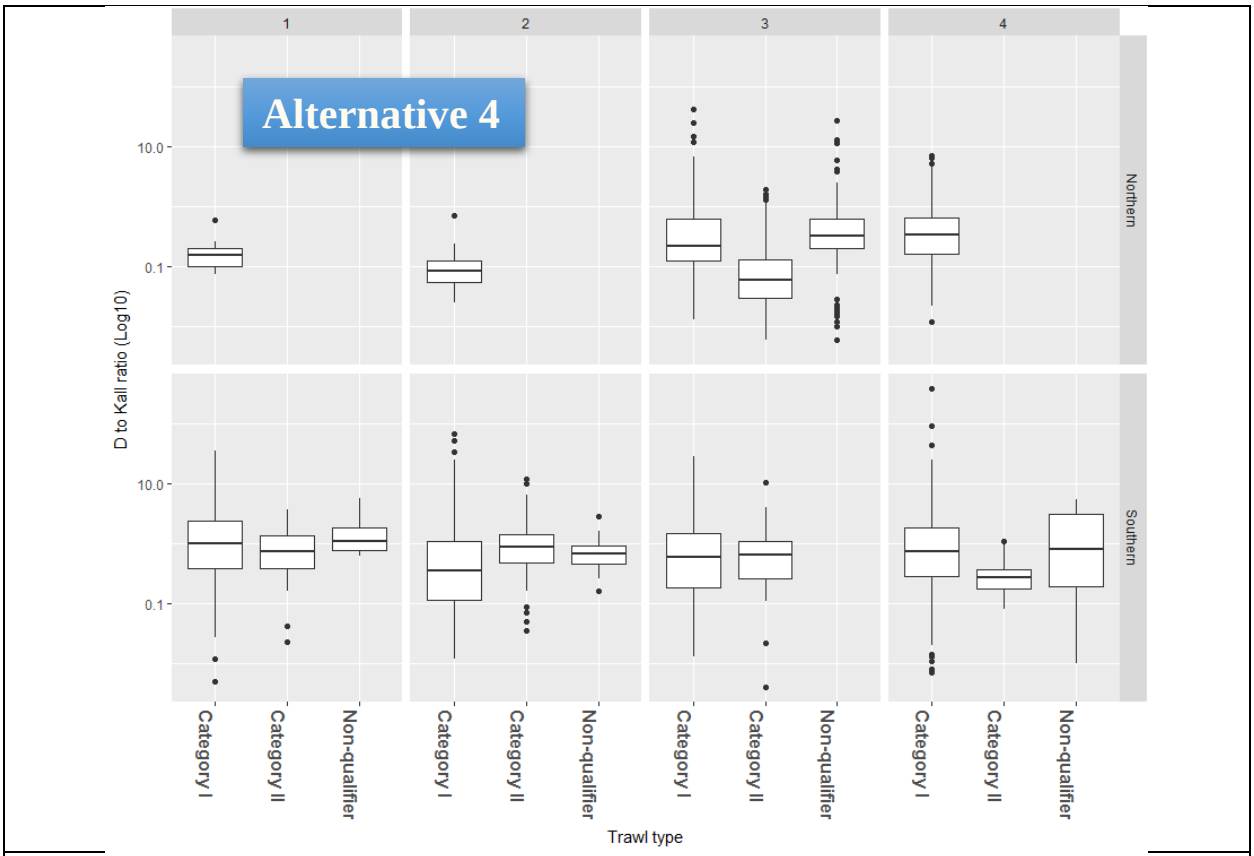
The PDT also examined total bycatch rates by alternative and potential qualification status on trips landing greater than or equal to 2000 lbs. of whiting or 400 lbs. of red hake (see Figure 54). For each alternative, vessels with permits or MRIs were classified according to whether the permit or MRI history exceeded the qualification threshold for Category I or Category II, did not have landings that exceeded the Category II threshold (and would not qualify), or had no whiting or red hake landings during the applicable qualification period.

Except for the northern management area in quarter 3, the total bycatch rates did not appear to vary by qualification status. In quarter 3, the total bycatch rates of vessels qualifying for a Category II permit in alternatives 1, 2, 4, and 5 appeared to be significantly lower than those for non-qualifying vessels and Category I vessels. There does not appear to be any cogent rationale for the lower rates for Category II vessels, but the differences here were confirmed by an ANOVA test of significance.

Figure 54. Total discard rate (D/Kall) on using small mesh otter trawls to target whiting and red hake in 2014-2016 by limited access alternative and qualification category for the Northern (Top) and Southern (Bottom) management areas by quarter.




Alternative 2
1
2
3
4
Northern
Southern
10.0
0.1
D to Kall ratio (Log10)
Category I
Category II
No history
Non-qualifier
Trawl type
Alternative 3
1
2
3
4
Northern
Southern
10.0
0.1
D to Kall ratio (Log10)
Category I
Category II
Non-qualifier
Trawl type


Alternative 4
1
2
3
4
Northern
Southern
10.0
0.1
D to Kall ratio (Log10)
Category I
Category II
Non-qualifier
Trawl type

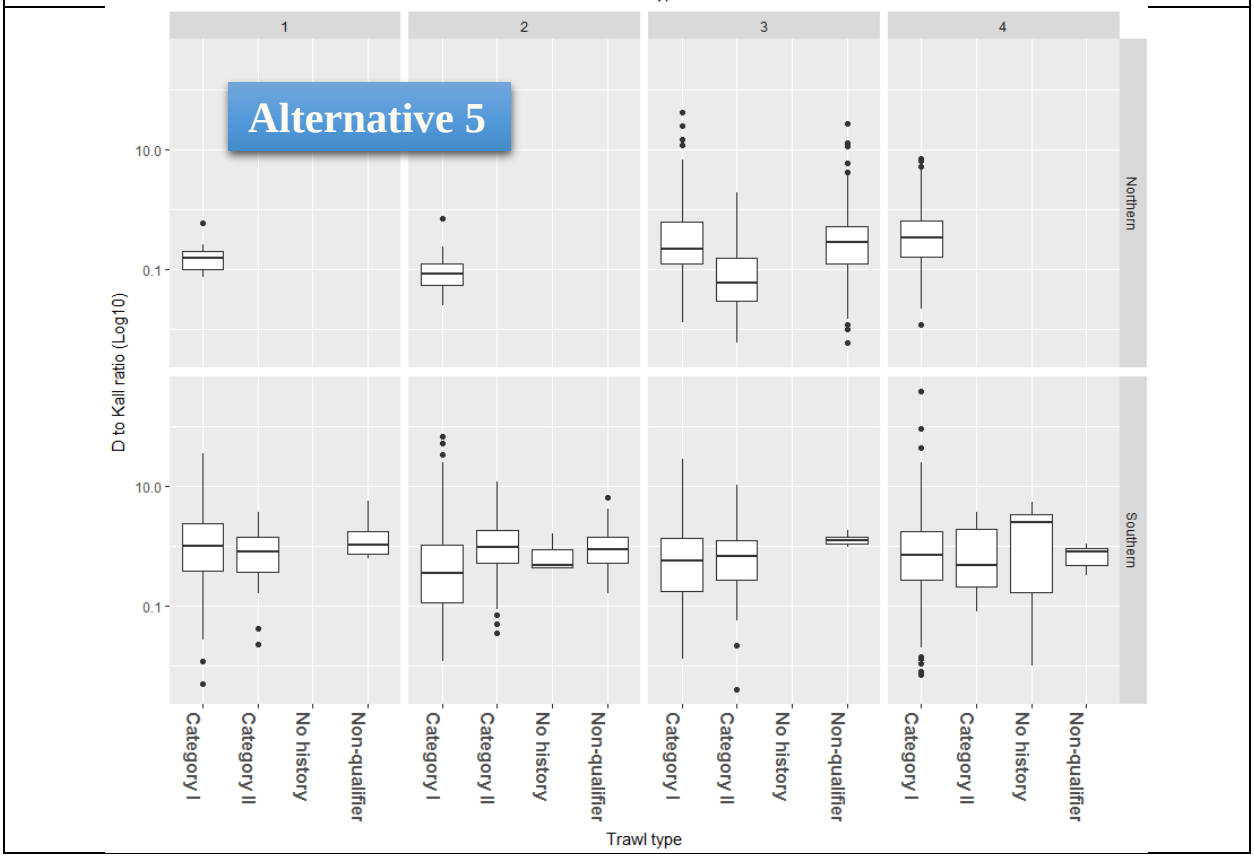
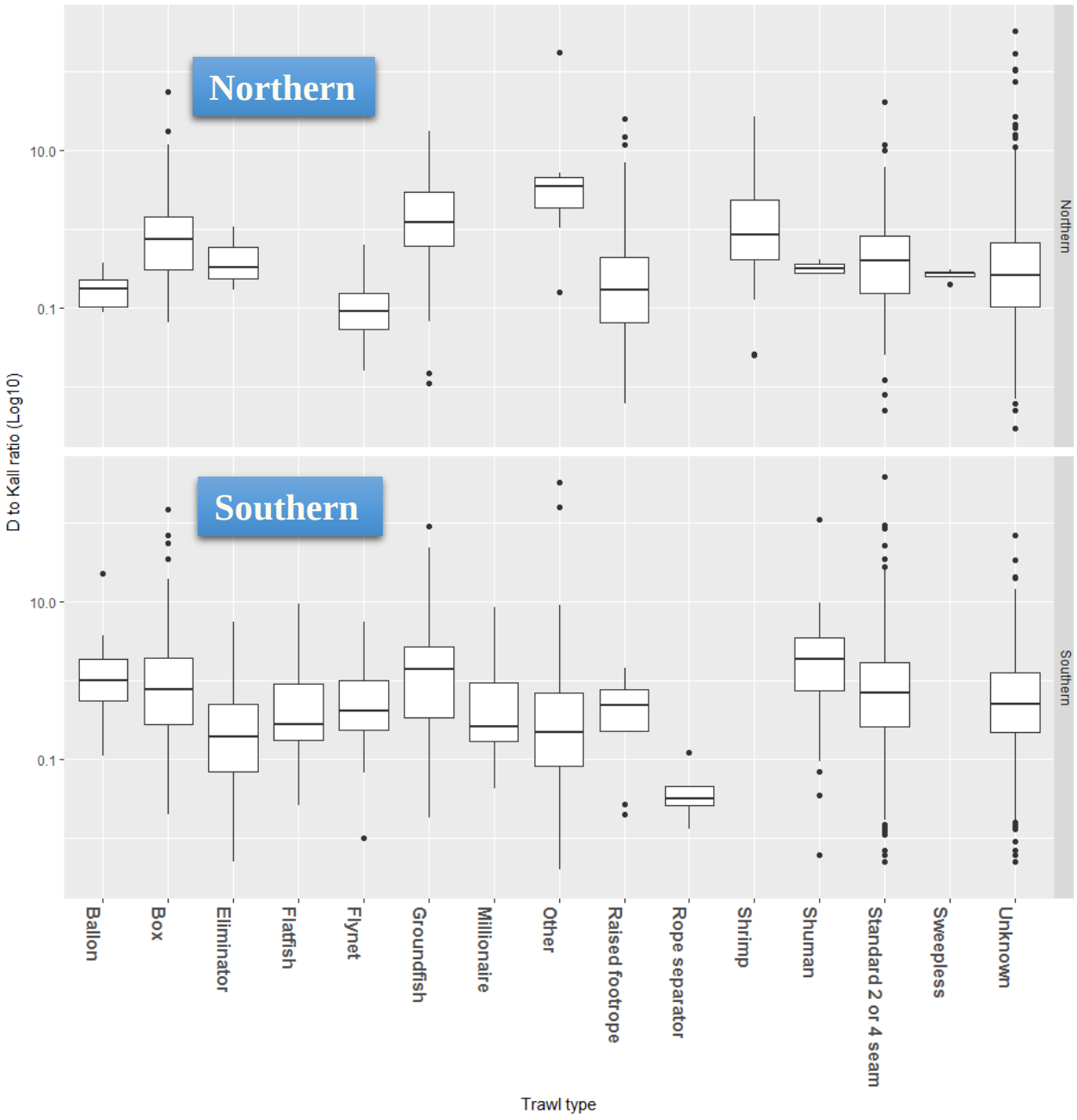

Alternative 5
1
2
3
4
Northern
Southern
10.0
0.1
D to Kall ratio (Log10)
Category I
Category II
No history
Non-qualifier
Trawl type

Figure 55. Total bycatch rate by management area (Top – Northern; Bottom – Southern) small-mesh trawl configuration for all observed species.



11.2 Bycatch rates by species and gear

Trends in bycatch rates were observed in some species, but others varied without trend through the time series. Likewise, the bycatch rates for a variety of small-mesh trawls types (balloon, box, eliminator, flynet, groundfish, millionaire, other, raised footrope, rope separator, shrimp, Shuman, standard 2 and 4 seam, sweepless, and unknown) also varied for some species and not others. The largest differences by

gear were apparent with the raised footrope trawl, particularly for benthic species like flounders, skates, and monkfish. Drawing conclusions from these differences by gear are however difficult (or inappropriate) because the gears are used (sometimes infrequently) in different exemption areas and seasons. Differences in bycatch rates could be more related to bycatch availability in the observed areas and seasons than due to the use of selective gear.

Table 110. Mean bycatch rate (D/Kall) by small-mesh multispecies management area during 2014-2016 weighted by number of observed hauls

	Northern		Southern	
Species	Mean D/Kall	Rank	Mean D/Kall	Rank
American plaice	0.005	9	0.000	19
Atlantic herring	0.051	6	0.005	13
Barndoor skate	0.005	8	0.030	9
Butterfish	0.001	17	0.088	4
Cod	0.001	18	0.000	18
Haddock	0.248	1	0.039	6
Little skate	0.033	7	0.085	5
Monkfish	0.002	15	0.019	10
Ocean pout	0.000	20	0.006	11
Red hake	0.091	3	0.241	2
Silver hake	0.052	5	0.104	3
Smooth skate	0.000	21	-	20
Spiny dogfish	0.170	2	0.271	1
Summer flounder	0.003	12	0.035	7
Thorny skate	0.000	19	-	20
White hake	0.002	16	0.000	17
Windowpane flounder	0.002	14	0.002	16
Winter flounder	0.003	13	0.004	14
Winter skate	0.066	4	0.031	8
Witch flounder	0.004	10	0.005	12
Yellowtail flounder	0.004	11	0.003	15
All	0.035		0.046	

Table 111. Observed 2014-2016 D/Kall bycatch statistics by species and quarter for the northern management area.

	2014			2014 Total	2015		2015 Total	2016		2016 Total
Species	1	3	4		3	4		3	4	
Haddock										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.002	0.279	0.095	0.125	0.217	0.167	0.192	0.456	0.109	0.282
CV	0.654	2.398	0.827	1.293	3.451	1.279	2.365	4.554	1.985	3.269
Red hake										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.002	0.069	0.017	0.029	0.091	0.692	0.391	0.140	0.046	0.093
CV	2.236	1.725	1.843	1.935	1.790	1.593	1.691	3.393	4.701	4.047
Spiny dogfish										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.092	0.027	0.115	0.078	0.378	0.014	0.196	0.016	0.374	0.195
CV	0.707	2.138	2.293	1.713	6.516	2.070	4.293	3.676	1.898	2.787
Atlantic herring										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.010	0.166	0.059	0.040	0.640	0.340	0.001	0.010	0.006
CV		7.078	4.825	5.952	7.153	1.468	4.311	4.117	2.588	3.353
Silver hake										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.068	0.069	0.021	0.053	0.008	0.032	0.020	0.079	0.178	0.128
CV	2.440	2.512	1.432	2.128	5.922	1.310	3.616	6.392	3.608	5.000
Winter skate										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.002	0.014	0.005	0.085	0.005	0.045	0.185	0.075	0.130
CV		6.230	2.249	4.239	4.261	2.239	3.250	9.030	2.554	5.792
Little skate										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.006	0.007	0.004	0.059	0.004	0.032	0.044	0.065	0.054
CV		3.648	2.724	3.186	3.908	2.250	3.079	8.761	4.060	6.410
Witch flounder										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.001	0.002	0.001	0.003	0.028	0.015	0.003	0.021	0.012
CV	1.708	2.749	3.598	2.685	2.126	1.973	2.049	2.122	2.010	2.066
White hake										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.004	0.000	0.002	0.002	0.000	0.029	0.015	0.003	0.002	0.002
CV	1.083	5.241	3.503	3.276		2.346	2.346	9.366	3.464	6.415
American plaice										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.002	0.004	0.002	0.003	0.003	0.006	0.004	0.012	0.003	0.008
CV	0.654	1.960	2.863	1.826	1.900	2.151	2.026	2.770	2.485	2.628
Barndoor skate										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.001	0.001	0.003	0.002	0.009	0.007	0.008	0.005	0.001	0.003
CV	2.646	7.988	1.986	4.207	8.412	3.162	5.787	6.798	5.831	6.314
Yellowtail flounder										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.002	0.005	0.002	0.006	0.005	0.006	0.003	0.000	0.001
CV		4.461	1.712	3.087	3.522	1.392	2.457	1.968	5.831	3.899
Monkfish										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.006	0.000	0.001	0.003	0.003	0.000	0.002	0.001	0.003	0.002
CV	0.847	3.273	3.519	2.546	2.876		2.876	2.308	2.384	2.346
Summer flounder										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.010	0.000	0.003	0.000	0.004	0.002	0.000	0.000	0.000
CV		6.891	3.509	5.200	8.187	3.162	5.675	7.524		7.524
Winter flounder										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.005	0.001	0.002	0.003	0.000	0.002	0.000	0.000	0.000
CV		4.008	2.996	3.502	2.506		2.506	4.678	5.831	5.255
Windowpane flounder										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.001	0.003	0.001	0.003	0.000	0.002	0.001	0.000	0.000
CV		10.853	2.718	6.785	7.038		7.038	6.463		6.463
Butterfish										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.002	0.000	0.001	0.002	0.000	0.001	0.001	0.000	0.000
CV		5.752	3.338	4.545	7.417		7.417	5.118		5.118
Cod										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.000	0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000
CV		4.072	3.127	3.600	3.224		3.224	4.764		4.764
Thorny skate										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
CV		12.124	4.028	8.076	12.728		12.728	4.485	5.831	5.158
Ocean pout										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.000
CV		4.769		4.769	3.335		3.335	5.384	3.420	4.402
Smooth skate										
Number of observed hauls	7	147	69	223	162	10	172	89	34	123
Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CV	2.646		8.307	5.476						
Total Number of observed hauls	147	3,087	1,449	4,683	3,402	210	3,612	1,869	714	2,583
Total Mean	0.008	0.023	0.022	0.018	0.043	0.078	0.061	0.045	0.042	0.044
Total CV	1.562	4.994	3.070	3.538	5.067	2.030	3.833	5.184	3.655	4.504

Table 112. Observed 2014-2016 D/Kall bycatch statistics by species and quarter for the southern management area.

	2014				2014 Total	2015				2015 Total	2016				2016 Total
Species	1	2	3	4		1	2	3	4		1	2	3	4	
Spiny dogfish															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.307	0.209	0.038	0.074	0.157	0.576	0.231	0.006	0.411	0.306	0.811	0.035	0.029	0.014	0.222
CV	3.301	3.686	2.670	1.567	2.806	2.163	4.690	3.625	6.753	4.308	4.014	5.640	3.119	3.667	4.110
Red hake															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.093	0.060	0.273	0.055	0.120	0.411	0.185	0.229	0.408	0.308	0.550	0.348	0.025	0.098	0.255
CV	2.393	2.572	1.400	2.089	2.113	1.669	5.734	3.329	1.761	3.123	1.367	4.593	1.328	2.367	2.414
Silver hake															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.027	0.102	0.369	0.063	0.140	0.016	0.022	0.140	0.060	0.060	0.011	0.439	0.054	0.234	0.184
CV	5.512	1.592	1.362	2.025	2.623	1.769	3.425	3.735	3.383	3.078	2.292	6.124	2.630	1.320	3.092
Little skate															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.001	0.056	0.144	0.117	0.080	0.032	0.106	0.193	0.059	0.097	0.030	0.021	0.141	0.226	0.104
CV	4.034	2.410	2.107	1.278	2.457	4.034	5.980	3.234	4.835	4.521	2.114	1.994	1.263	3.702	2.268
Butterfish															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.152	0.076	0.099	0.093	0.105	0.197	0.021	0.106	0.075	0.100	0.085	0.079	0.077	0.046	0.072
CV	2.198	3.342	2.195	2.204	2.485	4.347	3.923	1.609	7.752	4.408	1.958	3.778	5.074	2.583	3.348
Summer flounder															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.034	0.025	0.001	0.015	0.019	0.169	0.012	0.020	0.000	0.050	0.112	0.002	0.007	0.029	0.037
CV	2.360	7.577	7.141	2.409	4.872	2.175	3.681	2.652		2.836	3.225	3.374	2.042	2.810	2.863
Haddock															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.003	0.014	0.069	0.027	0.028	0.001	0.113	0.047	0.066	0.057	0.044	0.004	0.002	0.001	0.013
CV	5.993	4.690	1.692	2.574	3.737	5.708	3.381	1.936	4.506	3.883	2.614	5.572	3.437	3.139	3.690
Winter skate															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.032	0.000	0.085	0.001	0.029	0.057	0.014	0.010	0.000	0.020	0.155	0.003	0.010	0.000	0.042
CV	5.791	9.165	2.497	4.867	5.580	5.750	4.499	5.569		5.272	2.734	5.753	3.563		4.017
Barndoor skate															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.048	0.047	0.005	0.031	0.033	0.034	0.018	0.020	0.026	0.025	0.093	0.008	0.004	0.001	0.027
CV	6.371	3.985	3.692	2.488	4.134	2.558	3.416	4.820	2.841	3.409	1.961	2.811	4.800	4.506	3.520
Monkfish															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.004	0.004	0.000	0.003	0.003	0.035	0.006	0.003	0.013	0.014	0.082	0.016	0.008	0.062	0.042
CV	2.565	3.848	7.141	2.409	3.991	2.242	4.004	2.929	3.243	3.104	2.299	4.480	1.741	2.953	2.868
Ocean pout															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.000	0.040	0.000	0.000	0.010	0.002	0.005	0.000	0.000	0.002	0.004	0.015	0.000	0.000	0.005
CV		3.557			3.557	7.019	4.865	6.059	6.948	6.223	2.860	2.599	4.963		3.474
Witch flounder															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.009	0.004	0.000	0.000	0.003	0.034	0.004	0.001	0.000	0.010	0.008	0.005	0.000	0.000	0.003
CV	4.378	2.569	5.746	5.416	4.527	1.529	5.706	4.559		3.931	3.858	2.464	5.320	4.840	4.121
Winter flounder															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.000	0.002	0.012	0.001	0.004	0.000	0.001	0.006	0.000	0.002	0.000	0.007	0.022	0.003	0.008
CV		2.957	3.053	5.873	3.961		7.210	4.404		5.807		3.398	2.518	6.691	4.202
Atlantic herring															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.001	0.007	0.000	0.000	0.002	0.002	0.022	0.003	0.006	0.008	0.000	0.000	0.000	0.000	0.000
CV	8.367	3.574		6.000	5.980	7.746	9.291	4.708	9.821	7.892					
Yellowtail flounder															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.010	0.000	0.016	0.005	0.008	0.000	0.000	0.003	0.000	0.001	0.000	0.000	0.004	0.001	0.001
CV	8.205	6.442	3.078	2.198	4.981			3.564		3.564			2.128	5.096	3.612
Windowpane flounder															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.007	0.001	0.009	0.000	0.004	0.000	0.000	0.009	0.000	0.002	0.000	0.001	0.005	0.000	0.001
CV	8.190	2.239	3.693	6.000	5.031		4.555	4.482		4.518	8.775	4.311	1.938		5.008
White hake															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.001	0.000	0.000	0.002	0.000	0.001
CV						4.982		3.847	8.669	5.832	8.775		5.616		7.195
Cod															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.001
CV		6.913			6.913		10.149		10.677	10.413	6.823				6.823
American plaice															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CV			7.141		7.141			6.708	10.677	8.693	8.775				8.775
Thorny skate															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CV															
Smooth skate															
Number of observed hauls	70	84	51	36	241	60	103	45	114	322	77	45	66	46	234
Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
CV															
Total Number of observed hauls	1,470	1,764	1,071	756	5,061	1,260	2,163	945	2,394	6,762	1,617	945	1,386	966	4,914
Total Mean	0.035	0.031	0.053	0.023	0.035	0.075	0.036	0.038	0.054	0.051	0.095	0.047	0.019	0.034	0.049
Total CV	4.976	4.183	3.641	3.293	4.013	3.835	5.282	3.987	6.297	4.784	4.028	4.064	3.217	3.640	3.733

11.3 Total bycatch estimates

The observed discard to kept ratios (D/Kall) by quarter, year, and small-mesh multispecies management area were applied total landings data supplied by dealers (CFDBS) for trips using small-mesh trawls and landing more than 2000 lbs. of whiting or 400 lbs. of red hake, giving the total discard estimates shown in Table 113. Combined across management areas, haddock, spiny dogfish, silver hake, little skate, and winter skate were the highest discards during 2014-2016.

In the northern area, the red hake discard estimates increased to 91 mt in 2014 to 224 mt in 2015 and declined slightly to 210 mt in 2016, consistent with a very large 2013 year class entering the fishery. Estimated red hake discards in the southern management area were considerably higher, increasing from 657 mt in 2014 to 1099 mt in 2015 and 1401 mt in 2016.

In the northern area, haddock were the highest of all discarded species, decreasing from 477 mt in 2014 to 353 mt in 2016. In the southern area, haddock discards peaked at 233 mt in 2015 and declined to 76 mt in 2016. These estimates are consistent with a very large 2013 year-class of haddock becoming vulnerable to small-mesh trawls then moving out of areas where whiting occur.

Both management areas combined, our estimates of yellowtail flounder discards declined from 4.5 mt in 2014 to 8.7 mt ion 2016. It should be noted that the estimates provided here do not correspond directly with the Georges Bank yellowtail flounder stock area and include yellowtail flounder caught in the Mid-Atlantic, Southern New England, and Gulf of Maine waters. The estimates only apply to small-mesh multispecies trips landing 2000 lbs. of whiting or 400 lbs. of red hake while using small-mesh trawls.

Table 113. Total estimated bycatch (mt) by species for the small-mesh multispecies fishery.

Species	2014	2015	2016	3-year average	20142	20153	20164	3-year average
Red hake	91.4	224.1	209.6	175.1	657.0	1099.0	1400.6	1,052.2
Haddock	476.8	241.0	353.0	356.9	199.9	233.7	76.0	169.9
Winter skate	6.8	114.9	98.4	73.4	29.7	13.4	285.2	109.4
Spiny dogfish	98.3	90.7	399.2	196.1	534.9	376.3	130.8	347.3
Butterfish	4.0	4.2	1.5	3.2	376.5	260.4	161.2	266.0
Little skate	12.3	29.1	44.6	28.7	140.2	66.6	171.1	126.0
Silver hake	175.2	34.5	133.5	114.4	619.0	101.5	231.5	317.3
Barndoor skate	2.9	4.0	7.5	4.8	37.2	51.7	151.9	80.3
Atlantic herring	20.2	77.3	4.6	34.0	1.5	11.4	0.0	4.3
Monkfish	0.9	2.6	5.7	3.1	4.4	24.5	135.6	54.8
Summer flounder	4.8	1.5	1.5	2.6	21.7	129.5	93.4	81.5
.Yellowtail flounder	3.0	13.7	7.9	8.2	1.5	0.0	0.8	0.8
Witch flounder	1.5	4.9	14.0	6.8	9.6	57.2	9.7	25.5
.Winter flounder	5.6	2.3	1.5	3.1	15.1	0.2	25.6	13.6
Ocean pout	0.1	0.7	0.6	0.4	58.3	5.2	13.3	25.6
American plaice	4.0	3.2	10.5	5.9	0.0	0.0	0.1	0.0
Cod	0.7	0.8	1.4	1.0	0.3	0.0	1.1	0.5
Windowpane	1.1	0.2	5.6	2.3	2.3	0.0	2.0	1.5
White hake	1.3	2.6	1.4	1.8	0.0	0.1	1.1	0.4
Smooth skate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Thorny skate	0.4	0.0	0.4	0.2	0.0	0.0	0.0	0.0
Pollock	0.9	0.1	0.2	0.4	0.1	0.0	0.5	0.2
Redfish	0.7	1.4	0.1	0.7	0.0	0.0	0.0	0.0
Total estimated bycatch	913.0	853.8	1,302.6	1,023.1	2,709.3	2,430.9	2,891.5	2,677.2

11.4 Bycatch summaries for the small-mesh multispecies fishery by species

11.4.1 Red hake

Red hake bycatch rates were the second highest of the observed discards in the small-mesh multispecies fishery, ranking 3rd (0.091 lbs/lbs. kept) in the northern and 2nd (0.241 lbs/lbs. kept) in the southern management area.

Red hake bycatch rates (generally the most frequent discarded species in the small-mesh multispecies fishery, were relatively stable from 1989 to 2016 in both the northern and southern management areas (Figure 56). This is a bit surprising because red hake abundance markedly increased in the northern management area from a very large 2013 year-class. Although there is no minimum size or apparent price differential with size, these fish would have been very small in 2014 and 2015. Conversely, red hake biomass in the spring surveys has substantially declined in 2015 and 2016, yet the observed bycatch rate held steady. Bycatch rates by gear type did not appear to be lower for the raised footrope trawl than for other gear types.

Figure 56. Red hake bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

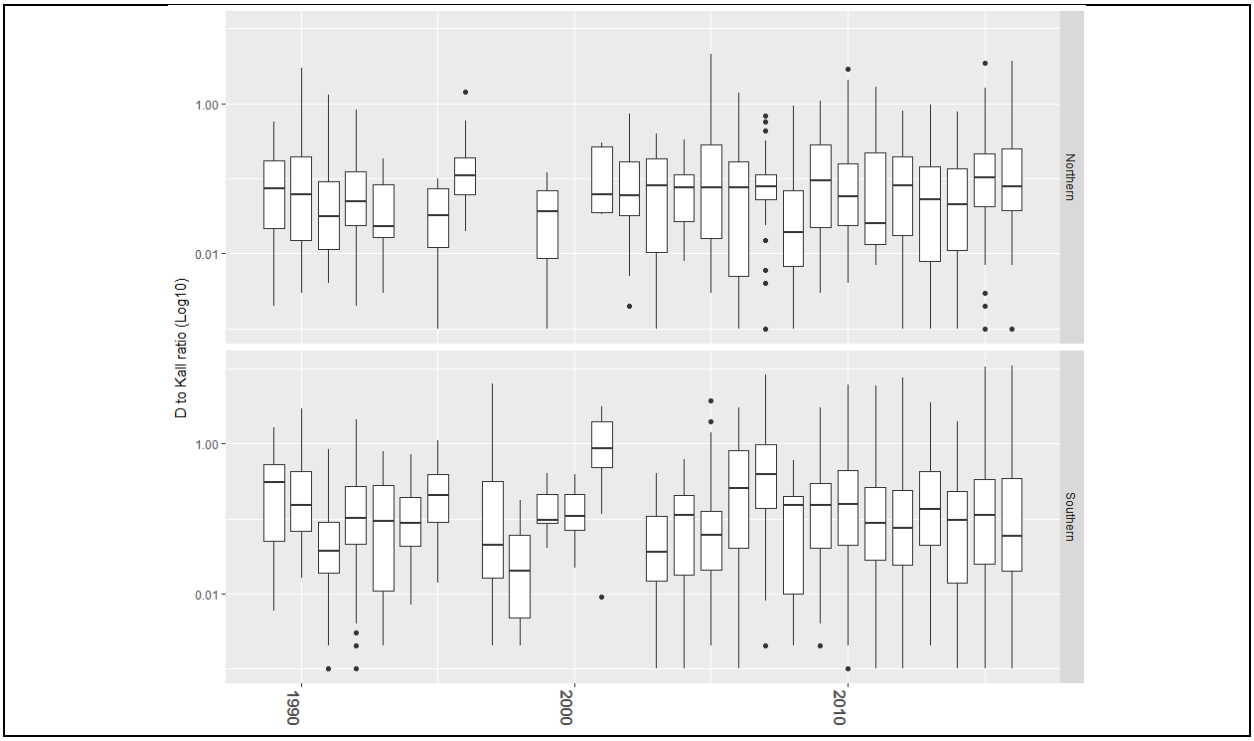
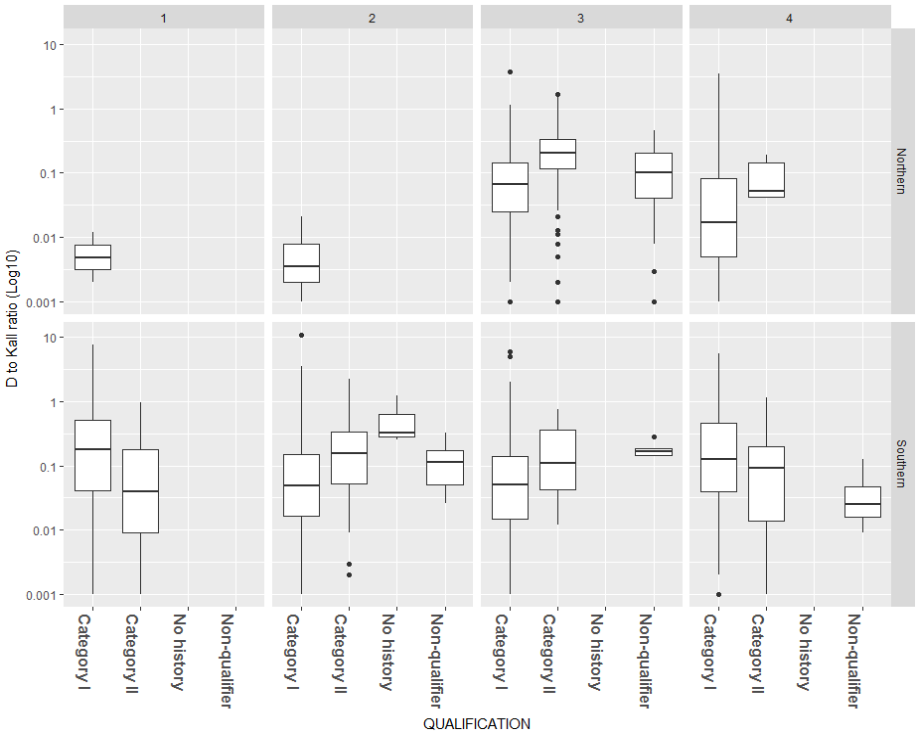


Figure 57. Red hake bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.



Bycatch rates for red hake also did not appear to vary by qualification status. Figure 66 shows the bycatch rates by Alternative 2 qualification. Bycatch rates amongst qualification categories for other alternatives showed similar patterns and thus were not shown in this document. A test of significance confirmed that the qualification effect was not a significant factor in either the northern or southern management areas (Table 114). There were significant differences ($P<0.05$) in red hake catch rates in the southern management area for Alternatives 2 and 3 (Table 115). For Alternative 2, the standardized effect was negative (i.e. less bycatch) for Category II vessels and positive for non-qualifying vessels. For Alternative 3, the standardized effect was positive (i.e. more bycatch) for Category II vessels.

Figure 58. 2014-2016 bycatch rates (D/Kall) for red hake by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.

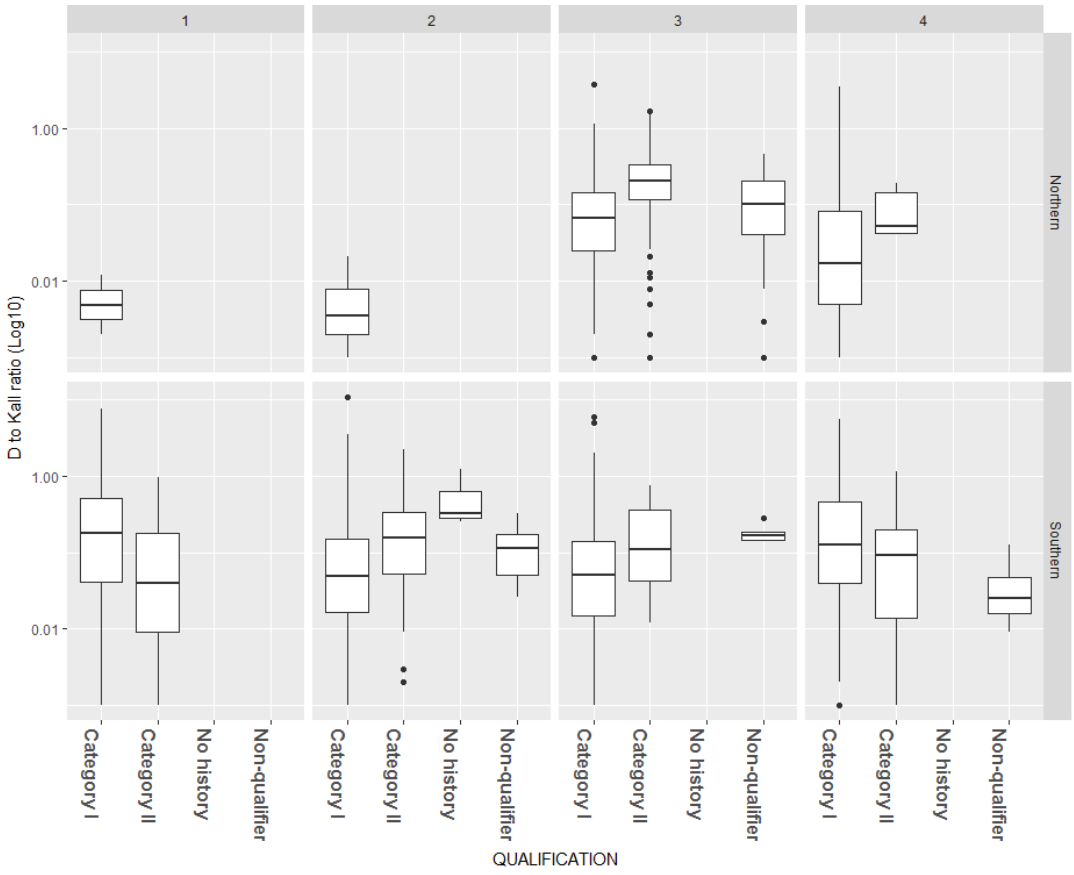


Table 114. Analysis of variance of significant differences in 2014-2016 red hake bycatch rates by management area for Alternative 1 qualification status.

- Red hake
- Northern area
- Alternative 1
- Qualification effect is not significant (p>0.05)

Variables	Levels
QUALIFICATION$ (3 levels)	Category I|Category II|Non-qualifier

11 case(s) are deleted due to missing data.

Dependent Variable	D_KALL_RED_HAKE
N	507
Multiple R	0.051
Squared Multiple R	0.003

Estimates of Effects B = (X'X)⁻¹X'Y

Factor	Level	D_KALL_RED_HAKE
CONSTANT		0.084
QUALIFICATION$	Category I	0.020
QUALIFICATION$	Category II	-0.014

Analysis of Variance

Source	Type III SS	df	Mean Squares	F-Ratio	p-Value
QUALIFICATION$	0.112	2	0.056	0.661	0.517
Error	42.793	504	0.085		

Test for Normality

	Test Statistic	p-Value
K-S Test (Lilliefors)	0.361	0.000
Shapiro-Wilk Test	0.125	0.000

Durbin-Watson D-Statistic	1.614
First Order Autocorrelation	0.193

Information Criteria

AIC	193.431
AIC (Corrected)	193.511
Schwarz's BIC	210.345

- Red hake
- Southern area
- Alternative 1
- Qualification effect is not significant (p>0.05)

Variables	Levels
QUALIFICATION$ (4 levels)	Category I|Category II|No history|Non-qualifier

16 case(s) are deleted due to missing data.

Dependent Variable	D_KALL_RED_HAKE
N	781
Multiple R	0.085
Squared Multiple R	0.007

Estimates of Effects B = (X'X)⁻¹X'Y

Factor	Level	D_KALL_RED_HAKE
CONSTANT		0.272
QUALIFICATION$	Category I	-0.002
QUALIFICATION$	Category II	-0.155
QUALIFICATION$	No history	0.325

Analysis of Variance

Source	Type III SS	df	Mean Squares	F-Ratio	p-Value
QUALIFICATION$	3.024	3	1.008	1.878	0.132
Error	416.989	777	0.537		

Test for Normality

	Test Statistic	p-Value
K-S Test (Lilliefors)	0.353	0.000
Shapiro-Wilk Test	0.120	0.000

Durbin-Watson D-Statistic	1.723
First Order Autocorrelation	0.138

Information Criteria

AIC	1,736.292
AIC (Corrected)	1,736.370
Schwarz's BIC	1,759.595

Table 115. **Red hake:** Analysis of variance results, testing significant differences by qualification category for red hake discards to kept of all species ratios on 2014-2016 observed trips. Significant differences are indicated with '**' when p<0.01 and '*' when p<0.05.

Northern		Standardized effect			
N=507 hauls	P-value	Category I	Category II	No history	Non-qualifier
Alternative 1	0.517	0.020	-0.014		0.084
Alternative 2	0.276	0.029	0.007		0.078
Alternative 3	0.892	0.035	0.024		0.060
Alternative 4	0.546	0.019	-0.013		0.085
Alternative 5	0.552	0.019	-0.011		0.085
Southern		Standardized effect			
N=781 hauls	P-value	Category I	Category II	No history	Non-qualifier
Alternative 1	0.132	-0.002	-0.155	0.325	0.272
Alternative 2	0.001 **	0.037	-0.188	0.317	0.280
Alternative 3	0.035 *	0.090	0.175		
Alternative 4	0.120	0.077	-0.089		0.190
Alternative 5	0.101	0.004	-0.171	0.330	0.267

11.4.2 Spiny dogfish

Spiny dogfish bycatch ranked high in the northern (0.173 lbs/lbs. kept; rank 2) and southern (0.271 lbs/lbs. kept; rank 1) management areas. Bycatch rates in both management areas (Figure 59) appeared to be relatively stable through time with no trend. There were variations in the bycatch rate for various trawl configurations (Figure 60), but there did not appear to be much difference in the catch rates for the raised footrope trawl and for groundfish or 2/4 seam standard trawls. Likewise, the spiny dogfish bycatch rates by qualification category (Figure 61) were very similar to one another, but the spiny dogfish bycatch rate for Category II vessels fishing in the northern area in quarter 3 was lower than for Category I or for non-qualifying vessels.

Figure 59. Spiny dogfish bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

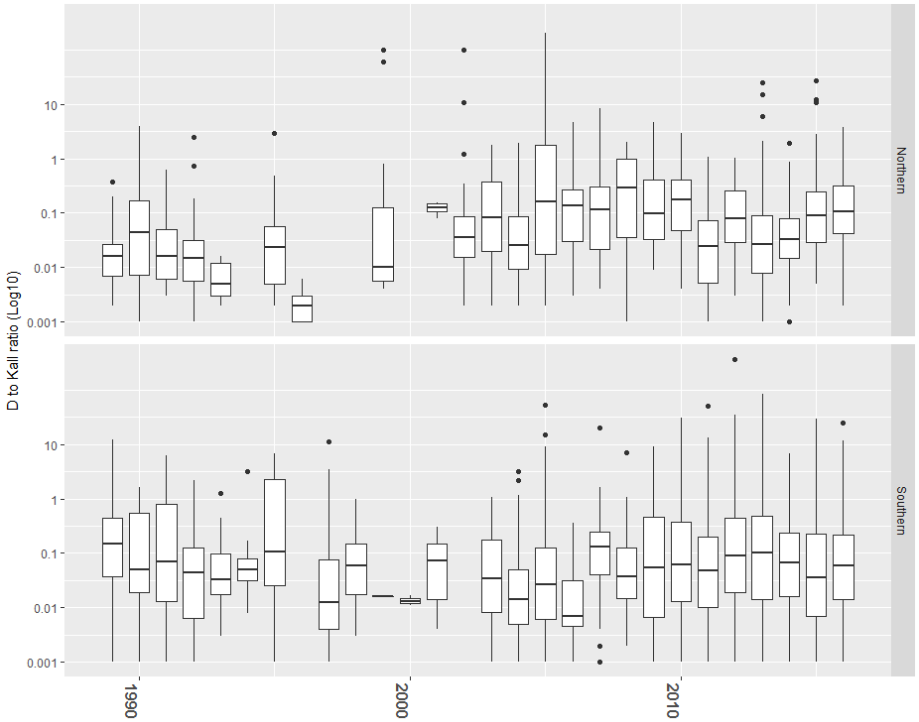


Figure 60. Spiny dogfish bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

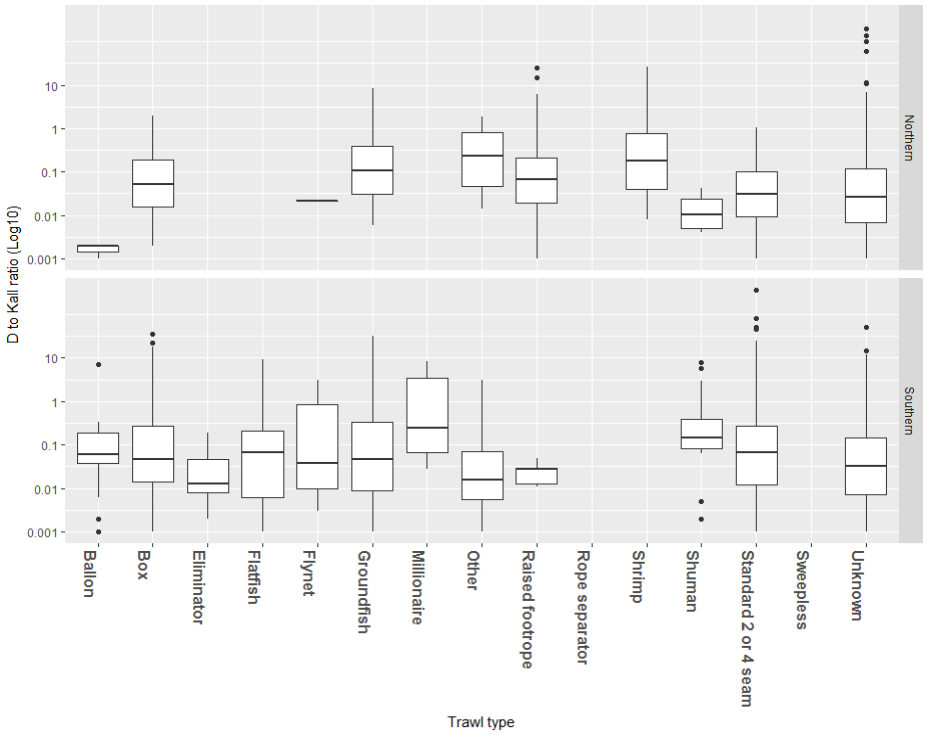
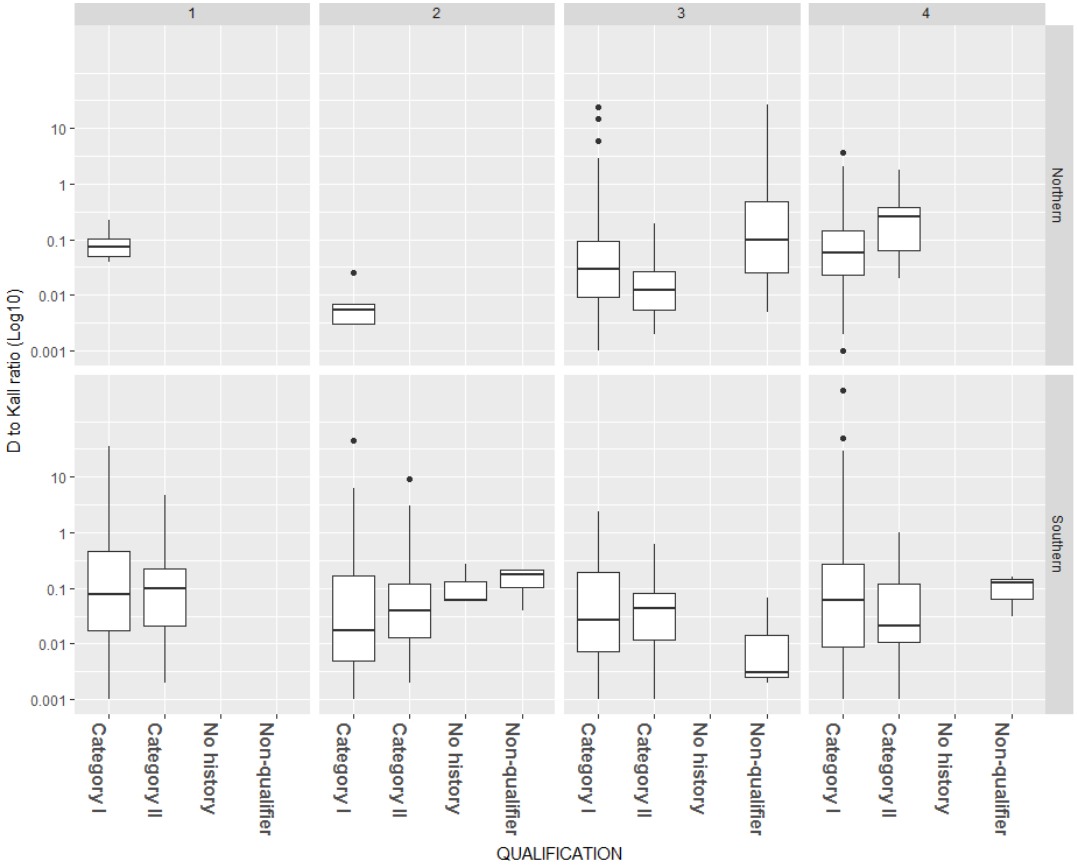


Figure 61. 2014-2016 bycatch rates (D/Kall) for spiny dogfish by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.



11.4.3 Silver hake

Silver hake bycatch rates were the fourth highest of the observed discards in the small-mesh multispecies fishery, ranking 5th (0.052 lbs/lbs. kept) in the northern and 3rd (0.104 lbs/lbs. kept) in the southern management area.

Bycatch rates in both management areas (Figure 62) appeared to be relatively stable through time with no trend. Because silver hake are the major target species in the small-mesh multispecies fishery, this result should be expected. Variations in bycatch of silver hake may arise due to marketing or other reasons, since there is no regulatory size limit. For similar reasons, the silver hake bycatch rate also does not vary much by trawl configuration (Figure 63) or qualification status (Figure 64).

Figure 62. Silver hake bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

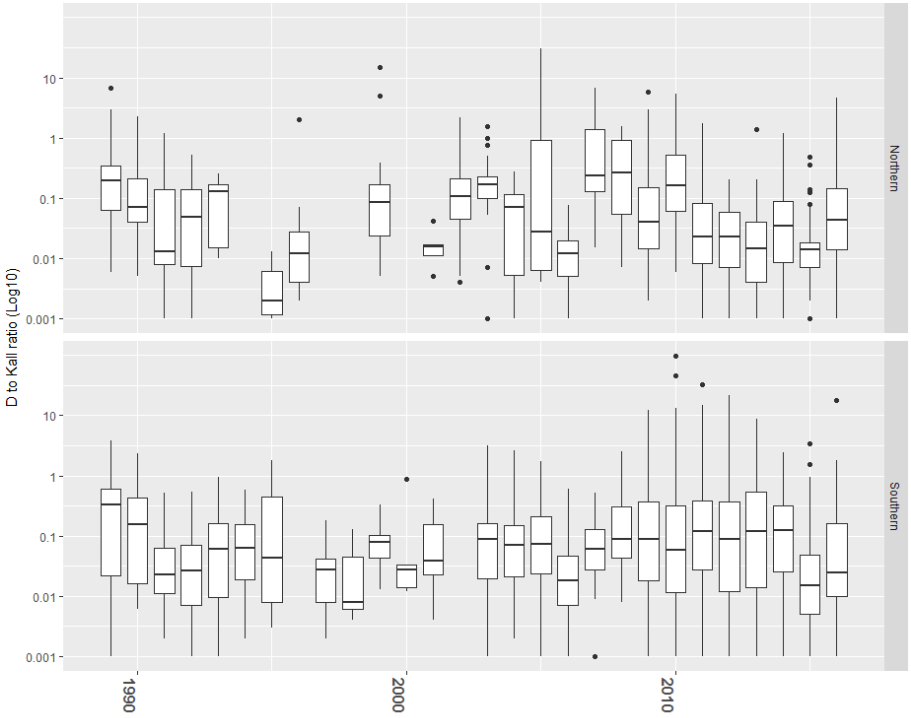


Figure 63. Silver hake bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

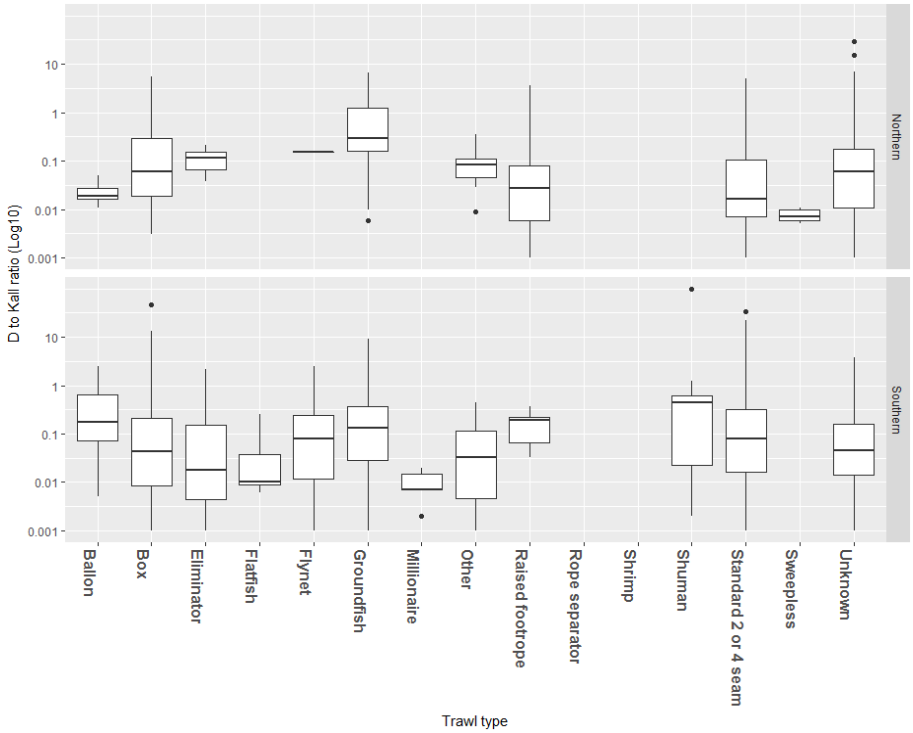
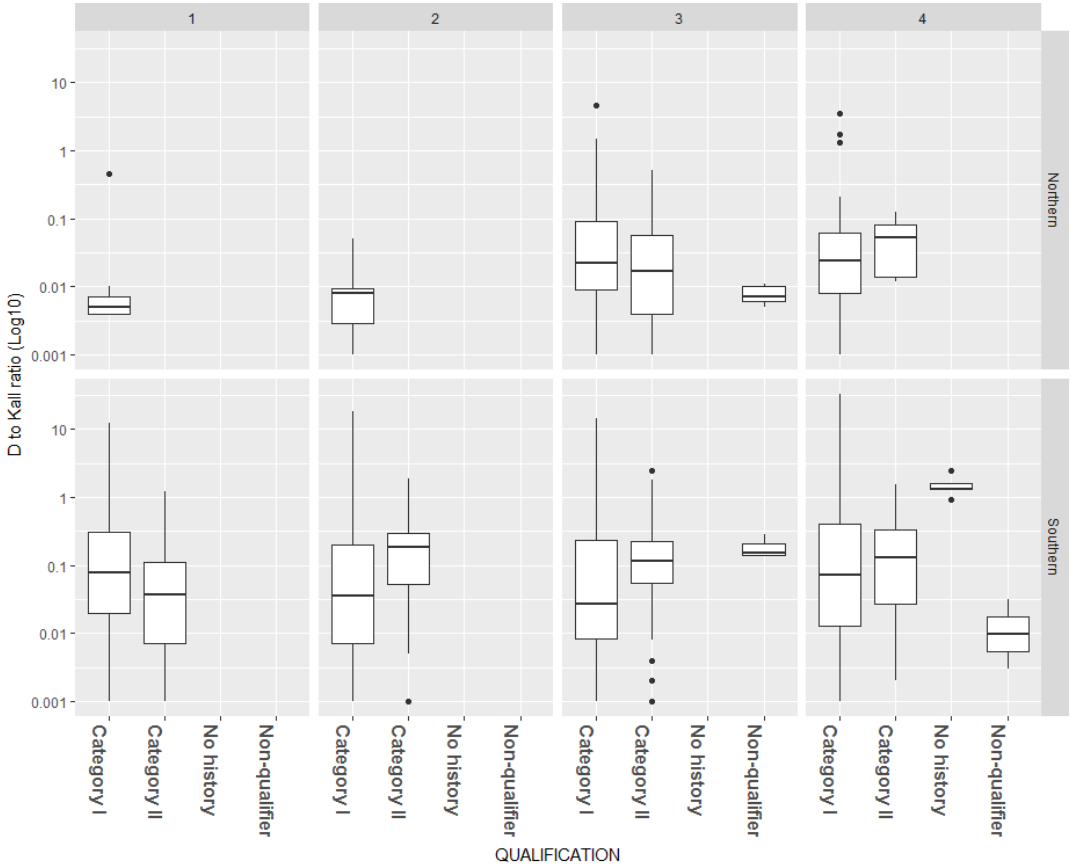


Figure 64. 2014-2016 bycatch rates (D/Kall) for silver hake by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.



11.4.4 Haddock

Haddock bycatch rates were the third highest of the observed discards overall in the small-mesh multispecies fishery, but ranked 1st (0.248 lbs/lbs. kept) in the northern area. Haddock are less prevalent in the southern management area and ranked 6th (0.039 lbs/lbs. kept).

Haddock was the second most frequent observed bycatch species, particularly in the Gulf of Maine and the Cultivator Shoals Area. Haddock bycatch rates have increased by a substantial amount in recent years (Figure 65), since 2014 in the northern management area and since 2012 in the southern management area. This increase is consistent with changes in haddock biomass in both areas due to exceptionally large recent year classes. Like red hake, bycatch rates by gear type (Figure 65) do not appear to be substantially different. Bycatch by shrimp nets were higher than other gears, but the number of samples for this gear were very low and are probably not significant.

Figure 65. Haddock bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

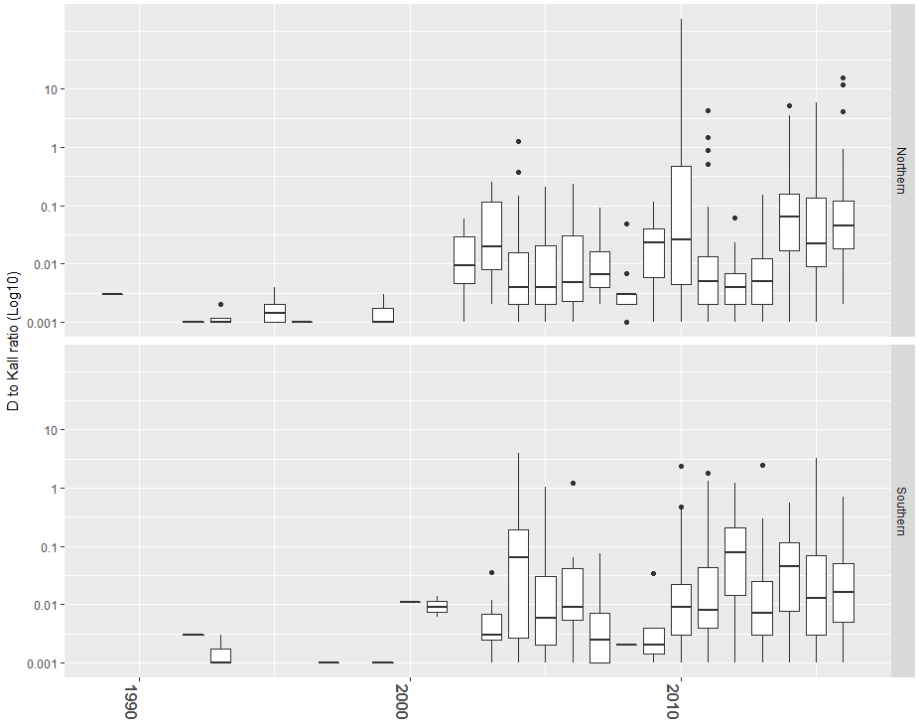
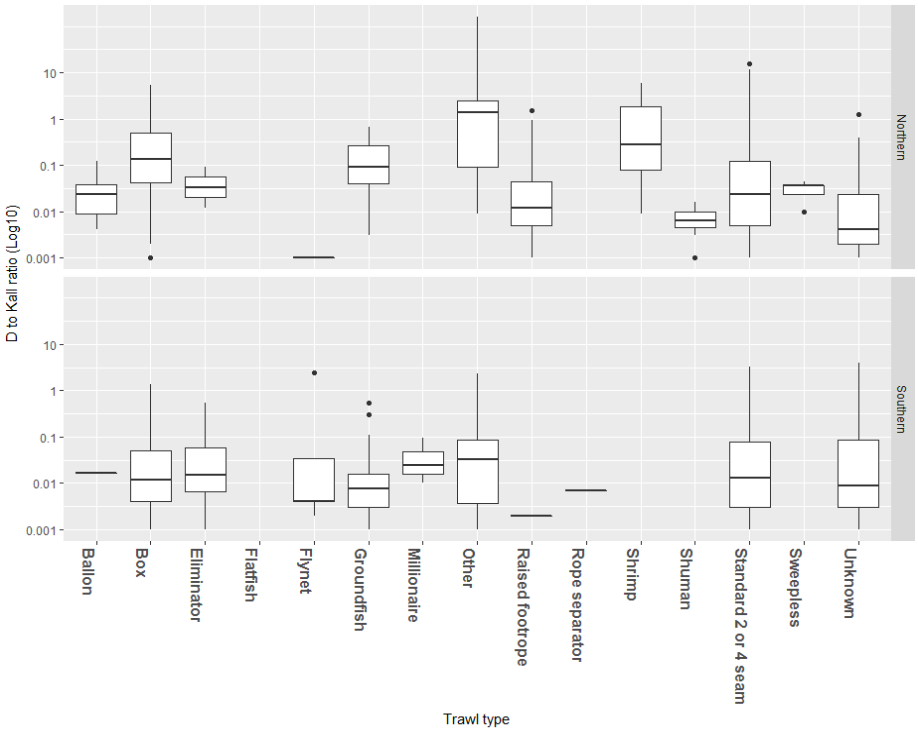


Figure 66. Red hake bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.



In the northern area, there was a significant difference in haddock bycatch rates (P<0.1 for Alternative 1; Table 116). This difference was mainly caused by lower bycatch rates for vessels that would qualify for a Category II permit. This significant difference was also significant for Alternatives 2 and 5 (Table 117), but the standardized effect for Alternative 4 was positive (i.e. higher bycatch than for other qualification classes). In the southern management area, the haddock bycatch rates were lower for vessels qualifying for a Category II permit in quarters 2 and 3 (Figure 67), but this was only significant for Alternative 2 (Table 117).

Figure 67. 2014-2016 bycatch rates (D/Kall) for haddock by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.

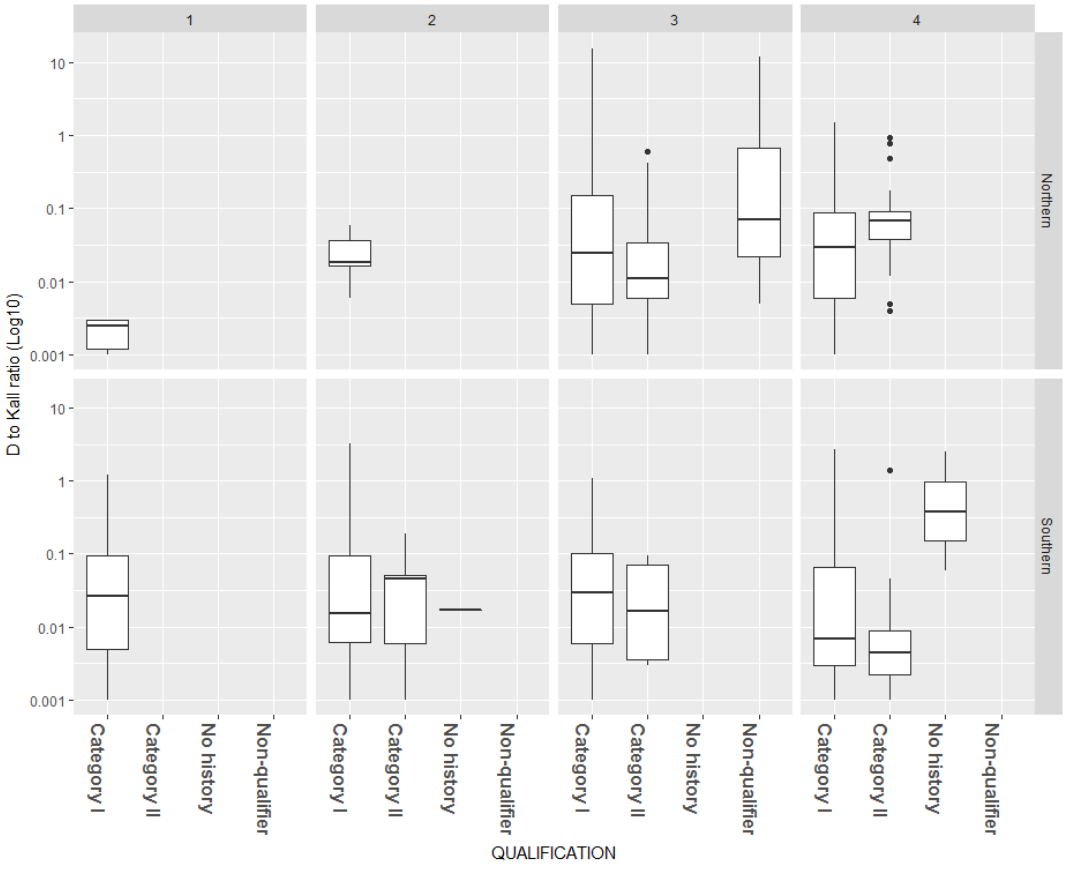


Table 116. Analysis of variance of significant differences in 2014-2016 red hake bycatch rates by management area for Alternative 1 qualification status.

- **Haddock**
- **Northern area**
- **Alternative 1**

Variables	Levels		
QUALIFICATION$ (3 levels)	CategoryI	CategoryII	Non-qualifier

11 case(s) are deleted due to missing data.

Dependent Variable	D_KALL_HADDOCK
N	507
Multiple R	0.146
Squared Multiple R	0.021

Estimates of Effects B = (X'X)⁻¹X'Y

Factor	Level	D_KALL_HADDOCK
CONSTANT		0.284
QUALIFICATION$	CategoryI	-0.046
QUALIFICATION$	CategoryII	-0.223

Analysis of Variance

Source	Type III SS	df	Mean Squares	F-Ratio	p-Value
QUALIFICATION$	11.637	2	5.819	5.512	0.004
Error	532.041	504	1.056		

Test for Normality

	Test Statistic	p-Value
K-S Test (Lilliefors)	0.345	0.000
Shapiro-Wilk Test	0.125	0.000

Durbin-Watson D-Statistic	1.558
First Order Autocorrelation	0.221

Information Criteria

AIC	1,471.246
AIC (Corrected)	1,471.325
Schwarz's BIC	1,488.160

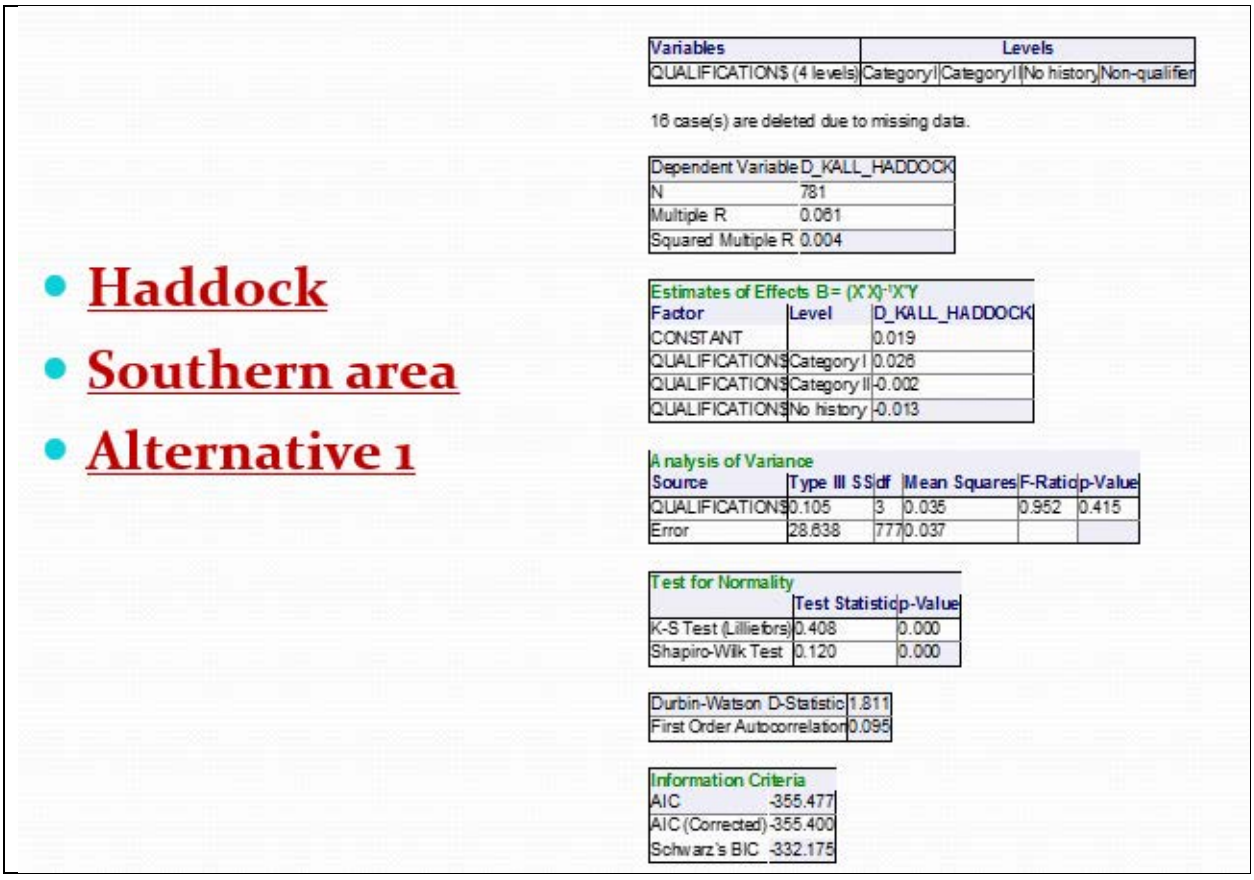


Table 117. **Haddock:** Analysis of variance results, testing significant differences by qualification category for haddock discards to kept of all species ratios on 2014-2016 observed trips. Significant differences are indicated with '**' when p<0.01 and '*' when p<0.05.

Northern		Standardized effect			
N=507 hauls	P-value	Category I	Category II	No history	Non-qualifier
Alternative 1	0.004 **	-0.046	-0.223		0.284
Alternative 2	<0.001 **	-0.101	-0.306		0.365
Alternative 3	0.121	-0.010	0.218		0.214
Alternative 4	0.002 **	-0.038	0.249		0.294
Alternative 5	0.007 **	-0.014	-0.223		0.270
Southern		Standardized effect			
N=781 hauls	P-value	Category I	Category II	No history	Non-qualifier
Alternative 1	0.415	0.026	-0.002	-0.013	0.019
Alternative 2	0.018 *	0.037	-0.008	-0.012	0.017
Alternative 3	0.070	0.020	0.024		
Alternative 4	0.098	0.023	-0.022		0.022
Alternative 5	0.184	0.031	-0.013	-0.010	0.015

11.4.5 Butterfish

Butterfish appear in the observed small-mesh multispecies fishery bycatch more frequently in the southern area than they do in the northern area. Butterfish bycatch rates ranked 17 (0.001 lbs/lbs. kept) in the northern and 4th (0.088 lbs/lbs. kept) in the southern management area.

The butterfish bycatch rate appears to have declined in the northern area since a peak in 2010-2011 (Figure 68). In the southern management area, butterfish bycatch has remained relatively stable since 2009. Bycatch rates for various trawl configurations (Figure 69) show some variation, most notably with a much lower bycatch rate for vessels using a 'millionaire' net in the southern management area. Caution should be exercised before reaching any conclusions, because the bycatch rate can also be affected by where and when the hauls were observed.

Butterfish bycatch catch rates between Alternative 2 qualification categories appear to be very similar (Figure 70), except that in quarters 1, 3, and 4 vessels fishing in the southern management area that are likely to qualify for Category II and non-qualifying vessels had a higher bycatch rate than vessels that would qualify for Category I. Before reaching conclusions about this outcome, it would be wise to evaluate whether many of these vessels were mixed species trips, targeting whiting, squid, and/or butterfish.

Figure 68. Butterfish bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

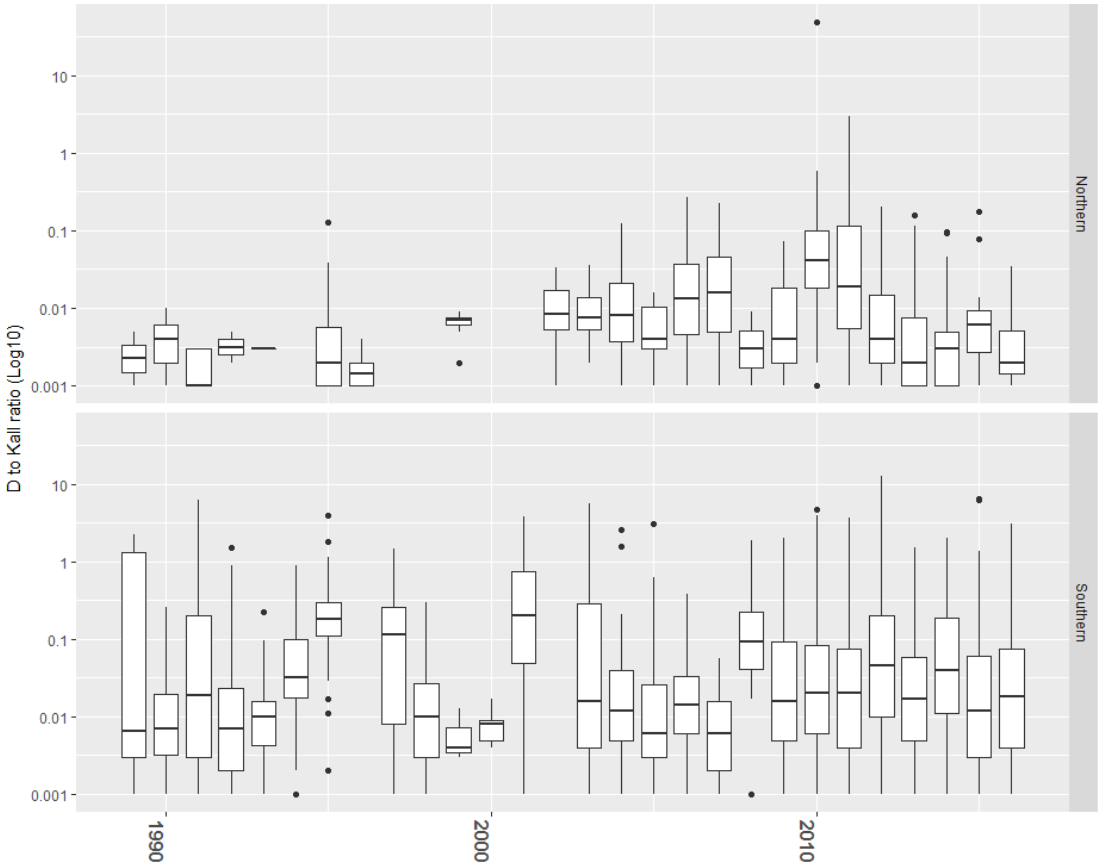


Figure 69. Butterfish bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

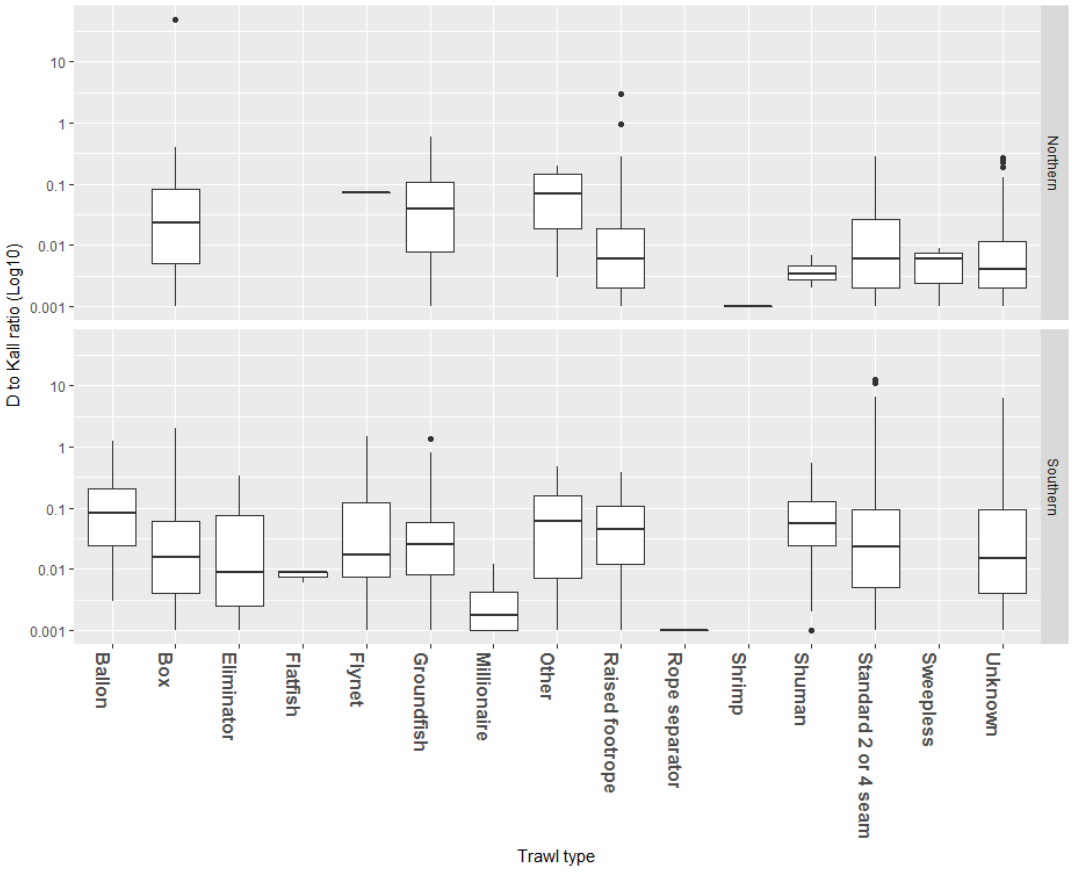
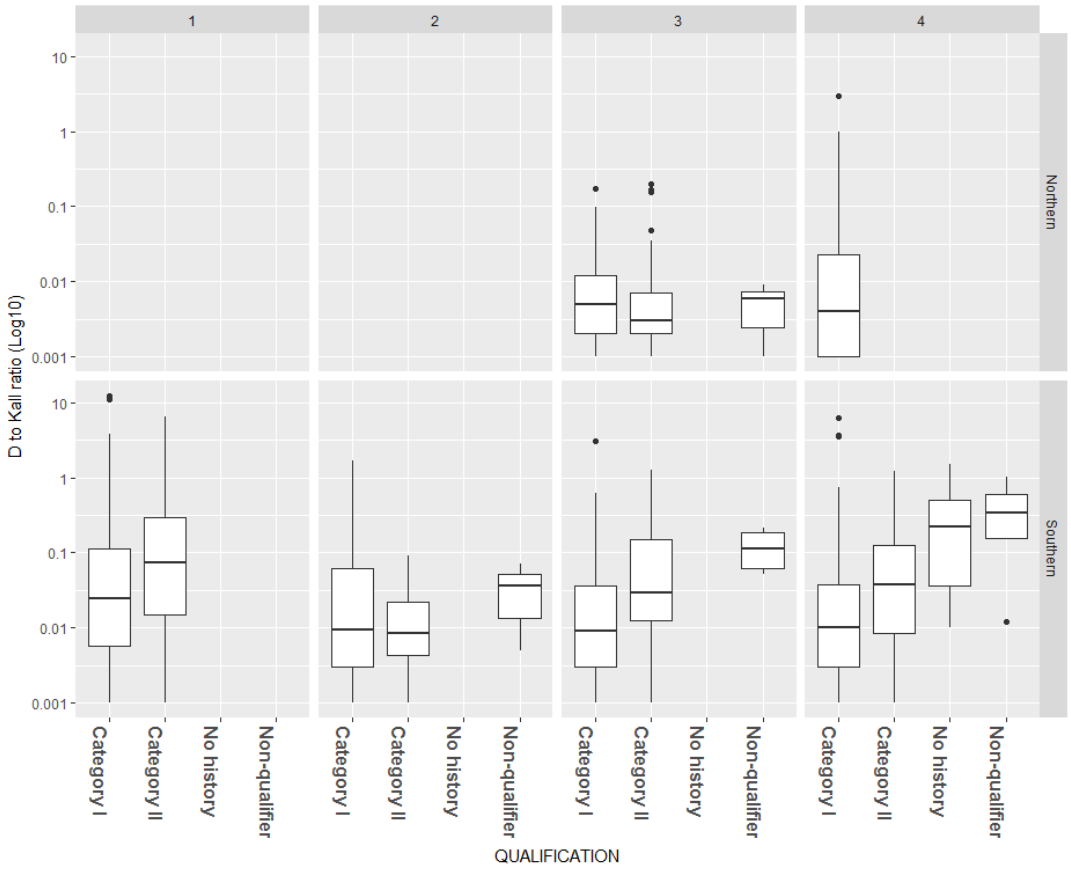


Figure 70. 2014-2016 bycatch rates (D/Kall) for butterfish by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.



11.4.6 Little skate

Little skate bycatch rates were the next highest of the observed discards in the small-mesh multispecies fishery, ranking 7th (0.033 lbs/lbs. kept) in the northern and 5th (0.085 lbs/lbs. kept) in the southern management area.

Little skate bycatch rate appears to have declined somewhat betwwen2003 and 2016 (Figure 71) in the northern management area, but remained steady without trend in the southern management area. Although it would be expected that the little skate bycatch rate for the raised footrope trawl would be lower than that when vessels use a standard groundfish or 2/4 seam trawl, this does not appear to be the case for little skate (Figure 72). It does however appear that vessels using the 'millionaire' trawl had a much lower little skate bycatch rate. Again, this result may be caused by the time and location where the observed hauls occurred than from selectivity of the net itself.

In the northern management area, the little skate bycatch appears to be higher for Category II vessels in quarter 3 and for non-qualifying vessels in quarter 4 (Figure 73), than for vessels that would qualify for a Category I permit with limited access qualification Alternative 2. This also appears to be the case in the southern management area during quarters 2, 3, and 4.

Figure 71. Little skate bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

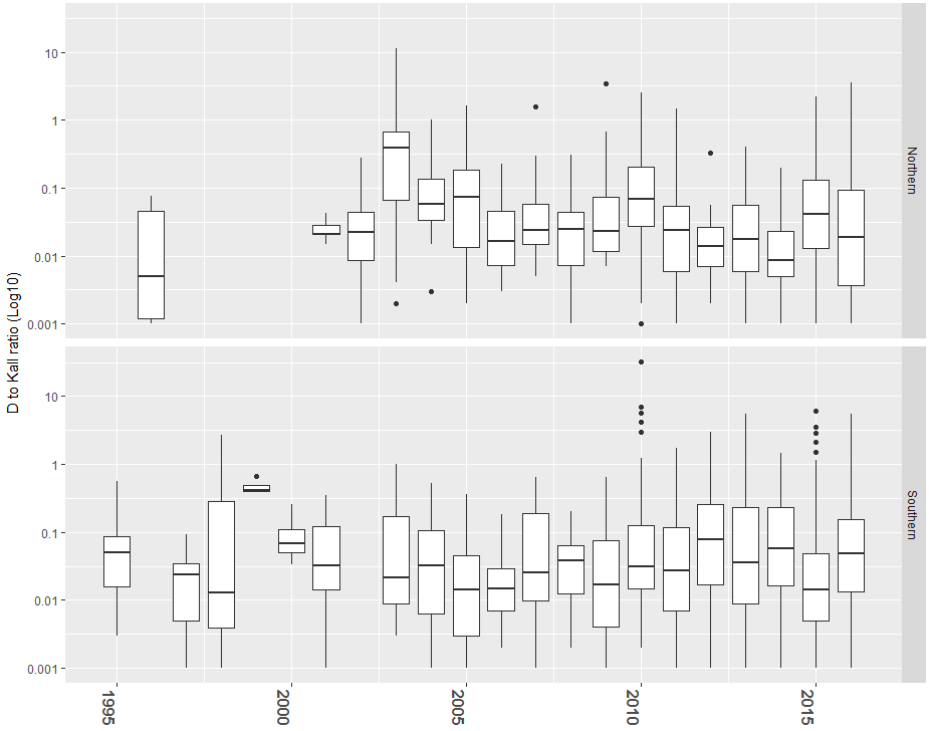


Figure 72. Little skate bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

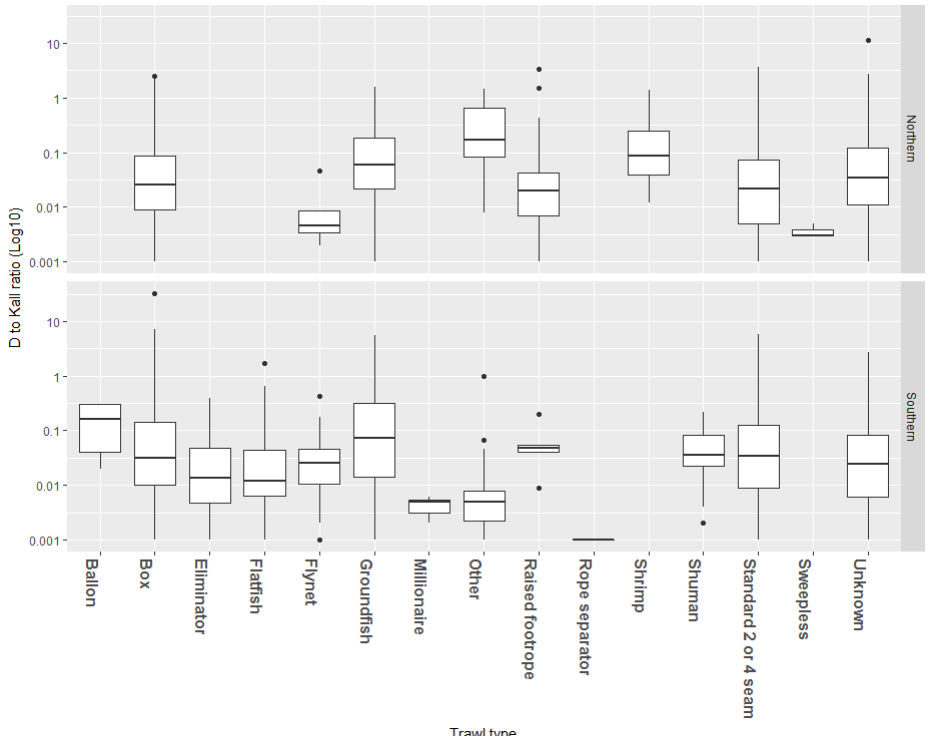
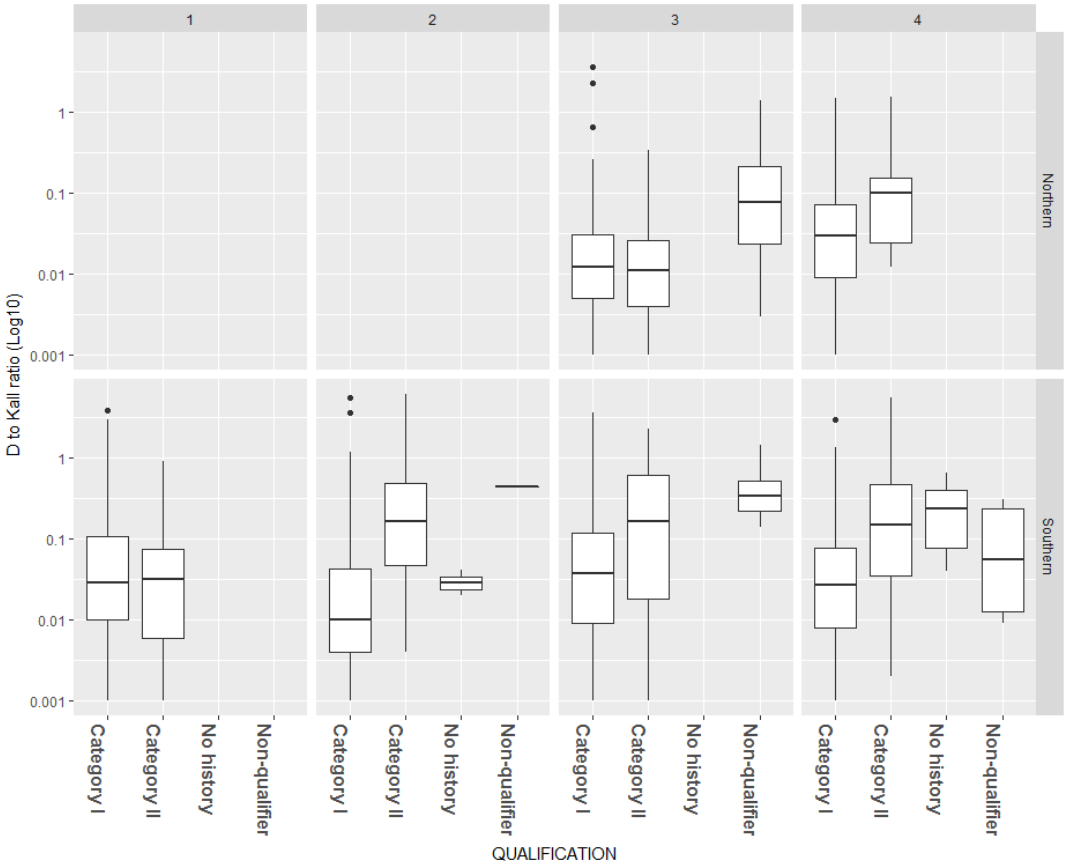


Figure 73. 2014-2016 bycatch rates (D/Kall) for little skate by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.



11.4.7 Winter skate

Winter skate bycatch rates were the fourth highest of the observed discards in the small-mesh multispecies fishery, ranking 4th (0.066 lbs/lbs. kept) in the northern and 8th (0.031 lbs/lbs. kept) in the southern management area. The winter skate bycatch rate in the northern management area was highly variable between years (Figure 74), but there does not appear to be a trend. It seems less variable in the southern management area, but there appears to be an increasing trend in the bycatch rate since a 2005 low.

As a flatfish type species, it would be expected that the bycatch rate for the raised footrope trawl would be lower than for a standard groundfish or 2/4 seam trawl. This does not appear to be the case in the northern management area (Figure 75) where the raised footrope trawl is used, however. It is lower in the southern management area, but the gear is not required here and there are few samples for hauls with a raised footrope trawl in this area. It should be noted that there was no observed winter skate catch in the southern management area using the 'millionaire' trawl.

Except for quarter 3 in the southern management area, there does not appear to be a difference between winter skate bycatch rates by qualification category (Figure 76). In quarter 3 the winter skate bycatch rate appears to be much higher for vessels that would qualify for a Category II permit and for non-qualifiers, than for vessels qualifying for Category I.

Figure 74. Winter skate bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

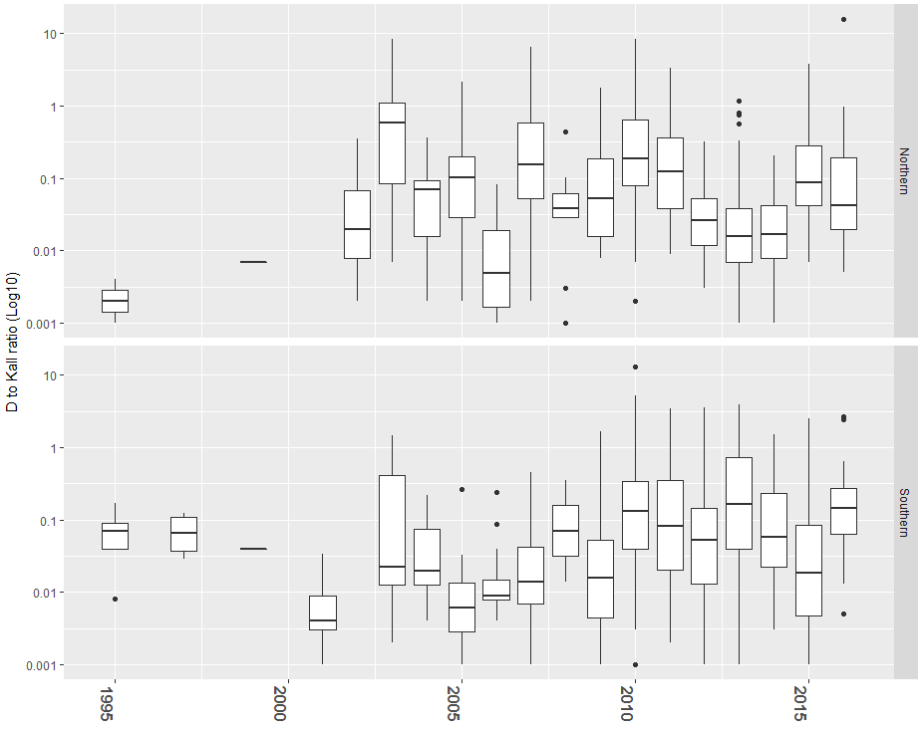


Figure 75. Winter skate bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

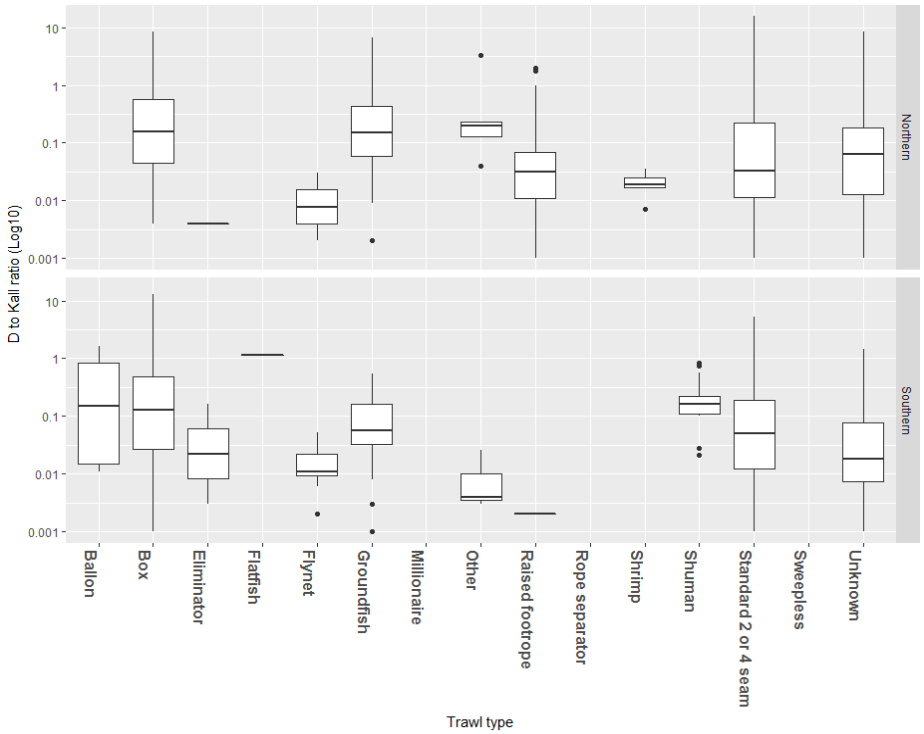
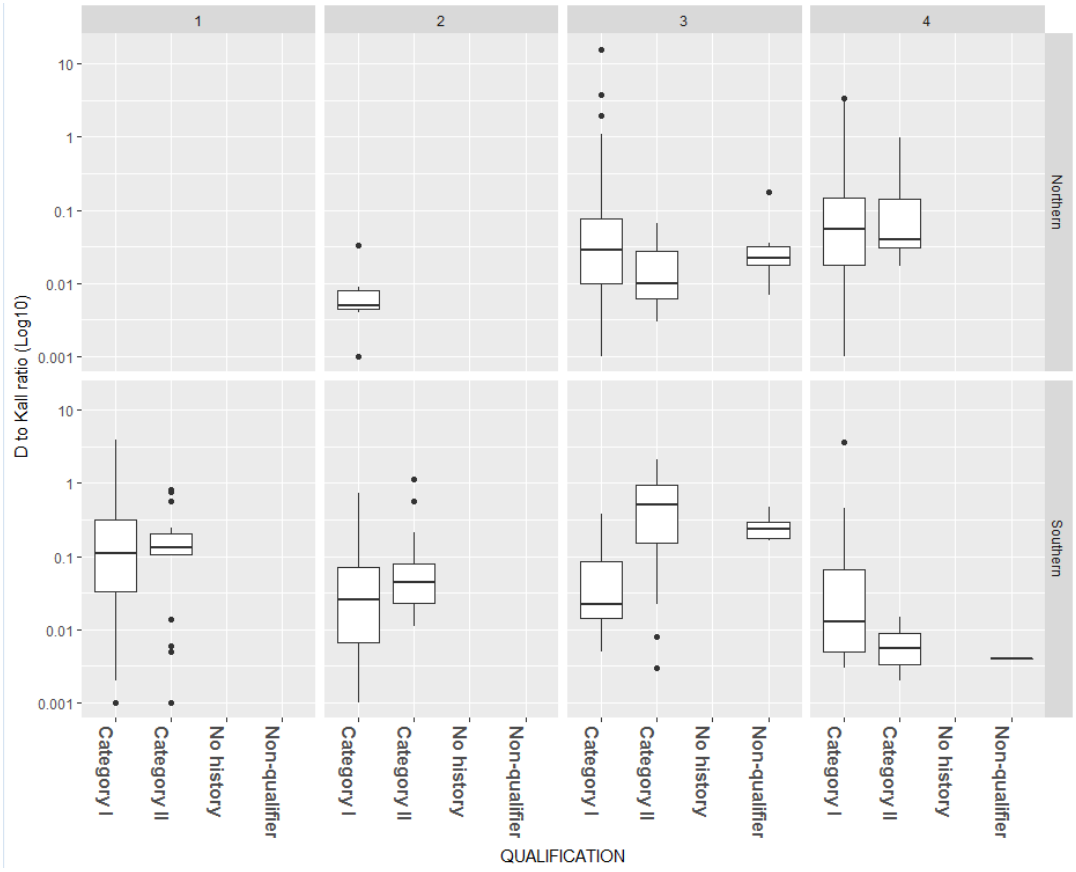


Figure 76. 2014-2016 bycatch rates (D/Kall) for winter skate by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.



11.4.8 Summer flounder

Summer flounder appear in the observed small-mesh multispecies fishery bycatch more frequently in the southern area than they do in the northern area (Figure 77). Bycatch in the southern area does however appear to be increasing, possibly linked to warming water temperatures and northeastern expansion of the summer flounder distribution to areas where the small-mesh multispecies fishery occurs on eastern Georges Bank. Summer flounder bycatch rates ranked 12th (0.003 lbs/lbs. kept) in the northern and 7th (0.035 lbs/lbs. kept) in the southern management area.

In the northern management area, summer flounder bycatch on observed hauls appears to be higher for a standard groundfish trawl than for a raised footrope trawl or 2/4 seam net (Figure 78).

Bycatch rates by Alternative 2 qualification status do not appear to be different among qualification categories (Figure 79). Otherwise, differences in summer flounder bycatch rates among trawl configurations appears to be unremarkable.

Figure 77. Summer flounder bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

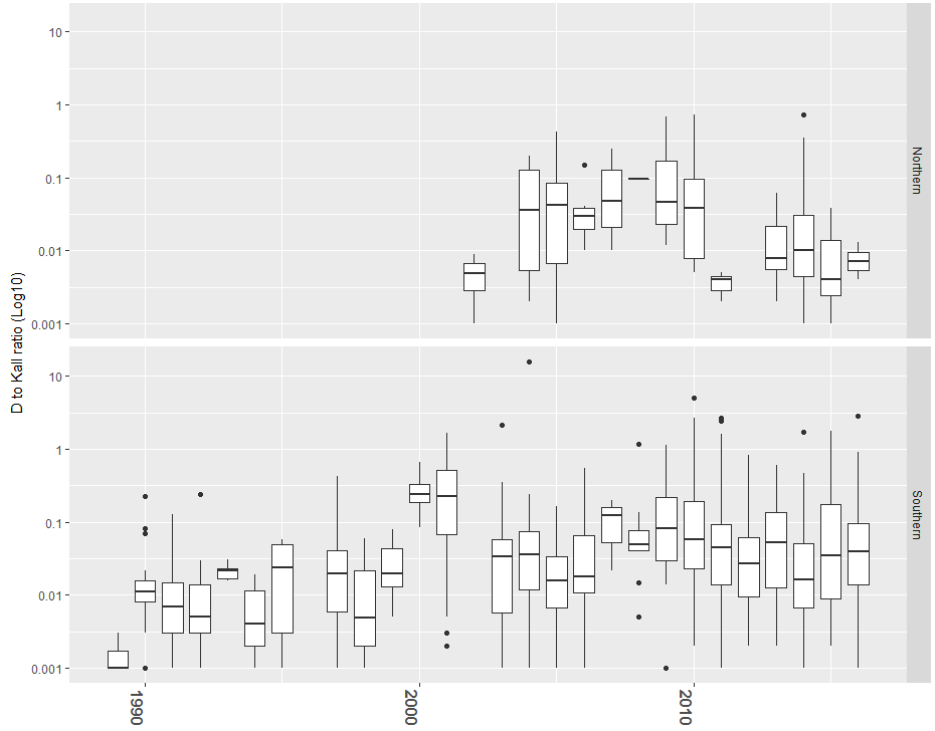


Figure 78. Summer flounder bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

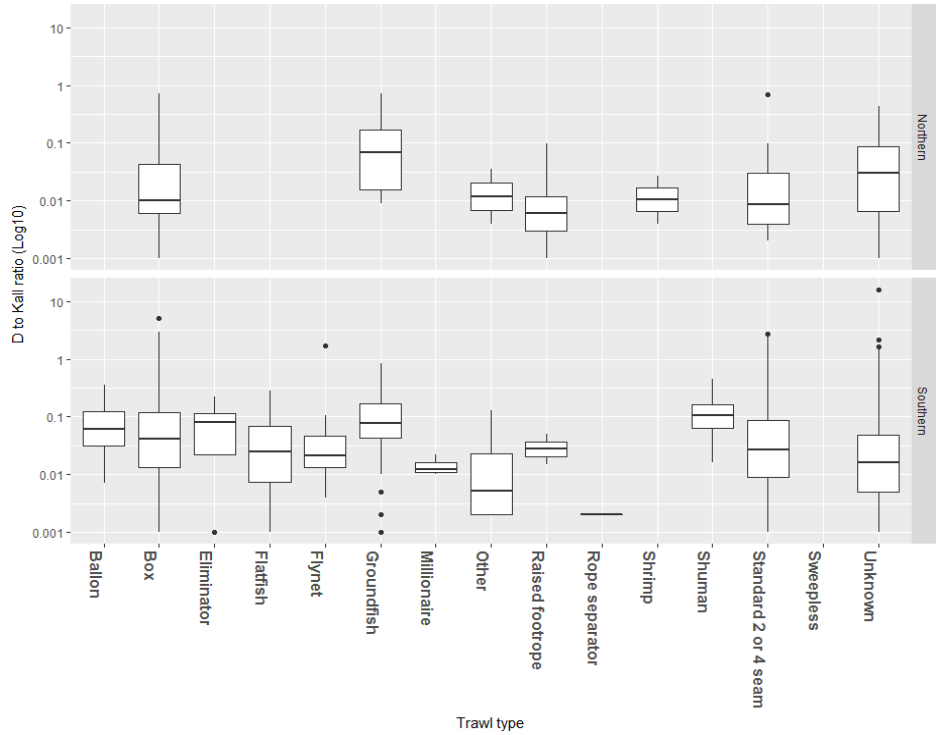
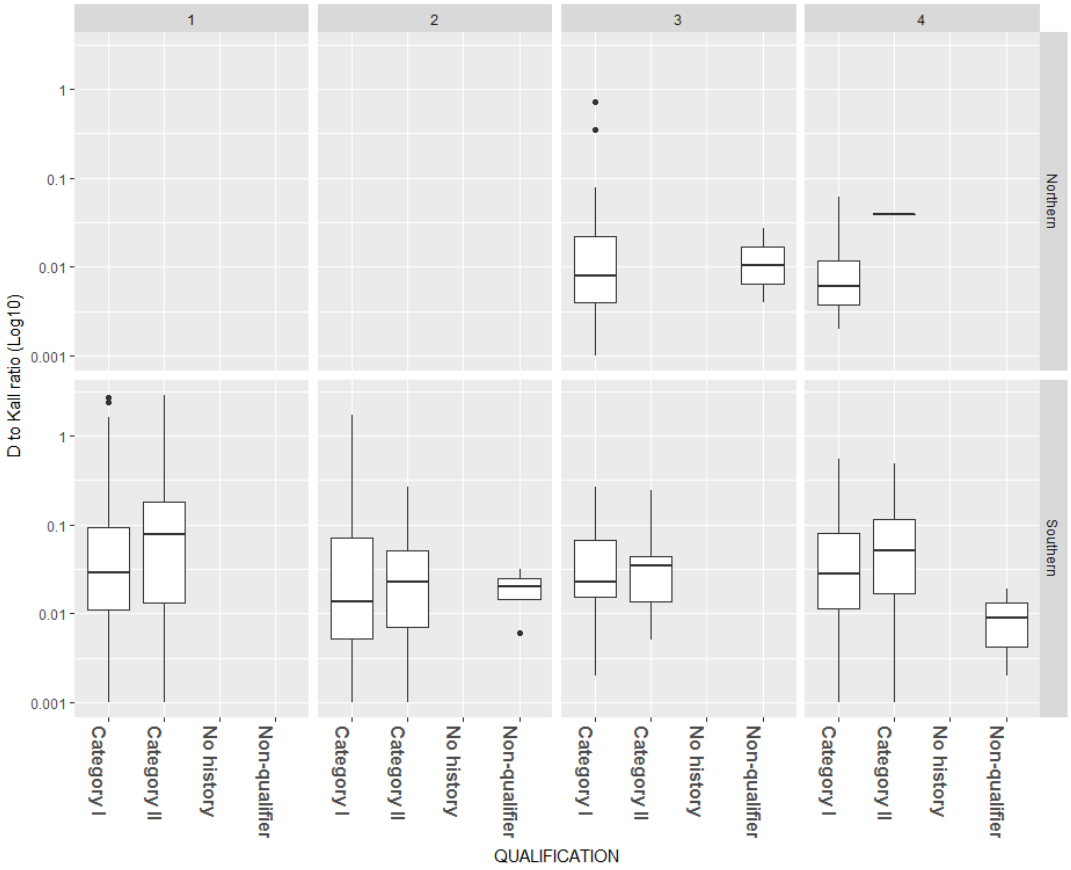


Figure 79. 2014-2016 bycatch rates (D/Kall) for summer flounder by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.



11.4.9 Barndoor skate

Although they are an infrequent bycatch in number of animals observed, barndoor skate bycatch rates by weight rank in the middle of all observed species. Barndoor skate bycatch rates were the next highest of the observed discards in the small-mesh multispecies fishery, ranking 8th (0.005 lbs/lbs. kept) in the northern and 9th (0.030 lbs/lbs. kept) in the southern management areas. Barndoor skate bycatch rates appear to have declined since 2010 in the northern management area, but have held steady since 2008 in the southern management area (Figure 80).

Like summer flounder bycatch, the barndoor skate bycatch rate in the northern area for the raised footrope trawl is lower than for a standard groundfish trawl, but similar to a 2/4 seam trawl (Figure 81). Bycatch rates among Alternative 2 qualification categories is very similar to each other in both areas and most quarters (Figure 82).

Figure 80. Barndoor skate bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

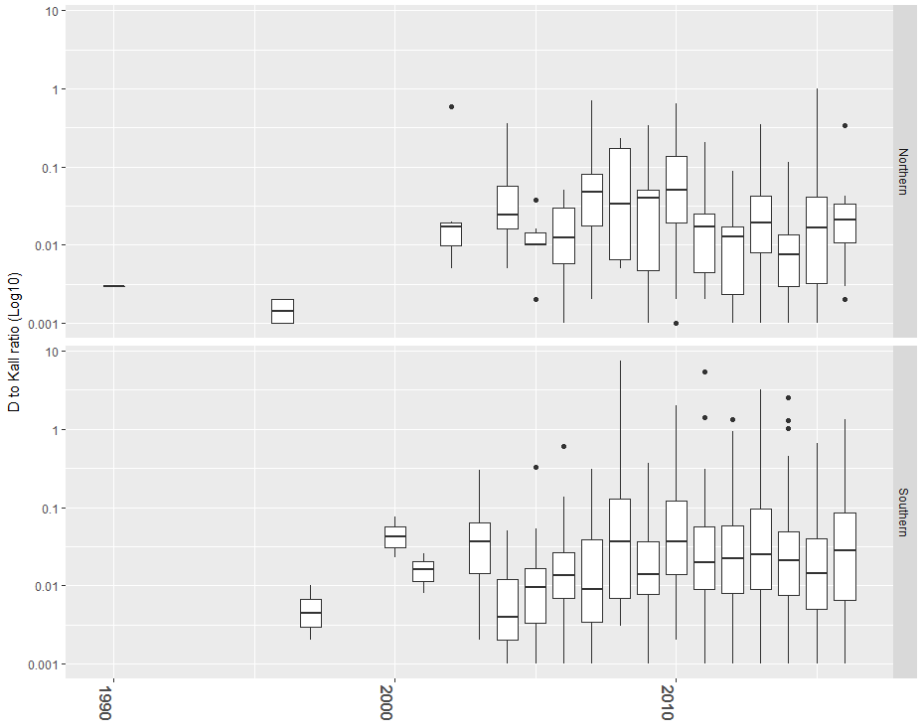


Figure 81. Barndoor skate bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

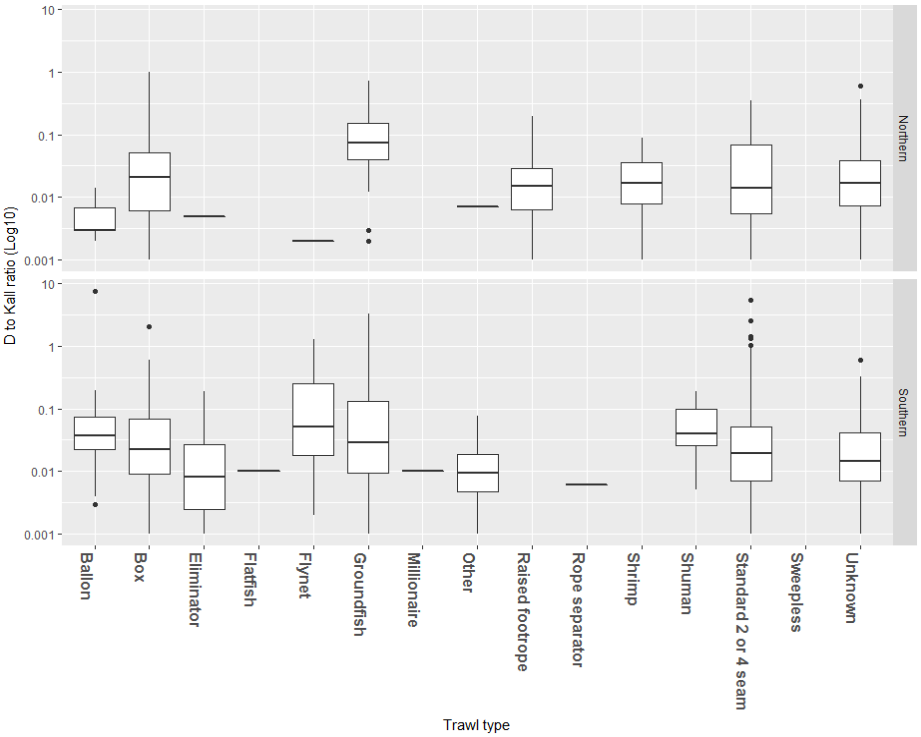
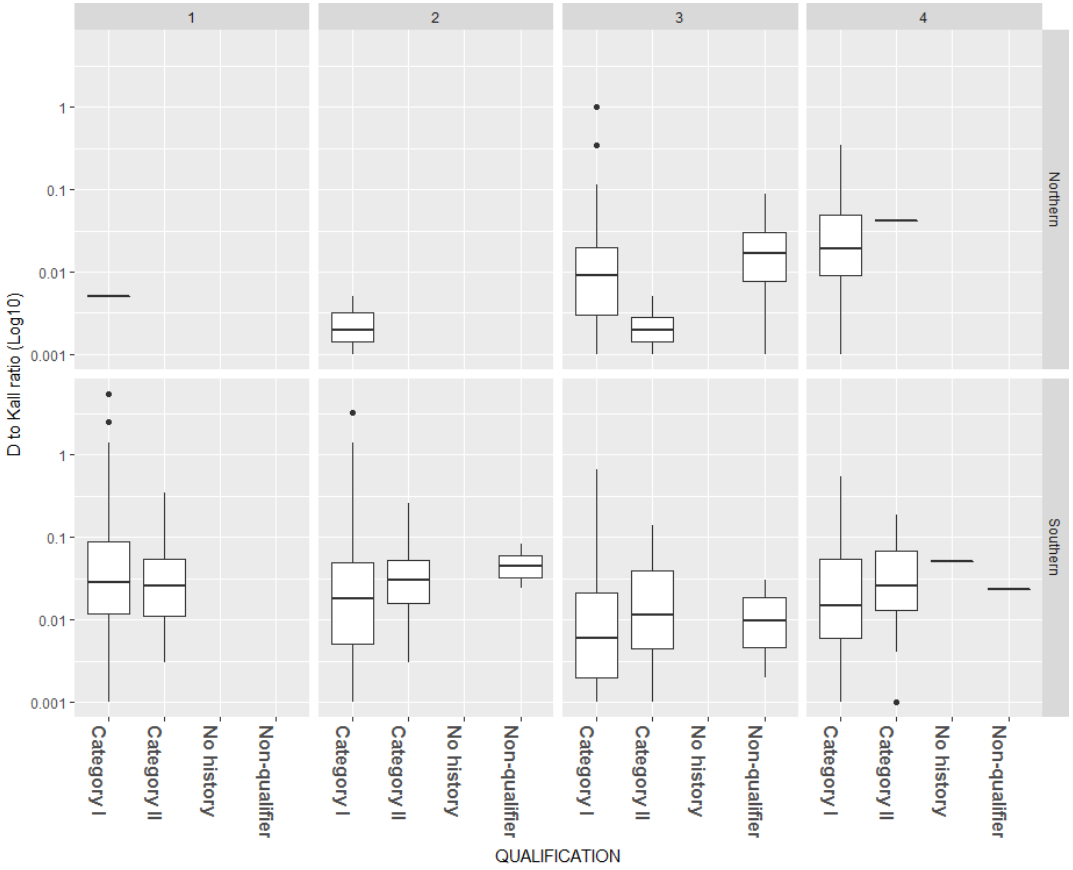


Figure 82. 2014-2016 bycatch rates (D/Kall) for barndoor skate by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.



11.4.10 Atlantic herring

Atlantic herring appear in the observed small-mesh multispecies fishery bycatch more frequently in the northern area than they do in the southern area. In particular, there is a significant overlap between the fishery in the Cultivator Shoals Area and herring on the northern edge of Georges Bank, which may have seasonal characteristics. Atlantic herring bycatch rates ranked 6th (0.051 lbs/lbs. kept) in the northern and 13th (0.005 lbs/lbs. kept) in the southern management area.

In the northern management area, the bycatch rate has substantially declined since a peak in 2005 (Figure 83). Atlantic herring bycatch in the southern management area is sporatic and varies between years without trend.

As with other species, the Atlantic herring bycatch in the northern management area using a raised footrope trawl is similar to the rate for a 2/4 seam net, but less than that for a standard groundfish net (Figure 84). There does not appear to be much difference in Atlantic bycatch among qualification categories and catches in the southern management area are too sporatic to say whether there was a meaningful difference (Figure 85).

Figure 83. Atlantic herring bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

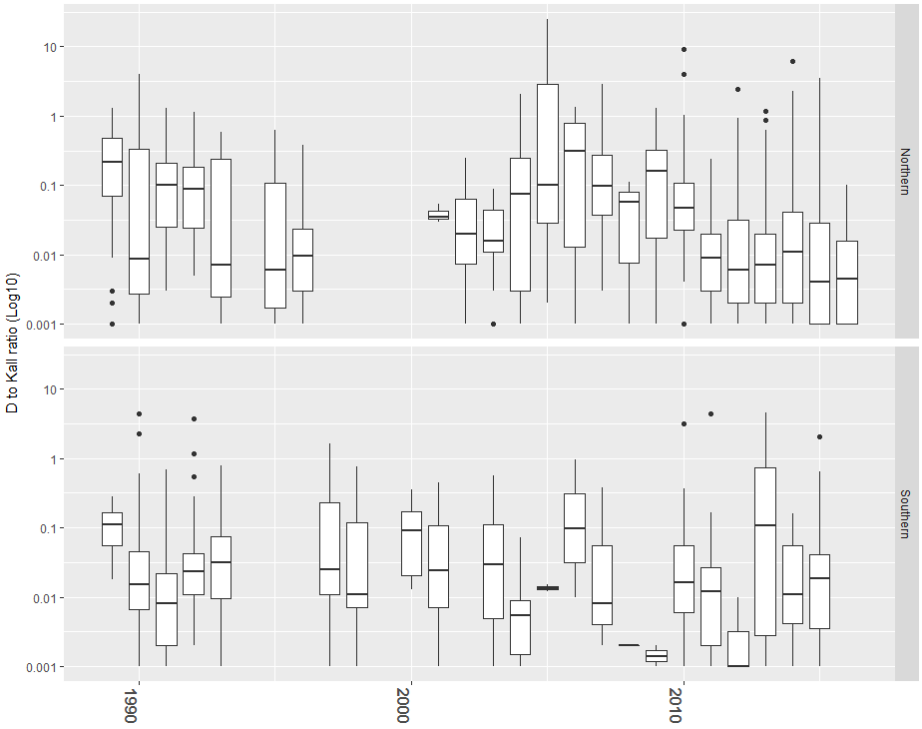


Figure 84. Atlantic herring bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

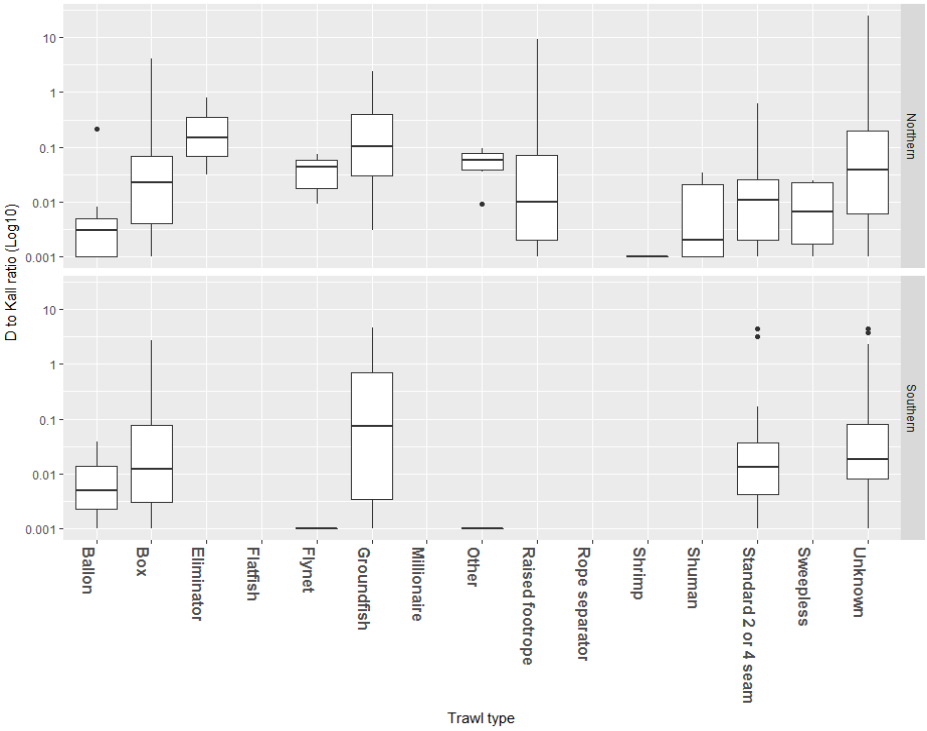
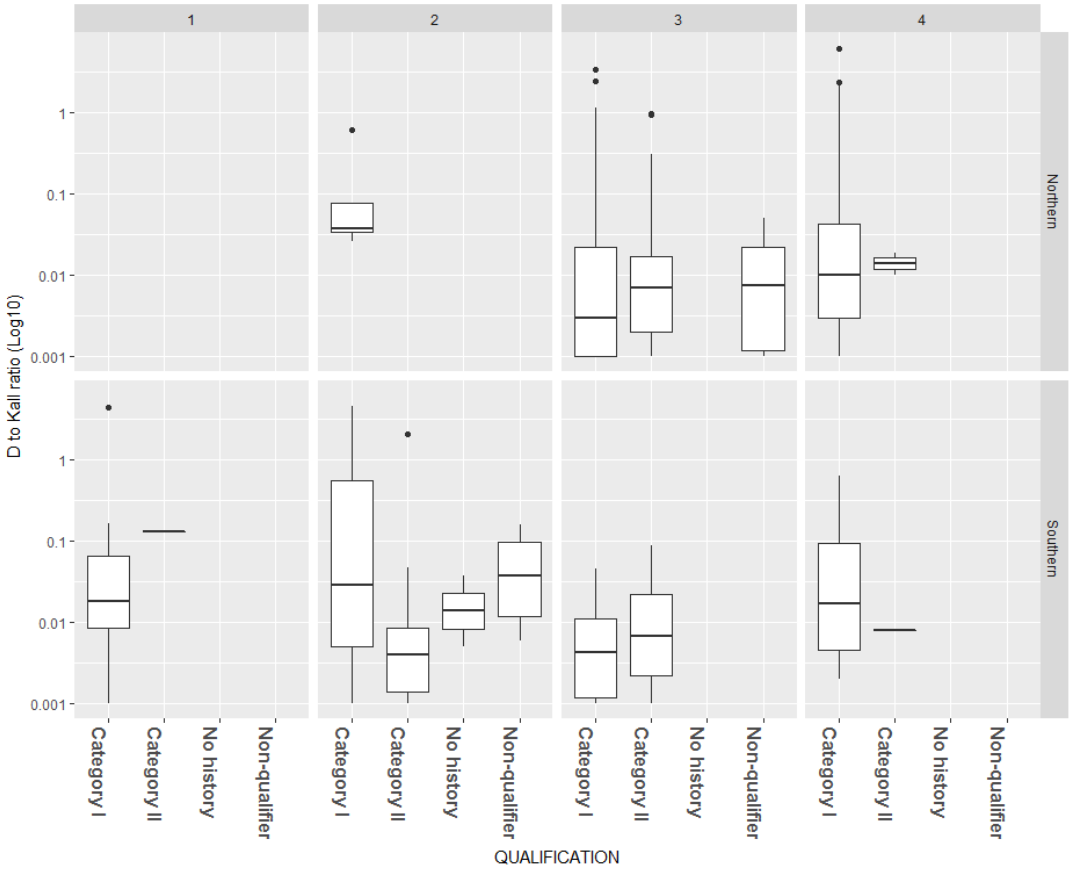


Figure 85. 2014-2016 bycatch rates (D/Kall) for Atlantic herring by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.



11.4.11 Witch flounder

Witch flounder bycatch rates were the next highest of the observed discards in the small-mesh multispecies fishery, ranking 10th (0.004 lbs/lbs. kept) in the northern and 12th (0.005 lbs/lbs. kept) in the southern management area.

Witch flounder observed bycatch was sporadic in the northern management area and the bycatch rate had a high degree of variation among years (Figure 86). In the southern management area, the bycatch rate appeared to increase through the time series through 2013, but then has declined.

It is difficult to say whether the bycatch rate was different amongst trawl configurations in the northern management area because witch flounder was not frequently observed. In the southern management area, the bycatch rate appears to be lower for the 'eliminator' and 'millionaire' trawls than for other trawl types (Figure 87).

In the southern management area, the bycatch of witch flounder appears to be substantially higher for vessels that would qualify for a Category I permit under Alternative 1 than for other vessels (Figure 88). This result may be due to the larger Category I vessels tending to fish further offshore and on Georges Bank, in the southern management area.

Figure 86. Witch flounder bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

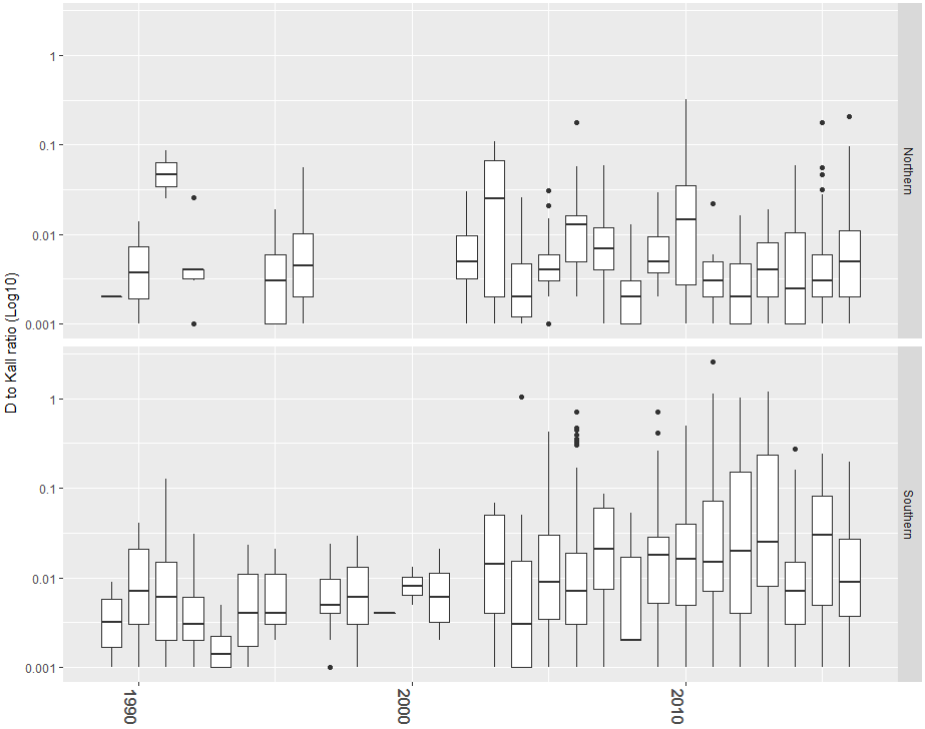


Figure 87. Witch flounder bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

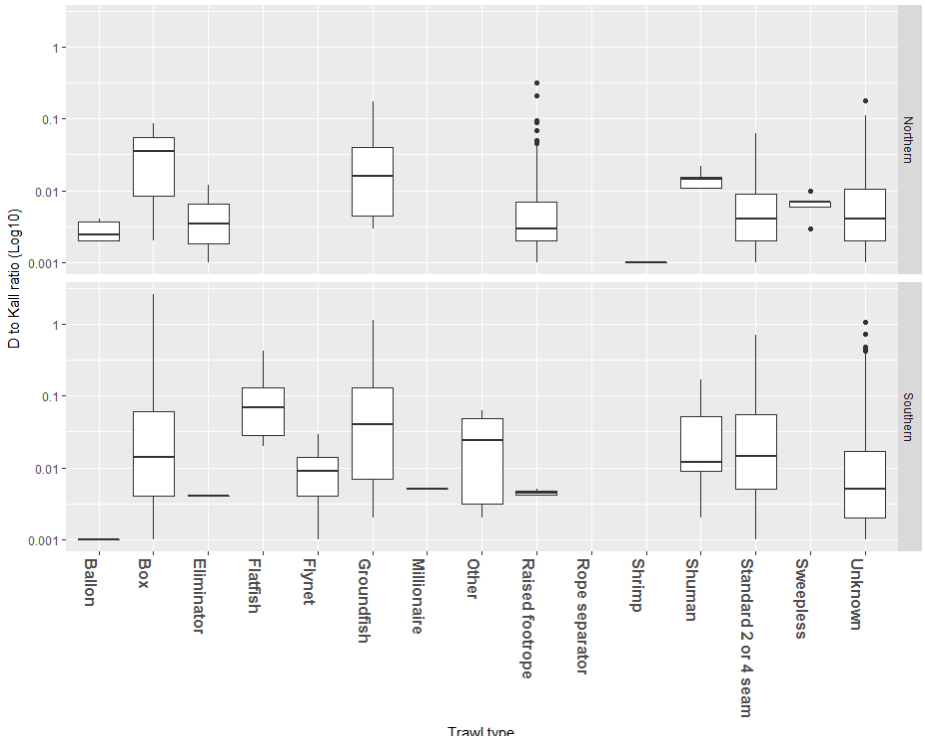
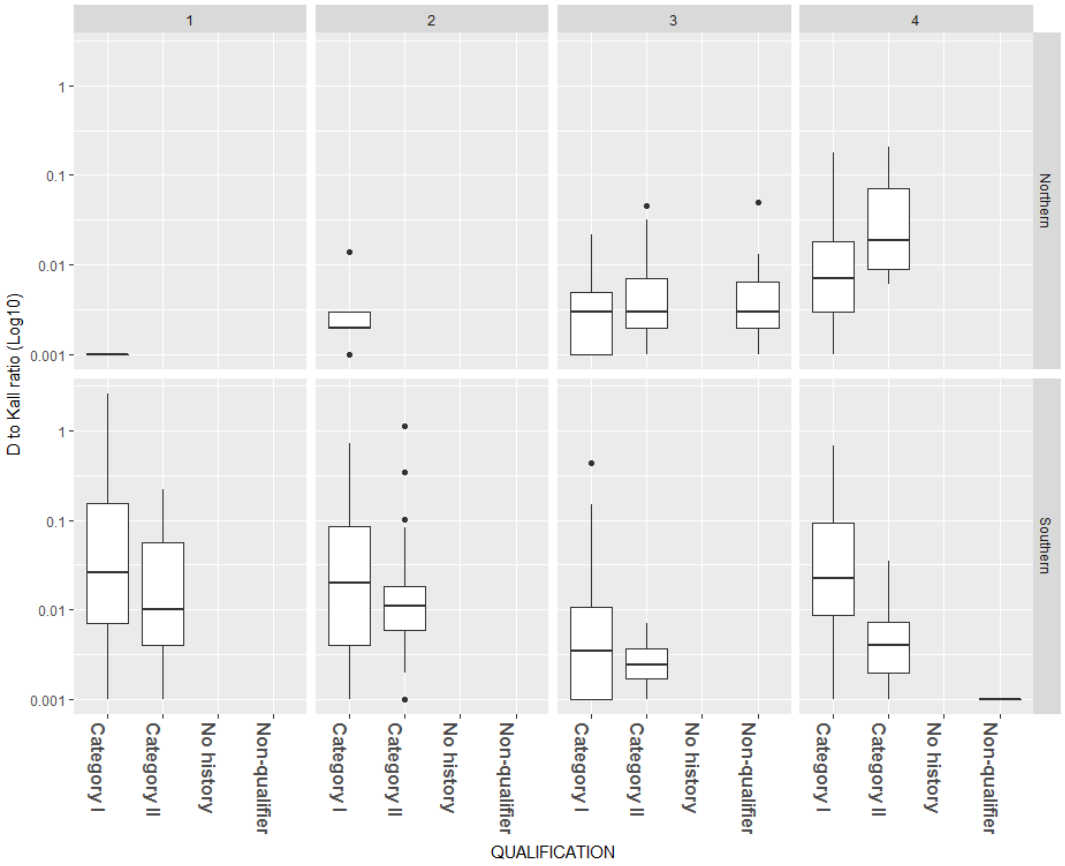


Figure 88. 2014-2016 bycatch rates (D/Kall) for witch flounder by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.



11.4.12 Other species in observed bycatch

Other species that were observed in 2014-2016 sea sampling and at-sea monitoring data include monkfish (northern rank=15; southern rank=10), yellowtail flounder (11,15), winter flounder (13,14), American plaice (9,19), windowpane flounder (14,16), ocean pout (20,11), white hake (16,17), cod (18,18), thorny skate (19,-), and smooth skate (21,-).

Yellowtail flounder is a species with a sub-ACL that applies to the small-mesh multispecies fishery that operates in the Georges Bank yellowtail flounder stock area. The yellowtail flounder bycatch rate was high in the northern management area (which includes the Cape Cod yellowtail flounder stock) during 2003-2010, then drops to a lower level (Figure 89). Observed yellowtail flounder bycatch in the southern management area peaked in 2010 and 2012, but had no trend for other years.

Interestingly (because the raised footrope trawl is expected to reduce catches of flatfish), the bycatch rate for observed hauls using a raised footrope trawl in the northern management area does not appear to be different than that for hauls using a standard 2/4 seam net (Figure 90), but less than that observed for a standard groundfish net.

In the northern management area, there does not appear to be much difference in yellowtail flounder bycatch among Alternative 2 qualification categories (Figure 91). In the southern management area, the

yellowtail flounder bycatch for Category II vessels appears to be lower than for other qualification categories, particularly during quarters 2 and 3. This may be related to differences in the target species and areas fished by vessels that would qualify for Category I or Category II.

Figure 89. Yellowtail flounder bycatch rates (D/Kall) by year on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

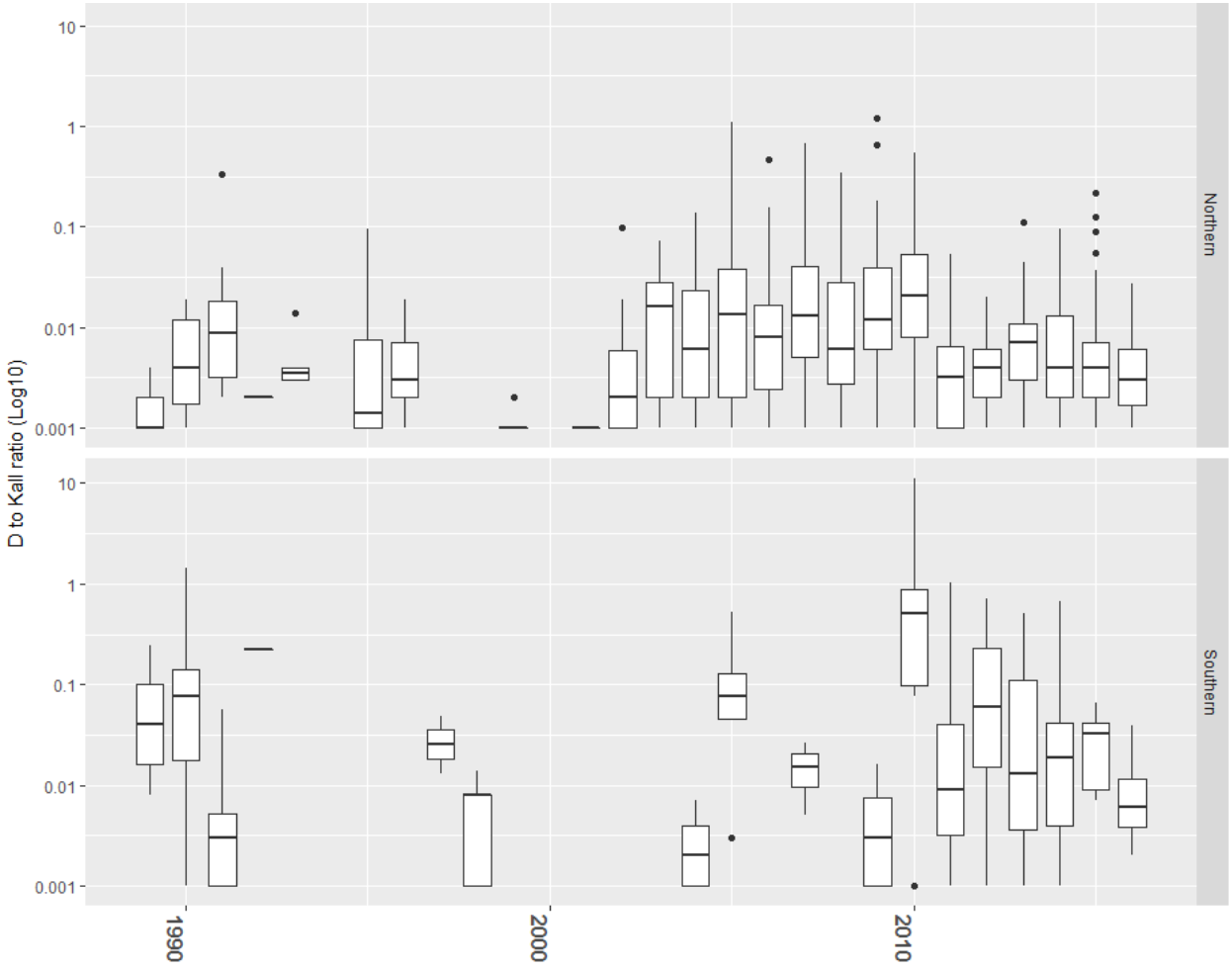


Figure 90. Yellowtail flounder bycatch rates (D/Kall) by trawl type on observed small-mesh multispecies trips in Northern (Top) and Southern (Bottom) management areas.

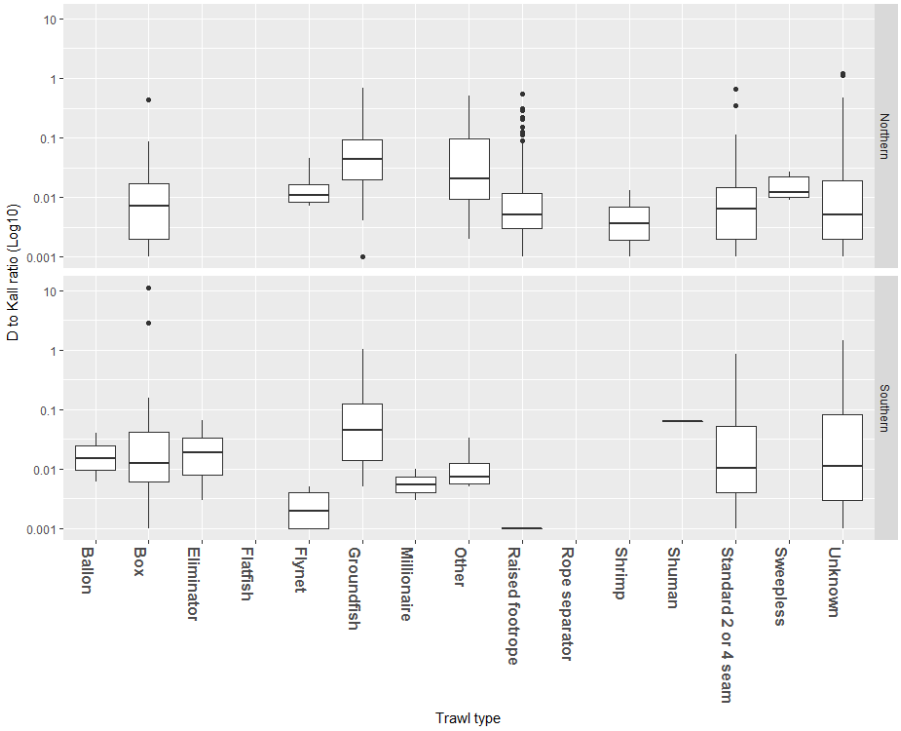


Figure 91. 2014-2016 bycatch rates (D/Kall) for yellowtail flounder by Alternative 2 qualification status on observed small-mesh multispecies trips by management area and quarter.