INITIAL REVIEW DRAFT

**Environmental Assessment/ Regulatory Impact Review/
Initial Regulatory Flexibility Analysis
for Proposed Regulatory Amendment for the
Groundfish Fishery of the Gulf of Alaska**

Revising Skate Maximum Retainable Amounts in the Gulf of Alaska Groundfish Fishery

October 2014

Big skate, *Raja baniculata*

For further information contact: Steve MacLean, North Pacific Fishery Management Council
605 W 4th Ave, Suite 306, Anchorage, AK 99501
(907) 271-2809

Abstract: This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis analyzes proposed management measures that would reduce the maximum retainable amounts (MRA) for skates in directed fisheries for groundfish in the Gulf of Alaska (GOA). The Council proposed reducing the skate MRA because the catch of big and longnose skates in the GOA groundfish and halibut fisheries has exceeded area specific acceptable biological catch for several years. Current regulations allow vessels to "top off" their catch of groundfish by retaining skates in an amount up to 20 percent of the retained groundfish catch. The purpose of this action is to slow the harvest rate of skates and decrease the incentive for vessels to top off on skates by reducing the MRA to levels that more accurately reflect the intrinsic rate of incidental catch of skates in the GOA. The intrinsic catch rate is the rate that would occur if there were no market for skates, or, alternatively, if the skate retention were prohibited by regulation. The analysis considers reducing the MRA for skates to 5%, 10%, 15%, and the no-action alternative which would keep the MRA at 20%.The proposed action is not likely to have any impacts on the human environment features, including habitat, ecosystem or ecosystem components, marine mammals, or seabirds. Potential impacts are limited to skates in the GOA and groundfish in the GOA.

List of Acronyms and Abbreviations

‘	feet
AAC	Alaska Administrative Code
ABC	acceptable biological catch
ADF&G	Alaska Department of Fish and Game
AEQ	adult equivalent
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
AGDB	Alaska Groundfish Data Bank
AKFIN	Alaska Fisheries Information Network
ANILCA	Alaska National Interest Lands Conservation Act
BASIS	Bering Sea-Aleutian Salmon International Survey
BEG	biological escapement goal
BOF	Board of Fish
BSAI	Bering Sea and Aleutian Islands
CAS	Catch Accounting System
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
COAR	Commercial Operators Annual Report
Council	North Pacific Fishery Management Council
CP	catcher/processor
CV	catcher vessel
CWT	coded-wire tag
DPS	distinct population segment
E	East
E.O.	Executive Order
EA	Environmental Assessment
EEZ	Exclusive Economic Zone
EFH	essential fish habitat
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESU	endangered species unit
FMA	Fisheries Monitoring and Analysis
FMP	fishery management plan
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FRFA	Final Regulatory Flexibility Analysis
ft	foot or feet
GHL	guideline harvest level
GOA	Gulf of Alaska
ID	Identification
IRFA	Initial Regulatory Flexibility Analysis
IPA	Incentive Plan Agreement
IQF	individually quick frozen
JAM	jeopardy or adverse modification
lb(s)	pound(s)
LEI	long-term effect index
LLP	license limitation program
LOA	length overall
m	meter or meters

Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
MRA	Maximum Retainable Amount
MSST	minimum stock size threshold
mt	metric ton
NAO	NOAA Administrative Order
NEPA	National Environmental Policy Act
NMFS	National Marine Fishery Service
NOAA	National Oceanographic and Atmospheric Administration
NPAFC	North Pacific Anadromous Fish Commission
NPFMC	North Pacific Fishery Management Council
NPPSD	North Pacific Pelagic Seabird Database
Observer Program	North Pacific Groundfish Observer Program
OEG	optimal escapement goal
OFL	Overfishing Level
OMB	Office of Management and Budget
PBR	potential biological removal
PSC	prohibited species catch
PPA	Preliminary preferred alternative
PRA	Paperwork Reduction Act
PSEIS	Programmatic Supplemental Environmental Impact Statement
PWS	Prince William Sound
RFA	Regulatory Flexibility Act
RFFA	reasonably foreseeable future action
RIR	Regulatory Impact Review
RPA	reasonable and prudent alternative
RSW	refrigerated seawater
SAFE	Stock Assessment and Fishery Evaluation
SAR	stock assessment report
SBA	Small Business Act
Secretary	Secretary of Commerce
SEG	sustainable escapement goal
SET	sustainable escapement threshold
SNP	single nucleotide polymorphism
SPLASH	Structure of Populations, Levels of Abundance, and Status of Humpbacks
SRKW	Southern Resident killer whales
SSFP	Sustainable Salmon Fisheries Policy
SW	southwest
TAC	total allowable catch
U.S.	United States
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VMS	vessel monitoring system
W	West

Table of Contents

EXECUTIVE SUMMARY **7**

1 INTRODUCTION **10**

1.1 Purpose and Need 11
1.2 History of this Action 11
1.3 Description of Action Area 11

2 DESCRIPTION OF ALTERNATIVES **13**

2.1 Alternative 1, No Action, Status Quo 13
2.2 Alternative 2 13
2.3 Alternative 3 13
2.4 Alternative 4 13
2.5 Comparison of Alternatives 13

3 ENVIRONMENTAL ASSESSMENT **15**

3.1 Groundfish species 17
3.1.1 Skates in the GOA 17
3.1.1.1 Survey Biomass Estimates 18
3.1.1.2 Skate Management 20
3.1.1.3 Big Skate 21
3.1.1.4 Longnose Skate 22
3.1.1.5 “Other Skates” 23
3.1.2 State-managed Fisheries 24
3.1.3 Effects of the Alternatives 25
3.2 Other fish species 26
3.2.1 Effects of the Alternatives 26
3.3 Cumulative Effects 27

4 REGULATORY IMPACT REVIEW **28**

4.1 Statutory Authority 28
4.2 Purpose and Need for Action 29
4.3 Alternatives 29
4.4 Methodology for analysis of impacts 29
4.5 Description of Fisheries 33
4.5.1 Catch 33
4.5.1.1 Big Skate Catch History 33
4.5.1.2 Longnose Skate Catch History 38
4.5.1.3 Other Skate Catch History 41
4.5.1.4 Retention rates 43
4.6 Description of management 46
4.6.1 Vessels 48
4.6.1.1 Vessel Dependency 48
4.6.2 Communities 50
4.7 Analysis of Impacts: Alternative 1, No Action 51
4.8 Analysis of Impacts: Alternatives 2 and 3 (15 and 10 Percent MRAs) 55
4.9 Analysis of Impacts: Alternative 4 (5 Percent MRA) 56
4.10 Enforcement 57
4.11 Summation of the Alternatives with Respect to Net Benefits to the Nation 58

5 INITIAL REGULATORY FLEXIBILITY ANALYSIS **59**

5.1 Introduction 59
5.2 IRFA Requirements 59
5.3 Definition of a Small Entity 60
5.4 Reason for Considering the Proposed Action 61
5.5 Objectives of Proposed Action and its Legal Basis 62
5.6 Number and Description of Directly Regulated Small Entities 62
5.7 Recordkeeping and Reporting Requirements 63
5.8 Federal Rules that may Duplicate, Overlap, or Conflict with Proposed Action 63

5.9 Description of Significant Alternatives to the Proposed Action that Minimize Economic Impacts on Small Entities 63

6 PREPARERS AND PERSONS CONSULTED 64

7 REFERENCES 65

List of Tables

Table 2-1 Summary of alternatives and major impacts 14
Table 3-1 Resources potentially affected by the proposed action and alternatives 16
Table 3-2. Biomass estimates (t) of skate species from GOA bottom trawl surveys, 1984 – 2013, and three-season average biomass from 2009-2013. CV = coefficient of variation. 19
Table 3-3. Survey biomass estimates (t) for big skates by GOA regulatory area, 1984-2013. CV = coefficient of variation. 19
Table 3-4. 2008-2014 GOA big skate OFL, ABC/TAC, catch, and catch as percentage of the area ABC/TAC in the Gulf of Alaska. 21
Table 3-5. Percentage of Big Skate Catch by Gear and Target Fishery in the GOA. 21
Table 3-6. 2008-2014 Longnose skate OFL, ABC/TAC, catch, and catch as percentage of the area ABC/TAC in the Gulf of Alaska. 22
Table 3-7. Percentage of Longnose Skate Catch by Gear and Target Fishery 23
Table 3-8. OFL, ABC/TAC, and Catch of “Other Skates” in the GOA, 2008-2014 23
Table 3-9. Percentage of “other skates” catch by gear and target fishery 24
Table 3-10 Criteria used to determine significance of effects on skates and target groundfish stocks. 26
Table 4-1 Hook-and-line and non-pelagic trawl catches of big skates in the Central GOA, 2008 through mid-2014 36
Table 4-2 Sectoral proportions of Central GOA non-pelagic trawl big skate catch (discarded and retained) by target species fishery and year 36
Table 4-3 Estimated rate of Central GOA big skate catch (retained and discarded) in relation to groundfish catch (retained and discarded) before and after (shaded cells) PSC closures 38
Table 4-4 Hook-and-line and non-pelagic trawl catches of longnose skates in the Western GOA, 2008 through mid-2014 40
Table 4-5 Sectoral proportions of Western GOA longnose skate catch (discarded and retained) by gear, target species fishery, and year 41
Table 4-6 Vessels with retained skate catch by sector and gear type, 2008 through mid-2014 (in number of vessels) 48
Table 4-7 Summary of Alternative impacts and net benefits estimates 58
Table 5-1 Numbers of small entities directly regulated by this action 63

List of Figures

Figure 1-1 Regulatory and reporting areas in the GOA. 12
Figure 4-1 Catch of big skates, ABC, and OFL, by management area from 2008 through mid-2014 34
Figure 4-2 Retained and discarded catch of big skates in the Central GOA, by gear and sector, 2008 through mid-2014. HAL – hook-and-line, NPT– non-pelagic trawl, OTH – other 35
Figure 4-3 Catch of longnose skates, ABC, and OFL, by management area from 2008 through mid-2014. 39
Figure 4-4 Retained and discarded catch of longnose skates in the Western GOA, by gear and sector, 2008 through mid-2014. 40
Figure 4-5 Catch of other skates OFL, ABC/TAC and OFL by and management area from 2008 through mid-2014. 42
Figure 4-6 Retained and discarded catch of other skates catches by gear and sector for the entire GOA, from 2008 through mid-2014. 43
Figure 4-7 2013 GOA Skate retention (all species, all areas, all gears) by hypothetical MRA rate 45
Figure 4-8 2013 Central GOA Big Skate retention (all gears) by hypothetical MRA rate 46
Figure 4-9 Percent of gross revenues from skates for CVs and C/Ps with retained skates, 2008 through 2013 49
Figure 4-10 Percent of gross revenues from CGOA big skates for CVs and C/Ps with retained CGOA big skates, 2008 through 2013. 50
Figure 4-11 Seasonal patterns of groundfish retention in GOA arrowtooth, deep water flatfish, and rex sole target fisheries, 2012 through mid-2014 54

Executive Summary

This document analyzes the environmental impacts of proposed action alternatives to reduce the maximum retainable amount (MRA) for skates in the Gulf of Alaska (GOA) groundfish and halibut fisheries, the economic benefits and costs of the action alternatives, as well as their distribution, and the impacts of the action on directly regulated small entities.

Purpose and Need

During public testimony, in December 2013, the North Pacific Fishery Management Council (Council) was made aware that the incidental catch of skates (primarily big skates, *Raja binoculata*, and longnose skates, *Raja rhina*) has exceeded the intrinsic rate of skate incidental catch in GOA groundfish fisheries in some years. Testimony indicated that this is because the MRA for skates in the GOA (20%) allows industry to top off on skates while fishing for groundfish. Since 2010, the estimated catch of big skates has exceeded the acceptable biological catch (ABC) in the Central GOA each year, and estimated catch of longnose skates exceeded the ABC in the Western GOA in 2009, 2010, and 2013. The purpose of this action is to slow the harvest rate of skates and decrease the incentive for vessels to top off on skates by reducing the MRA to levels that more accurately reflect the intrinsic rate of the incidental skate catch in the GOA.

Alternatives

Alternative 1, the no-action alternative, would maintain the MRA for skates for all basis species at 20%. Vessels would be allowed to retain skates while fishing for other species up to 20% of the basis species catch until the ABC for skates is met.

Alternative 2 would reduce the MRA for skates for all basis species to 15%. Vessels would be allowed to retain skates while fishing for other species up to 15% of the basis species catch until the ABC for skates is met.

Alternative 3 would reduce the MRA for skates for all basis species to 10%. Vessels would be allowed to retain skates while fishing for other species up to 10% of the basis species catch until the ABC for skates is met.

Alternative 4 would reduce the MRA for skates for all basis species to 5%. Vessels would be allowed to retain skates while fishing for other species up to 5% of the basis species catch until the ABC for skates is met.

Environmental Assessment

The proposed action, to reduce the MRA of skates in the GOA, is limited in scope and will not likely affect all environmental components of the GOA. No effects are expected on the physical environment (habitat), ecosystem or ecosystem component species, marine mammals, or seabirds. Existing fishing regulations and protection measures for protected species would not be changed, nor would allowable harvest amounts for important prey species. Impacts to habitat and the ecosystem or ecosystem components are not expected because the proposed action could reduce the intensity of fishing (reduced number of tows) as top-off tows may be reduced or eliminated. No marine mammals or seabirds are known to feed extensively on skates. Offshore killer whales are known to feed on elasmobranchs, but it appears that offshore killer whales in the GOA feed primarily on Pacific sleeper sharks, blue sharks, Pacific spiny dogfish, and Chinook salmon, and have not been observed to feed on skates. (J. Ford,

Department of Fisheries and Oceans; C. Matkin, North Gulf Oceanic Society; P. Wade, NMFS Pers. Comm. Aug., 2014).

The proposed action to reduce skate MRAs in groundfish target fisheries are not likely to result in any significant impacts on skate stocks, as management measures designed to prevent negative effects to stocks will remain in place. It is possible that reductions in skate MRAs may result in reduced retained catch of some skate stocks; however, changes in incidental catch are expected to be minor and not affect the stocks' ability to sustain themselves above MSST.

Likewise, the management measures designed to prevent negative effects to groundfish stocks will remain in place in any alternative. The alternatives do not implement any direct changes to the groundfish target fisheries or impact ABCs. It is possible that reductions in skate MRAs may result in reduced catch of some target groundfish species; however, changes in catch are expected to be minor and not affect management of the GOA groundfish fisheries.

Regulatory Impact Review

Since 2008, the estimated catch of big skate has exceeded the ABC/total allowable catch (TAC) in the Central GOA in 2010, 2011, 2012, and 2013, and the estimated catch of longnose skate has exceeded the ABC/TAC in the Western GOA in 2009, 2010, and 2013. Big skate catches in the Eastern and Western GOA, longnose skate catches in the Eastern and Central GOA, and other skate catches throughout the GOA, have been within ABC/TAC levels. The GOA-wide ABCs have not been exceeded for big skate, longnose skate, or other skates.

Under the no action (or status quo) alternative, the GOA skate MRA would remain at 20 percent of the basis species. However, the MRA tool is used in conjunction with the Regional Administrator's decision about whether or not, and when, to prohibit retention, and place skates on prohibited species status. In recent years the Regional Administrator has found it necessary to place big skate in the Central GOA on prohibited species status increasingly early in the year. In 2014, big skate in the Central GOA were placed on prohibited species status on February 5.

In 2015, and in subsequent years, if fishing conditions are found similar to those in 2014, it is likely that big skate in the Central GOA would be placed on prohibited species status and retention prohibited early in the fishing year, perhaps earlier than in 2014. A prohibition on retention might be lifted later in the year if it becomes apparent that the annual TAC would not be reached.

Reductions in the MRA will affect retained catch but will not reduce discarded catch. ABC/TAC limits have been exceeded for big skate in the Central GOA and longnose skate in the Western GOA. A large proportion of big skate in the Central GOA are retained, while relatively more longnose skate in the Western GOA are discarded. Thus, a tightening of the MRA constraint may have more impact on the Central GOA big skate catch.

Various factors may limit the efficacy of a reduction in the MRA level: (1) retention as a percent of basis species estimates suggest that reductions in the MRA by half (to 10 percent) are likely to have relatively little impact on skate catches for operators with MRAs between the 20 percent level and the lower level to which the MRA would be changed; (2) many operators will not be constrained by MRA reductions (as they will have been operating below the new MRA), and may even be able to expand production if the reduction in harvest by operations constrained by the MRA increases prices, and the incentive to retain skates; (3) the MRA is a GOA-wide limit covering all species of skates with a single MRA; it is not species or area specific, while the problem is a species- and area-specific problem.

The following table, reproduced from the summary section of the RIR, provides key information on the impacts of the four alternatives under consideration.

Impact	Baseline	Status quo (20%)	10% or 15%	5%
Impact of the action on retained catch	Significant proportions of Big skate catches retained; less so of Longnose and other skates.	No change from the baseline.	Not likely to see any significant change from the baseline for fishing operations newly constrained by tighter limits. Moreover, the alternatives have no ability to change constraints on fishing operations fishing under new MRA limit.	May see more significant constraints imposed on retained catches at the extensive margin. However, the alternatives have no ability to change constraints on fishing operations fishing under new MRA limit.
Effect on in-season management ability to limit catch to designated catch limits	Recent problems limiting big skate catches to the ABC in the Central GOA, and limiting longnose catches to the ABC in the Western GOA. No current problems limiting catches of any skate species within OFL levels. Control currently requires prohibition of retention for some or all of year. Under current conditions this may allow limiting big skates in the Central GOA to the ABC, but ability to limit longnose skates to ABC in western GOA is limited by large proportion of these skates which are not retained.	No change from the baseline.	Not likely to see any significant change from the baseline.	Rates at this level may permit more control. Key problem that can be addressed by smaller MRA is retention of big skates in Central GOA. However, the MRA is a general one applying to all skates as a group. Moreover, even with tighter MRAs, there appears to be opportunity for operations under the MRA to expand skate catch. Probably little ability to address longnose skate problem in the Western GOA given the large proportion of these that are discarded.
Cost to fishing and processing industries	Loss of big skate top off opportunities in CGOA because of prohibition of retention. Loss may be on the order of between $3.2 million and $5.1 million to shoreside processors and the vessels that deliver to them. Catcher/processor production has averaged about $0.6 million at the first wholesale level. Shoreside impacts felt most in Kodiak.	No change from the baseline.	Not likely to see any significant change from the baseline.	May permit some additional retained catch and revenues. Potential increase as a proportion of baseline revenues lost is very uncertain.
Impact on enforcement	No significant enforcement issues.	No significant enforcement issues.	No significant enforcement issues; may see some short term transitional overages until industry becomes accustomed to the new MRAs.	No significant enforcement issues; may see some short term transitional overages until industry becomes accustomed to the new MRAs.
Net benefits to the nation	Not applicable.	None compared to baseline.	Not likely to see any compared to baseline.	May see some benefits if fishing operations have increased opportunities to retain catch.

1 Introduction

This document analyzes proposed management measures that would reduce the maximum retainable amount (MRA) for skates in the Gulf of Alaska (GOA) fisheries. The purpose of the proposed regulatory change is to slow the harvest rate of skates by reducing the MRA for skates to a level that more closely approximates the natural incidental catch rate of skates in the GOA.

This document is an Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) of proposed management measures that would reduce the MRA for skates in the Gulf of Alaska (GOA) fisheries. An EA/RIR/IRFA provides assessments of the environmental impacts of an action and its reasonable alternatives (the EA), the economic benefits and costs of the action alternatives, as well as their distribution (the RIR), and the impacts of the action on directly regulated small entities (the IRFA). This EA/RIR/IRFA addresses the statutory requirements of the Magnuson Stevens Fishery Conservation and Management Act, the National Environmental Policy Act, Presidential Executive Order 12866, and the Regulatory Flexibility Act. An EA/RIR/IRFA is a standard document produced by the North Pacific Fishery Management Council (Council) and the National Marine Fisheries Service (NMFS) Alaska Region to provide the analytical background for decision-making.

MRAs are the primary tool used by NMFS to reduce or slow the catch of groundfish species when directed fishing for that species is closed. Directed fishing is defined in 50 CFR part 679 as ‘‘any fishing activity that results in the retention of an amount of a species or species group onboard a vessel that is greater than the MRA for that species or species group.”

The MRA amount is calculated as a percentage of the species closed to directed fishing (incidental catch species) relative to the amount of other species retained onboard the vessel that are open for directed fishing (basis species). Table 10 to 50 CFR part 679 provides GOA MRA percentages for groundfish species or species groups that are closed to directed fishing.

The amounts of skates available to the commercial fisheries in the GOA are limited by relatively small acceptable biological catches (ABCs) and total allowable catches (TACs) that are fully needed to support incidental catch needs in other fisheries. As a result, the directed fishery for skates is typically closed at the beginning of the fishing year and skate incidental catch is limited by an aggregate skate MRA. As part of the aggregate skate MRA, the combined amounts of big, longnose, and “other species” of skates closed to directed fishing must not exceed 20 percent of retained other species that are open to directed fishing. For example, if Pacific cod is open to directed fishing (a basis species) and skates is closed to directed fishing, a vessel operator may retain skates in amounts up to 20 percent of the round weight equivalent of Pacific cod that is onboard the vessel at any point in time during a fishing trip. To calculate retained amounts for skates and Pacific cod, the vessel operator would estimate the processed weight of skates and Pacific cod for a trip, convert those processed amounts to round weight equivalent of retained catch, and compare that estimate of retained catch with the 20 percent MRA for skates. Amounts of an incidental catch species onboard a vessel that are below or equal to the specified MRA percentage for that species may be retained. Amounts that are in excess of the MRA percentage must be discarded. Such discards that are required by the regulations are known as regulatory discards.

MRA percentages serve as a management tool to slow the harvest rates of incidental catch species by limiting the amount that can be retained on board a vessel. By not placing the incidental catch species on ‘‘prohibited retention’’ status, thereby prohibiting all retention, MRAs also serve to minimize regulatory discard of species taken incidentally in other directed fisheries. MRA percentages reflect a balance between the need to reduce the harvest rate of incidental catch species and the desire to minimize regulatory discard of the incidental catch species. Although MRA percentages limit the incentive to target

on an incidental catch species, fishermen can ‘‘top-off’’ their retained catch with these species up to the MRA amount by deliberately targeting them.

MRAs assist in limiting harvest of a groundfish species within its annual TAC. Once the TAC for a species is reached, retention of that species becomes prohibited and all catch of that species must be discarded. Therefore, NMFS closes a species to directed fishing before the entire TAC is taken to leave sufficient amounts of the TAC available for incidental catch. A species–specific or species group MRA is used to manage the amount of a species left for incidental catch. Nonetheless, the catch of skates may exceed the TAC and ABC and approach the specified overfishing level. If an overfishing level of skates is approached, NMFS issues closures or prohibitions designed to prevent overfishing of that species for other fisheries in which skates are taken as catch. A reduction in the skate MRA may limit the incentive for fishermen to top-off and reduce the risk of approaching the overfishing level for skates.

1.1 Purpose and Need

Public testimony to the Council, in December 2013, indicated that the incidental catch of skates (primarily big skates, *Raja binoculata*, and longnose skates, *Raja rhina*) has exceeded the intrinsic rate of skate incidental catch in GOA groundfish fisheries in some years. Testimony indicated that this is because the MRA for skates in the GOA (20%) allows industry to top off on skates while fishing for groundfish. Since 2010, the estimated catch of big skates has exceeded the Allowable Biological Catch (ABC) in the Central GOA each year, and estimated catch of longnose skates exceeded the ABC in the Western GOA in 2009, 2010, and 2013. The purpose of this action is to slow the harvest rate of skates and decrease the incentive for vessels to top off on skates by reducing the MRA to levels that more accurately reflect the intrinsic rate of incidental skate catch in the GOA.

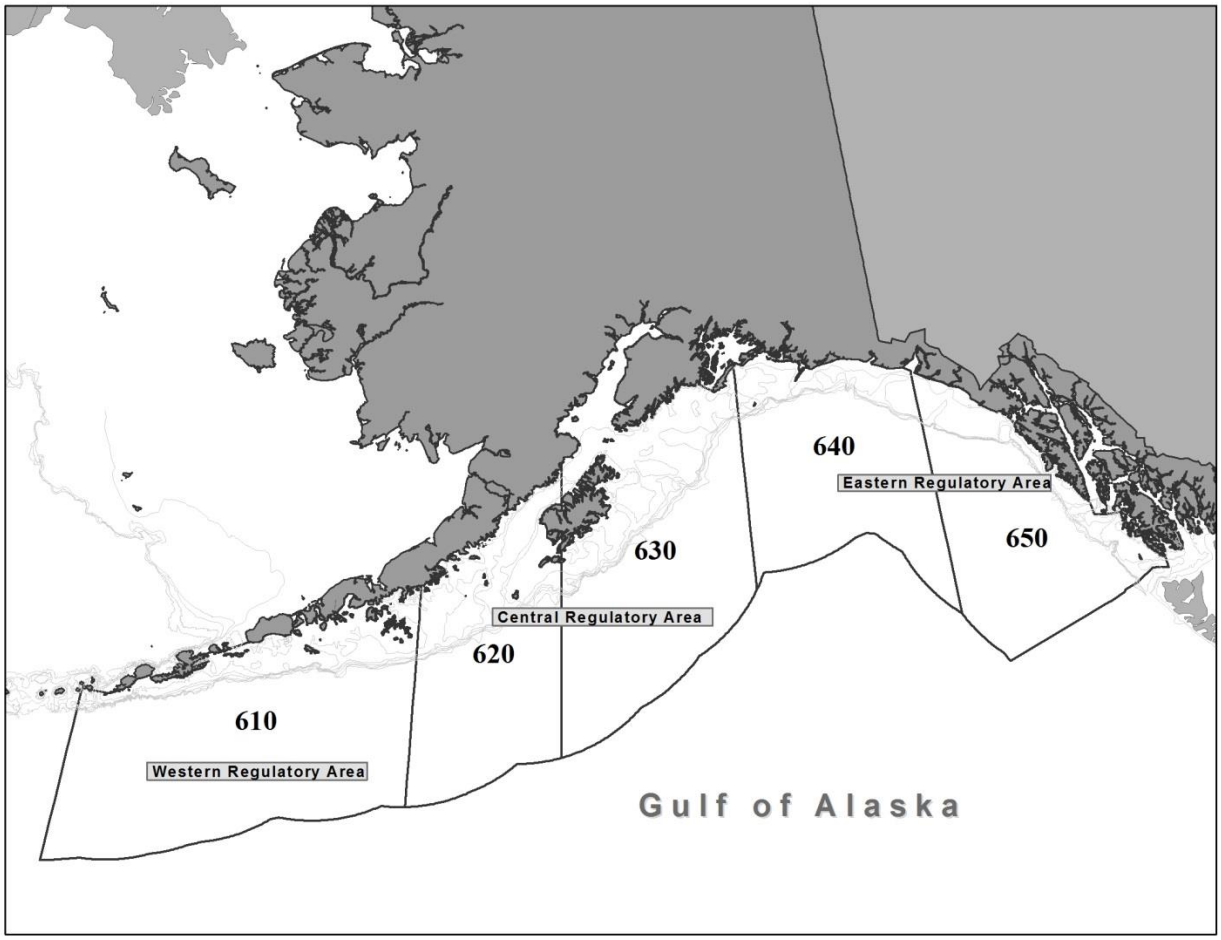
1.2 History of this Action

In June 2013, the Council requested a discussion paper on the potential for a directed octopus and skate fishery in the GOA. The discussion paper was presented to the Council in December 2013 (NPFMC 2013). Although the Council took no action in December 2013 to initiate a directed octopus or skate fishery, during public testimony the Council was informed that the incidental catch rate of skates in the groundfish fishery in the GOA exceeds the intrinsic catch rate because some vessels are topping off on skates while targeting other species. Topping off on skates may have contributed to the exceedance of the ABC/TAC for big skates in the Central GOA in 2010, 2011, 2012, and 2013, and longnose skates in the Western GOA in 2009, 2010, and 2013. At the December 2013 meeting, the Council requested that staff initiate an analysis to consider reducing the MRA for skates for all basis species to 5%, 10%, or 15%. This analysis considers all three of those alternatives, along with the no-action alternative that would keep the MRA at 20%.

1.3 Description of Action Area

The action area includes the entire Gulf of Alaska (Figure 1-1). Several documents, listed below in Chapter 3, have extensive information about the fishery management area, fisheries, marine resources, ecosystems, social, and economic elements of the GOA groundfish fisheries. These documents are cited in the References chapter and available on the NMFS, Alaska Region website at http://www.alaskafisheries.noaa.gov/analyses/default.htm. Additional information to describe specific components of the action area is included in the relevant sections below.

Figure 1-1 Regulatory and reporting areas in the GOA.



2 Description of Alternatives

The National Environmental Policy Act (NEPA) requires that an Environmental Assessment (EA) analyze a reasonable range of alternatives consistent with the purpose and need for the proposed action. The alternatives in this chapter were designed to accomplish the stated purpose and need for the action. All of the alternatives were designed to slow the harvest rate of skates by reducing the incentive for vessels to top off on skates.

The Council adopted the following alternatives for analysis in December, 2013.

2.1 Alternative 1, No Action, Status Quo

Alternative 1, the no-action alternative, would maintain the MRA for skates for all basis species at 20%. Vessels would be allowed to retain skates while fishing for other species up to 20% of the basis species catch until the ABC for skates is met.

2.2 Alternative 2

Alternative 2 would reduce the MRA for skates for all basis species to 15%. Vessels would be allowed to retain skates while fishing for other species up to 15% of the basis species catch until the ABC for skates is met.

2.3 Alternative 3

Alternative 3 would reduce the MRA for skates for all basis species to 10%. Vessels would be allowed to retain skates while fishing for other species up to 10% of the basis species catch until the ABC for skates is met.

2.4 Alternative 4

Alternative 4 would reduce the MRA for skates for all basis species to 5%. Vessels would be allowed to retain skates while fishing for other species up to 5% of the basis species catch until the ABC for skates is met.

2.5 Comparison of Alternatives

Table 2-1 summarizes the alternatives, and the expected environmental and economic impacts of each alternative. Additional detail is provided in the sections below.

Table 2-1 Summary of alternatives and major impacts

	Alternative 1 Status quo. No action.	**Alternative 2** MRA for skates reduced to 15% for all basis species	**Alternative 3** MRA for skates reduced to 10% for all basis species	**Alternative 4** MRA for skates reduced to 5% for all basis species
Environmental Impacts				
Skate populations	Skate catch in GOA may continue to exceed TAC/ABC in some areas in some years	Skate catch in GOA may continue to exceed TAC/ABC in some areas in some years	Skate catch in GOA may continue to exceed TAC/ABC in some areas in some years	Some, undefined potential to reduce catch of some skate species in GOA in some areas in some years
Economic Impacts				
Fishing effort	No significant change in fishing effort.	No significant change in fishing effort.	No significant change in fishing effort.	No significant change in fishing effort.
Gross Revenue at Risk	No change from the baseline.	Not likely to see any significant change from the baseline.	Not likely to see any significant change from the baseline.	May permit some additional retained catch and revenues.

3 Environmental Assessment

There are four required components for an environmental assessment. The need for the proposal is described in Section 1, and the alternatives in Section 2. This section addresses the probable environmental impacts of the proposed action and alternatives. A list of agencies and persons consulted is included in Section 6.

This section evaluates the impacts of the alternatives and options on the various environmental components. The socio-economic impacts of this action are described in detail in the Regulatory Impact Review (RIR) and Initial Regulatory Flexibility Analysis portions of this analysis (Sections 4 and 5).

Recent and relevant information, necessary to understand the affected environment for each resource component, is summarized in the relevant subsection. For each resource component, the analysis identifies the potential impacts of each alternative, and uses criteria to evaluate the significance of these impacts. If significant impacts are likely to occur, preparation of an EIS is required. Although an EIS should evaluate economic and socioeconomic impacts that are interrelated with natural and physical environmental effects, economic and social impacts by themselves are not sufficient to require the preparation of an EIS (see 40 CFR 1508.14).

The National Environmental Protection Act (NEPA) also requires an analysis of the potential cumulative effects of a proposed action and its alternatives. An environmental assessment or environmental impact statement must consider cumulative effects when determining whether an action significantly affects environmental quality. The Council on Environmental Quality (CEQ) regulations for implementing NEPA define cumulative effects as:

> *"the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7*).

The discussion of past and present cumulative effects is addressed with the analysis of direct and indirect impacts for each resource component below. The cumulative impact of reasonably foreseeable future actions is addressed in Section 3.3.

Documents incorporated by reference in this analysis

This EA relies heavily on the information and evaluation contained in previous environmental analyses, and these documents are incorporated by reference. The documents listed below contain information about the fishery management areas, fisheries, marine resources, ecosystem, social, and economic elements of the groundfish fisheries. They also include comprehensive analysis of the effects of the fisheries on the human environment, and are referenced in the analysis of impacts throughout this chapter.

Alaska Groundfish Harvest Specifications Final Environmental Impact Statement (NMFS 2007a).

This EIS provides decision makers and the public an evaluation of the environmental, social, and economic effects of alternative harvest strategies for the federally managed groundfish fisheries in the GOA and the Bering Sea and Aleutian Islands (BSAI) management areas and is referenced here for an understanding of the groundfish fishery.[1] The EIS examines alternative harvest strategies that comply with Federal regulations, the Fishery Management Plan (FMP) for Groundfish of the GOA, the Fishery

[1] The alternatives considered in this EA will not cause any of the potentially significant impacts addressed in the Alaska Groundfish Harvest Specifications Final EIS to recur.

Management Plan (FMP) for Groundfish of the BSAI Management Area, and the Magnuson-Stevens Fishery Conservation and Management Act. These strategies are applied using the best available scientific information to derive the total allowable catch (TAC) estimates for the groundfish fisheries. The EIS evaluates the effects of different alternatives on target species, non-specified species, forage species, prohibited species, marine mammals, seabirds, essential fish habitat, ecosystem relationships, and economic aspects of the groundfish fisheries. This document is available from: http://alaskafisheries.noaa.gov/analyses/specs/eis/default.htm.

Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Resources of the GOA (NPFMC 2014).

Annual SAFE reports review recent research and provide estimates of the biomass of each species and other biological parameters. The SAFE report includes the acceptable biological catch (ABC) specifications used by NMFS in the annual harvest specifications. The SAFE report also summarizes available information on the ecosystems and the economic condition of the groundfish fisheries off Alaska. This document is available from: http://www.afsc.noaa.gov/refm/stocks/assessments.htm.

Final Programmatic Supplemental Environmental Impact Statement (PSEIS) on the Alaska Groundfish Fisheries (NMFS 2004).

The PSEIS evaluates the Alaska groundfish fisheries management program as a whole, and includes analysis of alternative management strategies for the GOA and BSAI groundfish fisheries. The EIS is a comprehensive evaluation of the status of the environmental components and the effects of these components on target species, non-specified species, forage species, prohibited species, marine mammals, seabirds, essential fish habitat, ecosystem relationships, and economic aspects of the groundfish fisheries. This document is available from: http://alaskafisheries.noaa.gov/sustainablefisheries/seis/intro.htm.

Table 3-1 shows the components of the human environment and whether the proposed action or its alternatives may have an impact on the component and require further analysis. Analysis is included only for skates and groundfish in the GOA, the only environmental components which the proposed action may impact.

Table 3-1 Resources potentially affected by the proposed action and alternatives

Habitat	Ecosystem	Ecosystem Component Species	Marine Mammals	Seabirds	Skates	Groundfish
N	N	N	N	N	Y	Y

N = no impact anticipated by each alternative on the component.
Y = an impact is possible if each alternative is implemented.

The proposed action, to reduce the MRA of skates in the GOA, is limited in scope and will not likely affect all environmental components of the GOA. No effects are expected on the physical environment (habitat), ecosystem or ecosystem component species, marine mammals, or seabirds. Existing fishing regulations and protection measures for protected species would not be changed, nor would allowable harvest amounts for important prey species. Impacts to habitat and ecosystem or ecosystem components are not expected because the proposed action could reduce the intensity of fishing (reduced number of tows) as top-off tows may be reduced or eliminated. No marine mammals or seabirds are known to feed extensively on skates. Offshore killer whales are known to feed on elasmobranchs, but it appears that offshore killer whales in the GOA feed primarily on Pacific sleeper sharks, blue sharks, Pacific spiny dogfish, and Chinook salmon, and have not been observed to feed on skates. (J. Ford, Department of Fisheries and Oceans; C. Matkin, North Gulf Oceanic Society; P. Wade, NMFS Pers. Comm. Aug., 2014).

3.1 Groundfish species

3.1.1 Skates in the GOA

The following description has been summarized from the 2011 GOA skate assessment (Ormseth 2011), which is based on the last full assessment of GOA skate species in 2011[2]. The GOA skate complex is managed as three units. Big skates (*Raja binoculata*) and longnose skates (*R. rhina*) each have separate harvest specifications, with ABC specified for each GOA regulatory area. A single GOA-wide overfishing level (OFL) is specified for each stock. All remaining skate species are managed as "other skates", with GOA-wide harvest specifications. All GOA skates are managed under Tier 5, where OFL and ABC are based on survey biomass estimates and natural mortality rate.

The general range of the big skate extends from the Bering Sea to southern Baja California in depths ranging from 2 to 800 m. The longnose skate has a similar range, from the southeastern Bering Sea to Baja California in 9 to 1069 m depths. (Love et al. 2005). Both skates are generally found in shallow waters in the GOA. Within the genus *Bathyraja*, at least eleven species are found in Alaska, but only three are commonly found in the GOA. The Aleutian skate (*Bathyraja aleutica*) ranges throughout the north Pacific from Japan to northern California, and has been found in waters 16 to 1602 m deep. The Alaska skate (*B. parmifera*) is restricted to higher latitudes from the Sea of Okhotsk to the eastern GOA in depths from 17 to 392 m (Stevenson et al. 2007). The Bering skate (*B. interrupta*) may actually be a complex of species, with each species occupying a different part of the general range from the western Bering Sea to southern California (Love et al. 2005, Stevenson et al. 2007).

The species within this assemblage occupy different habitats and regions within the GOA groundfish FMP area. In general, the highest biomass of skates in found in the shallowest continental shelf waters less than 100 m deep, and is dominated by the big skate. Longnose skates dominate the skate biomass on the continental shelf from 100 to 200 m, and *Bathyraja* species are dominant in the deeper waters from 200 to 1000 m.

Information on fecundity in North Pacific skate species is extremely limited. There are one to seven embryos per egg case in locally occurring *Raja* species (Eschmeyer et al. 1983), but little is known about frequency of breeding or egg deposition for any of the local species. Similarly, information is lacking for breeding or spawning habitat, egg survival, hatching success, or other early life history characteristics for GOA skates.

Adults of *Raja* species are larger than adults of *Bathyraja* species found in the area. The big skate is the largest skate in the GOA, with maximum sizes observed over 200 cm in the directed fishery in 2003. Longnose skates are somewhat smaller, with maximum sizes between 165 and 170 cm. *Bathyraja* species observed in the bottom trawl surveys in the GOA range from 86 to 154 cm. Gburski et al. (2007) reported that the maximum observed age for longnose skates in the GOA was 25 years, and 15 years for big skates in the GOA.

Skate life cycles are marked by relatively low fecundity, slow growth to large body size, and dependence of population stability on high survival rates of a few well-developed offspring (Moyle and Cech 1996). Skates in general have been classified as "equilibrium" life history stragegists, with very low intrinsic rates of population increase implying that sustainable harvest is possible only at very low to moderate fishing mortality rates (King and McFarlane 2003). Smaller species have been observed to be somewhat more productive, but large skate species with late maturation (11+ years) are most vulnerable to fishing pressure (Walker and Hislop 1998, Frisk et al. 2001, Frisk et al. 2002). The most extreme cases of

[2] The 2013 assessment was cancelled due to the partial government shutdown in 2013.

overexploitation have been reported in the North Atlantic, where the common skate (*Dipterus batis*) has been extirpated from the Irish Sea (Brander 1981) and much of the North Sea (Walker and Hislop 1998). Because there are different life history traits between small and large skate species, there has been an apparent population stability for the aggregated "skate" group in many areas where fisheries occur, and this combined with the common practice of managing skate species within aggregate complexes has masked the decline of some skate species in European fisheries (Dulvy et al. 2000). Similarly, in the Atlantic off New England, declines in barndoor skate abundance were concurrent with an increase in the biomass of skates as a group (Sosebee 1998).

Age and size at maturity and adult size and longevity appear to be more important predictors of resilience to fishing pressure than fecundity or egg survival in the skate population studied to date (Frisk et al. 2001, Frisk et al. 2002, Walker and Hislop 1998). High fishing mortality is most often experienced in the long juvenile stage during which relatively large, but immature skates, are exposed to fishing pressure. This may also explain the mechanism for the shift in species composition to smaller skate species in heavily fished areas. There are clear implications of these results for sustainable management of skates in Alaska. After an extensive review of population information for many elasmobranch species, Frisk et al. (2001) recommended that precautionary management be implemented especially for the conservation of large species:

> *"(i) size based fishery limits should be implemented for species with either a large size at maturation or late maturation, (ii) large species (>100 cm) should be monitored with increased interest and conservative fishing limits implemented, (iii) adults stocks should be maintained, as has been recommended for other equilibrium strategists (Winemiller and Rose 1992)."*

.

3.1.1.1 Survey Biomass Estimates

There are several indices of skate abundance in the GOA, including longline and trawl surveys. The NMFS summer bottom trawl surveys are the primary source of information on the biomass and distribution of major skate species. Bottom trawl surveys are generally considered reliable estimators of skate biomass for trawlable areas, and a study in the Bering Sea suggests that bottom trawl catchability is high (Kotwicki and Weinberg 2005).

The biomass estimates of skate species in the GOA, as determined from trawl surveys from 1984 through 2013 are shown in Table 3-2, along with the three year survey average biomass that is used to make harvest recommendations. The Eastern GOA was not surveyed in 2001, and those estimates are not included in Table 3-2. Survey estimates for big skates, by GOA regulatory area from 1984 through 2013 are shown in Table 3-3. In general, the Central GOA contains a larger biomass of big skates than the Eastern or Western GOA.

Table 3-2. Biomass estimates (t) of skate species from GOA bottom trawl surveys, 1984 – 2013, and three-season average biomass from 2009-2013. CV = coefficient of variation.

Year	Big Skate		Longnose Skate		Other Skates		
	Biomass (t)	CV	Biomass (t)	CV	Biomass (t)	CV	Total Biomass (t)
1984	27,540	0.22	9,002	0.38	4,647	0.16	41,189
1987	28,093	0.16	6,631	0.36	3,339	0.21	38,063
1990	22,316	0.25	11,995	0.22	13,936	0.25	48,248
1993	39,708	0.18	17,803	0.12	61,91	0.14	63,702
1996	43,064	0.18	26,226	0.14	11,912	0.17	81,201
1999	54,650	0.15	39,333	0.14	18,946	0.11	112,929
2003	55,397	0.16	39,603	0.09	21,775	0.11	116,775
2005	39,320	0.16	41,449	0.08	30,063	0.11	110,832
2007	38,458	0.19	34,421	0.11	32,334	0.11	105,212
2009	44,349	0.16	36,652	0.09	27,461	0.12	108,463
2011	67,883	0.37	33,911	0.11	21,389	0.10	123,183
2013	38,234	0.26	44,484	0.11	30,705	0.11	113,423
3-Survey Average	50,155		38,319		27,061		

Source: Ormseth 2011.

Table 3-3. Survey biomass estimates (t) for big skates by GOA regulatory area, 1984-2013. CV = coefficient of variation.

Year	WGOA		CGOA		EGOA	
	Biomass	CV	Biomass	CV	Biomass	CV
1984	3,339	0.22	17,635	0.23	6,566	0.60
1987	4,313	0.16	20,855	0.19	2,925	0.47
1990	1,745	0.25	9,071	0.35	11,501	0.35
1993	2,287	0.18	21,586	0.19	15,836	0.37
1996	13,130	0.18	26,544	0.19	3,391	0.30
1999	11,038	0.15	34,007	0.20	9,606	0.34
2001	8,425	0.19	30,658	0.22	n/a	
2003	9,602	0.16	33,814	0.22	11,981	0.38
2005	9,792	0.16	25,544	0.21	3,984	0.36
2007	5,872	0.19	23,249	0.26	9,337	0.33
2009	6,652	0.16	26,691	0.22	11,007	0.32
2011	6,251	0.37	21,761	0.17	39,840	0.61
2013	10,669	0.26	12,810	0.21	14,755	0.56

Source: Ormseth 2011.

3.1.1.2 Skate Management

Prior to 2003, skates were managed as part of the "Other Species" FMP category (skates, sharks, squids, sculpins, and octopuses). Harvest within this category was historically limited by a total allowable catch (TAC) calculated as 5% of the sum of the TACs for GOA target species. The Other Species category was established to monitor and protect species groups that are not currently economically important in North Pacific groundfish fisheries but are considered ecologically important.

In response to a developing fishery in the GOA for big and longnose skate in 2003, FMP amendments to re-define the ABC, OFL, and TAC setting process for skate species in the GOA were completed. In 2004, big and longnose skates were managed together under a single TAC in the Central GOA, and the remaining skates in the Central GOA and all skates, including big and longnose skates, in the Western and Eastern GOA were managed as an "other skates" species complex GOA-wide. As identification of skate species in the fisheries improved, skate management became more specific.

Since 2005, GOA skates have been managed in three groups. Big skates and longnose skates each have separate harvest specifications, with OFLs defined GOA-wide and ABCs/TACs specified for Western, Central, and Eastern regulatory areas. TACs have been set equal to ABCs in all years since 2005. All remaining skate species are managed as an "Other Skates" species group with GOA-wide harvest specifications due to difficulty in identification of these species.

Before 2013, data on the incidental catch of skate species from fisheries that were largely unobserved was limited or not available. These largely unobserved fisheries included IFQ halibut and small catcher vessel hook-and-line Pacific cod fisheries. Both of these fisheries were expected to have large amounts of incidental catch of skates, based on overlap of the fisheries with skate habitat and anecdotal reports. The North Pacific observer program was restructured in 2013, allowing deployment of observers in the IFQ halibut fishery and on smaller vessels. As expected, the reported skate harvest increased in IFQ fisheries, due to the inclusion of the new observer data and halibut landings being included in NMFS catch accounting system. These data should be used with caution since they only represent one year; however, 2014 is showing similar skate harvest increases compared to years prior to the 2013 observer program restructuring (NMFS AKRO). For that reason, skate harvest is analyzed from 2008 through 2012 and 2013/2014.

Topping off fishing behavior is a recognized and generally accepted activity associated with species on bycatch status (directed fishing is closed). Topping off fishing involves ostensibly fishing for a target species, while also retaining an incidentally caught species that contributes to the value of the total trip catch. The incentive for fishermen to engage in this activity is directly related to the value of, and available market for, the incidental catch species relative to the associated operation costs of fishing for and retaining the target species. Retention of the incidental catch species is allowed up to the MRA. From a management perspective, MRA percentages are a tool used to slow down the harvest rate of a species. MRAs do not necessarily reflect an "intrinsic" incidental catch rate, but reflect a balance between the recognized need to slow harvest rates, minimize the potential for discards, and, in some cases, provide an increased opportunity to harvest available TAC through limited topping off fishing behavior.

3.1.1.3 Big Skate

Table 3-4 shows the 2008 through July 1, 2014 OFL, ABC/TAC, and catch of big skate in the GOA. The TAC is set equal to the ABC for skates. In the Western and Eastern GOA, catch of big skate has not exceeded the ABC/TAC. However in the Central GOA, in four out of the past six years (2008 through 2013), the catch has exceeded the ABC/TAC and in 2013, catch exceeded the ABC/TAC by 28%.

Table 3-4. 2008-2014 GOA big skate OFL, ABC/TAC, catch, and catch as percentage of the area ABC/TAC in the Gulf of Alaska.

Year	OFL	Western GOA			Central GOA			Eastern GOA		
		ABC/TAC	Catch	%	ABC/TAC	Catch	%	ABC/TAC	Catch	%
2008	4,439	632	133	21%	2,065	1,241	60%	633	46	7%
2009	4,439	632	79	13%	2,065	1,903	92%	633	100	16%
2010	4,438	598	148	25%	2,049	2,215	108%	591	149	25%
2011	4,438	598	111	19%	2,049	2,105	103%	681	90	13%
2012	5,023	469	66	14%	1,793	1,894	106%	1,505	38	3%
2013	5,023	469	122	26%	1,793	2,302	128%	1,505	79	5%
2014*	5,016	589	70	12%	1,532	946	62%	1,641	63	4%

Source: Harvest Specifications for groundfish of the GOA and NMFS Catch Accounting System
*2014 catch through July 1, 2014.

Big skates are a common incidental catch species in hook-and-line gear fisheries and non-pelagic trawl gear fisheries. Table 3-5 shows the percent of big skate catch by gear and target fishery in the GOA. From 2008 through 2012, an average of 32% of the big skate catch was harvested by hook-and-line gear and 67% from non-pelagic trawl gear. Less than one percent of the big skate catch was harvested using the other gear types combined: pelagic trawl gear, pot gear, and jig gear. Averaging the 2013 and 2104 data indicate that 46% of the big skate catch is harvested by hook-and-line gear and 54% by non-pelagic trawl gear.

Table 3-5. Percentage of Big Skate Catch by Gear and Target Fishery in the GOA.

	Hook-and-line gear			Non-pelagic trawl gear					
	Pacific cod	IFQ species	Total	Pacific cod	Shallow-water flatfish	Pollock	Arrowtooth and deep-water flatfish	Total	Other gears and targets**
2008	28%	3%	31%	13%	34%	1%	20%	68%	1%
2009	24%	8%	32%	3%	28%	1%	33%	66%	2%
2010	29%	2%	31%	8%	32%	2%	26%	67%	2%
2011	31%	6%	37%	9%	10%	4%	39%	62%	1%
2012	24%	2%	26%	12%	17%	2%	41%	73%	1%
2013	17%	17%	34%	8%	6%	8%	44%	65%	1%
2014*	41%	18%	59%	8%	0%	16%	18%	41%	< 1%

Source: NMFS Catch Accounting System
*2014 catch through July 1, 2014.
Area includes the Western, Central, and Eastern GOA regulatory areas. It does not include areas 649 and 659.
**Other gear and targets include pot, jig, and pelagic trawl gear and also include rockfish fisheries with non-pelagic trawl gear.

Catcher vessel operators participating in Central GOA fisheries indicate that big skates congregate in specific areas in the spring months. This big skate congregation enables catcher vessels using trawl gear to engage in top-off fishing when targeting arrowtooth flounder, Pacific cod, pollock, and shallow-water flatfish. Elandings retention data on big skates confirm that these areas have higher retention of big skates by non-pelagic trawl gear when compared to other areas. Data from hook-and-line Pacific cod catcher vessels in 2013 and 2014 indicate top-off fishing behavior occurs in these same areas.

NMFS prohibited retention of big skates in the Central GOA on May 8, 2013 because projected catch indicated that the TAC for big skates would be exceeded. Top-off fishing in the arrowtooth flounder, Pacific cod, pollock, and shallow-water flatfish fisheries, and new information on incidental catch of big skates in the IFQ fisheries that was identified via new observer coverage indicated that the TAC for big skates would be exceeded. Big skate incidental catch continued to accrue while IFQ fishing was active, although big skates caught after retention was prohibited were discarded. The discarded big skate catch, combined with the previously retained big skate catch resulted in an overage of the big skate ABC/TAC in 2013.

NMFS prohibited retention of big skates in the Central GOA on February 5, 2014, based on catch of big skates in top-off fishing in non-pelagic trawl flatfish, pollock, and hook-and-line Pacific cod fisheries, and projected incidental catch in the IFQ fisheries during 2014. Weekly catch rates as of July 1, 2014, indicate that the Central GOA big skate ABC/TAC will likely be exceeded in 2014.

3.1.1.4 Longnose Skate

Table 3-6 shows the OFL, ABC/TAC, and catch of longnose skate in the GOA from 2008 through July 1, 2014. The TAC is set equal to the ABC for skates. In three of those years (2009, 2010, and 2013), the catch of longnose skates has exceeded the ABC/TAC in the Western GOA. The longnose skate catch in the Central and Eastern GOA has not exceeded ABC/TAC in recent years.

Table 3-6. 2008-2014 Longnose skate OFL, ABC/TAC, catch, and catch as percentage of the area ABC/TAC in the Gulf of Alaska.

		Western GOA			Central GOA			Eastern GOA		
Year	OFL	ABC/TAC	Catch	%	ABC/TAC	Catch	%	ABC/TAC	Catch	%
2008	3,849	78	34	44%	2,041	966	47%	768	114	15%
2009	3,849	78	79	101%	2,041	1,096	54%	768	244	32%
2010	3,803	81	106	131%	2,009	851	42%	762	132	17%
2011	3,803	81	71	88%	2,009	892	44%	762	69	9%
2012	3,500	70	39	56%	1,879	793	42%	676	93	14%
2013	3,500	70	90	129%	1,879	1,260	67%	676	426	63%
2014*	3,835	107	13	12%	1,935	695	36%	834	262	31%

Source: Harvest Specifications for groundfish of the GOA and NMFS Catch Accounting System
*2014 catch through July 1, 2014.

Longnose skates are a common incidental catch species in hook-and-line gear fisheries and non-pelagic trawl gear fisheries. Table 3-7 shows the percentage of longnose skate catch in the GOA for each gear type and target fishery from 2008 through July 1, 2014. From 2008 through 2012, the reported longnose

skate catch by hook-and-line gear ranged from 48% to 57% of the total longnose skate catch, and the reported catch from non-pelagic trawl gear ranged from 38% to 50% of the total longnose skate catch. After 2012, when observer coverage was increased in the hook-and-line fisheries, the reported longnose skate catch by hook-and-line gear was 75% of the total in 2013, and 59% of the total in 2014 (up to July 1, 2014). The reported longnose skate catch in non-pelagic trawl gear was 23% in 2013 and 39% in 2014 (up to July 1, 2014).

Longnose skate have not been found to congregate like big skate; therefore, there is not currently a distinct top-off fishery for longnose skate. However, longnose skate that are caught incidentally are valuable and are retained. The ABC/TAC for longnose skate was exceeded in 2009, 2010, and 2013 (Table 3-6). Should fisherman identify areas where top-off fishing could occur, a top-off fishery for longnose skate may develop which could exasperate overage of an area specific ABC/TAC.

Table 3-7. Percentage of Longnose Skate Catch by Gear and Target Fishery

	Hook-and-line gear			Non-pelagic trawl gear					
	Pacific cod	IFQ	*Hook-and-line Total*	Pacific cod	Shallow-water Flatfish	Pollock	Arrowtooth and deep-water flatfish	*Non-pelagic trawl Total*	Other gears and targets
2008	28%	20%	*48%*	5%	21%	2%	22%	*50%*	2%
2009	22%	35%	*57%*	2%	19%	1%	16%	*38%*	4%
2010	32%	20%	*52%*	6%	19%	1%	20%	*46%*	3%
2011	28%	25%	*53%*	5%	9%	3%	27%	*44%*	3%
2012	29%	25%	*54%*	4%	13%	1%	25%	*43%*	3%
2013	17%	58%	*75%*	2%	4%	1%	16%	*23%*	2%
2014*	19%	40%	*59%*	1%	1%	9%	28%	*39%*	1%

Source: NMFS Catch Accounting System
*2014 catch through July 1, 2014.
Area includes the Western, Central, and Eastern GOA regulatory areas. It does not include areas 649 and 659.
Other gear and targets include pot, jig and pelagic trawl gear and also include rockfish fisheries with non-pelagic trawl gear.

3.1.1.5 "Other Skates"

Table 3-8 shows the OFL, ABC/TAC, and catch of "other skates" in the GOA from 2008 through July 1, 2014. As mentioned above "other skates" are managed GOA-wide, rather than by GOA regulatory area as is done for big and longnose skates. Catch has not exceeded the ABC/TAC in any year since 2004 when the skate complex was separated from the "other species" group; however, in 2013, the "other skates" catch was 93% of the ABC/TAC.

Table 3-8. OFL, ABC/TAC, and Catch of "Other Skates" in the GOA, 2008-2014

Year	OFL	ABC/TAC	Catch
2008	2,806	2,104	1,395
2009	2,806	2,104	1,552
2010	2,791	2,093	1,499
2011	2,791	2,093	1,351
2012	2,706	2,030	1,201

2013	2,706	2,030	1,879
2014*	2,652	1,989	1,162

Source: Harvest Specifications for groundfish of the GOA and NMFS Catch Accounting System
*2014 catch through July 1, 2014.

"Other skates" are a common incidental catch species in hook-and-line gear fisheries and non-pelagic trawl gear fisheries. Table 3-8 shows the percentage of "other skate" catch by gear and target fishery in the GOA from 2008 through July 1, 2014. From 2008 through 2012, catch of "other skates" in hook-and-line fisheries ranged from 73% to 81% of the "other skates" total catch, and in non-pelagic trawl fisheries the catch of "other skates" ranged from 17% to 25%. After 2012 and the increase in observer coverage, catch of "other skates" by hook-and-line gear was 89%, and 91% of the total in 2013 and 2014 (through July 1, 2014), respectively.

There has not been a top-off fishery for "other skates" as these skate species tend to inhabit deeper water and do not congregate like big skate. Habitat overlaps with several fisheries, particularly early season Pacific cod and sablefish, result in higher catch rates.

Table 3-9. Percentage of "other skates" catch by gear and target fishery

	Hook-and-line gear			Non-pelagic trawl gear					
	Pacific cod	IFQ	*Hook-and-line Total*	Pacific cod	Shallow-water Flatfish	Pollock	Arrowtooth & deep-water flatfish	*Non-pelagic trawl Total*	Other gears and targets
2008	66%	14%	*80%*	2%	8%	0%	8%	*18%*	2%
2009	57%	22%	*79%*	0%	7%	0%	10%	*17%*	3%
2010	69%	12%	*81%*	1%	4%	0%	12%	*17%*	2%
2011	54%	19%	*73%*	3%	2%	0%	20%	*25%*	2%
2012	55%	20%	*75%*	2%	4%	0%	16%	*23%*	2%
2013	42%	47%	*89%*	1%	3%	1%	5%	*10%*	1%
2014*	48%	43%	*91%*	1%	1%	1%	6%	*9%*	0%

Source: NMFS Catch Accounting System
*2014 catch through July 1, 2014.

3.1.2 State-managed Fisheries

Changes to federal skate MRAs in the GOA may impact some state-managed fisheries. In state waters (0-3 nm), the Alaska Department of Fish and Game manages groundfish as either parallel fisheries or Guideline Harvest Level (GHL) fisheries. The state tracks bycatch of skates annually by gear type and fishery. Skates are caught as bycatch in parallel fisheries, where target harvests accrue to the federal TAC. Parallel fisheries open and close concurrent with the federal fisheries and management measures are similar to those in the federal fisheries. Skates are also caught as bycatch in a number of GHL fisheries that use hook-and-line or trawl gear; most state waters are closed to bottom trawl gear. Big or longnose skate bycatch in parallel and GHL fisheries is generally counted against the federal TAC via the Catch Accounting System.

In the Central and Westward regions[3], when a GOA area federal–ABC/TAC is reached for skates (big or longnose) and retention of skates in federal fisheries is subsequently prohibited, the retention of skates is concurrently prohibited in parallel and GHL fisheries. Thus, if skate MRAs are reduced in the GOA, and that results in a reduction of skate catch, retention of skates could be prohibited later in the season for both federal and parallel/GHL fisheries in the Central and Westward regions.

In the Southeast region[4], retention of skates may be allowed beyond permissible skate retention dates in GOA federal fisheries. Therefore, state water fisheries in Southeast would not be impacted by changes to federal GOA skate MRAs.

The state does not manage any directed GHL fisheries for skates in the GOA. A directed fishery for big and longnose skates occurred in Prince William Sound in 2009 and 2010 under a Commissioner's permit (per 5 AAC 28.083). The fishery did not resume in 2011 due to the lack of comprehensive stock assessment data and issues associated with managing separate allocations for big and longnose skates.

3.1.3 Effects of the Alternatives

The status of GOA skate stocks are assessed annually in the GOA SAFE report (e.g., NPFMC 2014). Although catch of some skates have exceeded the TAC/ABC in recent years, no skate stock in the GOA is overfished, nor subject to overfishing. Table 3-10 describes the criteria used to determine whether the impacts of the alternatives are likely to be significant.

The FMP for groundfish in the GOA specifies conservation and management measures that regulate the groundfish fisheries. These measures are designed to prevent negative effects to groundfish stocks. Additional measures, including prohibiting retention and MRAs are used manage incidental catch of non-target species to avoid regularly exceeding the ABC for those species. The alternatives considered in this action reduce skate MRAs in groundfish target fisheries, and as such are not likely to have any significant impacts on skate stocks. It is possible that reductions in skate MRAs may result in reduced catch of some skate stocks; however, changes in catch are expected to be minor and not affect the stocks' ability to sustain itself above MSST.

[3]The Central (PWS, Cook Inlet) region annually sets a bycatch allowance percentage (amount that may be legally landed) of 15% for "skates" in aggregate for GHL and parallel fisheries. In Westward region (Kodiak, Chignik, Alaska Peninsula), for parallel fisheries, the state typically mirrors the federal MRAs. For GHL fisheries in this region, the bycatch allowance is up to 20%, by groundfish species, which includes skates.
[4]Skate bycatch in Southeast GHL fisheries is managed as part of an aggregate "other groundfish" category, and the allowable bycatch percentage per trip is 20% for GHL Pacific cod and sablefish fisheries in Southeast waters.

Table 3-10 Criteria used to determine significance of effects on skates and target groundfish stocks.

	Criteria			
Effect	**Significantly Negative**	**Insignificant**	**Significantly Positive**	**Unknown**
Stock Biomass: potential for increasing and reducing stock size	Changes in fishing mortality are expected to jeopardize the ability of the stock to sustain itself at or above its MSST (minimum stock size threshold)	Changes in fishing mortality are expected to maintain the stock's ability to sustain itself above MSST	Changes in fishing mortality are expected to enhance the stock's ability to sustain itself at or above its MSST	Magnitude and/or direction of effects are unknown
Fishing mortality	Reasonably expected to jeopardize the capacity of the stock to yield sustainable biomass on a continuing basis.	Reasonably expected not to jeopardize the capacity of the stock to yield sustainable biomass on a continuing basis.	Action allows the stock to return to its unfished biomass.	Magnitude and/or direction of effects are unknown
Spatial or temporal distribution	Reasonably expected to adversely affect the distribution of harvested stocks either spatially or temporally such that it jeopardizes the ability of the stock to sustain itself.	Unlikely to affect the distribution of harvested stocks either spatially or temporally such that it has an effect on the ability of the stock to sustain itself.	Reasonably expected to positively affect the harvested stocks through spatial or temporal increases in abundance such that it enhances the ability of the stock to sustain itself.	Magnitude and/or direction of effects are unknown
Change in prey availability	Evidence that the action may lead to changed prey availability such that it jeopardizes the ability of the stock to sustain itself.	Evidence that the action will not lead to a change in prey availability such that it jeopardizes the ability of the stock to sustain itself.	Evidence that the action may result in a change in prey availability such that it enhances the ability of the stock to sustain itself.	Magnitude and/or direction of effects are unknown

3.2 Other fish species

Skates are caught as bycatch in a number of fisheries in the GOA. The primary fisheries that land big skates as bycatch are the halibut IFQ, Pacific cod longline, arrowtooth flounder trawl, Pacific cod trawl, and rex sole trawl fisheries. Longnose skates are primarily caught in the halibut IFQ, sablefish, and Pacific cod longline fisheries, and the arrowtooth flounder, rex sole, and shallow-water flatfish trawl fisheries. Other skates are caught primarily in the halibut IFQ, and Pacific cod longline, and arrowtooth flounder and rex sole trawl fisheries.

3.2.1 Effects of the Alternatives

The FMP for groundfish of the GOA specifies conservation and management measures that regulate the groundfish fisheries. These measures are designed to prevent negative effects to groundfish stocks. Total catch of targeted groundfish is managed to prevent exceeding the area specific ABC/TAC. The alternatives considered in this action reduce skate MRAs in groundfish target fisheries. The alternatives do not implement any direct changes to the groundfish target fisheries or impact ABCs. It is possible that reductions in skate MRAs may result in reduced catch of some target groundfish species; however, changes in catch are expected to be minor and not affect management of the GOA groundfish fisheries.

3.3 Cumulative Effects

NEPA requires an analysis of the potential cumulative effects of a proposed federal action and its alternatives. Cumulative effects are those combined effects on the quality of the human environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions (RFFA), regardless of which federal or non-federal agency or person undertakes such other actions (40 CFR 1508.7, 1508.25(a) and 1508.25(c)). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The concept behind cumulative effects analysis is to capture the total effects of many actions over time that would be missed if evaluating each action individually. Concurrently, the Council on Environmental Quality (CEQ) guidelines recognize that it is most practical to focus cumulative effects analysis on only those effects that are truly meaningful.

The Council has requested a discussion paper concerning the potential to change the MRA enforcement period for all fisheries in the BSAI and GOA to an offload-to-offload period, rather than the currently enforced instantaneous period. A change in the MRA enforcement period is not considered a reasonably forseeable future action that would cause a cumulative effect on the GOA skate MRAs because the Council has not yet developed a problem statement for a change in the MRA enforcement period and the potential exists for that action to change significantly. If, between initial review and final review, the Council makes a recommendation on the MRA enforcement period in GOA fisheries, then that recommendation would be considered for potential cumulative effects on GOA skates.

4 Regulatory Impact Review

This Regulatory Impact Review (RIR) examines the benefits and costs of a proposed regulatory amendment to change the maximum retainable amount (MRA) of skates in the Gulf of Alaska (GOA) groundfish trawl and fixed gear fisheries for groundfish and halibut.

The preparation of an RIR is required under Presidential Executive Order (E.O.) 12866 (58 FR 51735: October 4, 1993)[5] . The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following Statement from the E.O.:

> *In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and Benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.*

E.O. 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

- 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, competition, jobs, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

4.1 Statutory Authority

Under the Magnuson-Stevens Fishery and Conservation Act (Magnuson-Stevens Act) (16 USC 1801, *et seq*.), the United States has exclusive fishery management authority over all marine fishery resources found within the exclusive economic zone (EEZ). The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the regional fishery management councils. In the Alaska Region, the North Pacific Fishery Management Council (Council) has the responsibility for preparing fishery management plans (FMPs) and FMP amendments for the marine fisheries that require conservation and management, and for submitting its recommendations to the Secretary. Upon approval by the Secretary, NMFS is charged with carrying out the federal mandates of the Department of Commerce with regard to marine and anadromous fish.

The groundfish fishery in the GOA EEZ off Alaska is managed under the FMP for Groundfish of the GOA. The proposed action under consideration would amend Federal regulations at 50 CFR 679. Actions

[5] National Marine Fisheries Service (2007) provides current NMFS guidance for preparation of an RIR; Queirolo (2013) provides a more accessible overview.

taken to amend FMPs or implement other regulations governing these fisheries must meet the requirements of Federal law and regulations.

4.2 Purpose and Need for Action

During public testimony, in December 2013, on an agenda item that considered establishing a directed fishery for skates and octopus in the GOA, the Council was made aware that the catch of skates (primarily big skates (*Raja binoculata*), and longnose skates, (*Raja rhina*)) in Gulf of Alaska groundfish fisheries has exceeded the area specific total allowable catch (TAC) and acceptable biological catch (ABC) in some years.

Testimony indicated that this is because the maximum retainable amount (MRA) for skates in the GOA (20 percent) allows industry to top off on skates while fishing for groundfish. Since 2008, the estimated catch of big skates has exceeded the ABC/TAC in the Central GOA in 2010, 2011, 2012, and 2013, and estimated catch of longnose skates has exceeded the ABC/TAC in the Western GOA in 2009, 2010, and 2013.

The purpose of this action is to slow the harvest rate of skates by reducing the MRA to levels that more accurately reflect the intrinsic rate of bycatch in the GOA, thereby reducing the incentive for vessels to top off on skates.

4.3 Alternatives

The Council tasked staff to analyze the following options in December, 2013.

Alternative 1: No Action, Status Quo: Alternative 1, the no-action alternative, would maintain the MRA for skates for all basis species at 20%. Vessels would be allowed to retain skates while fishing for other species up to 20% of the basis species catch until the ABC for skates is met.

Alternative 2: Alternative 2 would reduce the MRA for skates for all basis species to 15%. Vessels would be allowed to retain skates while fishing for other species up to 15% of the basis species catch until the ABC for skates is met.

Alternative 3: Alternative 3 would reduce the MRA for skates for all basis species to 10%. Vessels would be allowed to retain skates while fishing for other species up to 10% of the basis species catch until the ABC for skates is met.

Alternative 4: Alternative 4 would reduce the MRA for skates for all basis species to 5%. Vessels would be allowed to retain skates while fishing for other species up to 5% of the basis species catch until the ABC for skates is met.

4.4 Methodology for analysis of impacts

E.O. 12866

The evaluation of impacts in this analysis is designed to meet the requirement of E.O. 12866, which dictates that an RIR evaluate the costs and benefits of the alternatives, to include both quantifiable and qualitative considerations. Additionally, the analysis should provide information for decision makers “to

maximize net benefits (including potential economic, environment, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach."

Period chosen for analysis

The most recent landings data in this analysis are from August 3, 2014. The most recent price and revenue data are from 2013. The year 2008 was chosen as the earliest for examination because it was believed to provide a reasonable compromise between "recency" of the data and a number of years of activity sufficient to show the variability in the fisheries. The big and longnose skate fisheries were only broken out separately in harvest specifications for the 2005 fishing year. Discard data on skates may be problematic for years prior to the effective date of the observer program restructuring in 2013. The annual GOA skate assessments raise this concern (see, for example, NPFMC, 2014, pages 1037-1038).

The baseline, no action alternative, and status quo alternative in an analysis have different definitions. The baseline is a set of conditions against which the impacts of the different alternatives are measured; the no action alternative is the alternative that involves no action by the decision maker; the status quo alternative is the alternative in which no management change takes place. In the simplest instance, these definitions align. Then the no action and status quo alternatives are equivalent, and describe the baseline against which the impacts of a set of action alternatives will be measured. However, in some instances, the no action and status quo alternatives can diverge, making it necessary to describe a set of baseline conditions for the analysis.

The period, from 2008 to mid-2014 has been treated as the baseline for this analysis, against which the possible impacts of the no action alternative will be measured. This is the data for which information is available. The impacts of the no action alternative before the Council (20 percent skate MRA) will be measured by discussing what might have happened in those years if the MRA had been lower. The status quo alternative corresponds to the fishery as it existed in 2013 and, even more so, in 2014, when the Regional Administrator prohibited retention of skates during active fishing periods.

Catch data

This analysis was prepared using data from the NMFS catch accounting system, which are the best available data to estimate total catch in the groundfish fisheries off Alaska. Total catch estimates are generated from information provided through a variety of required industry reports of harvest and at-sea discard, and data collected through an extensive fishery observer program.

Estimating retention rates from catch accounting system data

Data shortcomings raise two issues the reader should keep in mind. Some catcher vessels split their delivery from one trip between two processors, and generate two fish ticket records. These two records would appear as two separate trips in the data base. However, in these instances, the allocation of skates and basis species from one real trip between the two fish tickets, and thus the two apparent trips, is unknown to NMFS. This problem does not affect catcher/processors.

Second, it is very difficult from landings records from catcher vessels and catcher/processors to identify the volume of basis species with precision. Basis species only include species open to directed fishing. Separating fish taken in an open fishery from fish taken under an MRA in a closed fishery is a complex issue to analyze. In this analysis, fish from both sources are treated as basis species. Because of this, some of the estimates of the volumes of basis species used in the MRA calculations for this analysis are higher than actual basis species, and this leads to a tendency to understate the actual skate retention rate for trips.

For example, a non-pelagic trawl catcher vessel may make a delivery of the following species:

Arrowtooth flounder:	50 metric tons
Pacific cod:	10 metric tons
Skates:	10 metric tons
Total	70 metric tons

Assume, for this example, that Pacific cod is closed to directed fishing, and the 10 metric tons is delivered by a vessel fishing to its Pacific cod MRA. Because it is not possible with available resources to discriminate, for each species, between catch from an open fishery and catch from a closed fishery, we would have estimated a skate retention rate for this vessel that was equal to 10/60 or about 17 percent. However, the actual skate retention rate, ignoring the catch of Pacific cod, would have been 10/50, or 20 percent.

This issue is believed to affect a large proportion of deliveries, and affects both catcher vessels and catcher/processors. It is not possible to know the size of the downward bias this gives to estimated retention rates. In the example given, which is not implausible, while there is a 3 percent difference between the estimated rate and the actual rates, the estimated rate is 85 percent of the actual rate.

An estimated rate of zero skates per metric ton of basis species would not be subject to this bias, since the bias is dependent on our inability to accurately measure the basis species, and in this limiting case, the estimated rate does not depend on the measured basis species.

Price and revenue data

Historical revenue data are available at both the ex-vessel and the first wholesale level. Ex-vessel price estimates are generally provided by the Commercial Fishery Entry Commission from fish tickets. Wholesale revenues are collected from commercial operators' annual reports (COAR) at the individual processing plant level.

For the analysis of changes in revenues flowing from actions that may affect retained catch, ex-vessel and wholesale revenue estimates are often converted into ex-vessel revenues per round metric ton retained, or wholesale revenues per round metric ton retained, by dividing aggregate revenue estimates by estimates of the round tonnage used to generate those revenues. In order to estimate specific values that may be affected by the action stepwise algorithms are employed. These processes append ex-vessel and wholesale price to catch accounting system data from either fish tickets or COAR. The resulting ex-vessel or wholesale "values per metric ton round retained catch" can then be multiplied by estimated catch changes to estimate revenue changes. While this may be appropriate for evaluating relatively small changes in retained catch, it will be less accurate for large changes since it does not account for price changes that may be caused by retained catch changes.

Wholesale value is an appropriate measure of value for catcher/processor vessels, motherships, floating processors, and shoreside processors, but ex-vessel value is a more relevant measure for catcher vessels. Wholesale revenues reported by processors cannot be added to ex-vessel revenues paid to harvesters in order to gauge total economic production. To do so would lead to overestimates of economic impact. Ex-vessel payments to catcher vessels are, in fact, a cost to processors; the amount of the ex-vessel payment is only one of several factors that determine shoreside wholesale values.

Related ongoing research

The Alaska Sea Grant program is sponsoring research at the University of Alaska to develop a bioeconomic model for skates that could be useful for the evaluation of management alternatives. As described on the Sea Grant web page (Alaska Sea Grant 2014), the research objectives are to:

1. Develop a stock assessment for big and longnose skates in the Gulf of Alaska.
2. Describe the potential market for big and longnose skates from Alaska and their place in the global market.
3. Build a bioeconomic model that will produce revenue estimates from skates under a variety of harvest scenarios.
4. Propose the most viable management structure for a big and longnose skate fishery in the Gulf of Alaska.

This research was initiated on February 1, 2014, and has a completion date of January 31, 2016.

A note on terms

Skate catch can be retained or discarded. Total skate catch, counted against the catch limits defined in the annual groundfish harvest specifications, is the sum of these. Harvest is retained catch. The terms by-catch and incidental catch are defined in law and regulation, and as defined there they are effectively equivalent to discarded catch and retained catch respectively. In everyday use these terms are not as precisely defined. For clarity, this analysis will describe skate catches as retained or discarded, and will minimize use of the terms harvest, by-catch, or incidental catch.

Skates may be retained when they are taken as a by-product of fishing for another species which is the target species. Skates may also be retained as the result of top off fishing. In top off fishing, fishermen catch and retain another species, which is technically the target, in order to provide a basis for retention of skates within the MRA restrictions. The two types of retention are distinguished here as opportunistic retention, and top off retention.[6]

The intrinsic catch rate is the rate that would occur if there were no market for skates, or, alternatively, if skate retention were prohibited by regulation. In these circumstances, there is no value to be obtained from retaining skates and incurring the costs of minimal preparation on board, icing, and lost space in the hold. Since big skate retention was prohibited in the Central GOA on May 8 in 2013, and on February 4 in 2014, NMFS has been able to observe an intrinsic catch rate for some periods in those two years. The intrinsic rate of skate catch is not a constant. It will vary from year to year as the biomass of skates and target species vary, or as the relative profitability of different target species vary.

In this analysis it is important to distinguish between the “extensive” and the “intensive” margins of regulatory control. Wikipedia explains that in economic use the term “margin” refers to “a set of constraints conceived as a border. A marginal change is the change associated with a relaxation or tightening of constraints.” In the current situation we can constrain the maximum rate of skate retention with an MRA, but we cannot constrain individual operations already operating within that limit from expanding retention up to the MRA. Wikipedia notes that an “extensive” margin “corresponds to the number of usable inputs that are in some sense employed,” while an “intensive” margin “corresponds to the amount of use extracted within a given extensive margin.” (Wikipedia 2013, “Margin (economics)”) In this context, the term extensive margin will be used to refer to activity by fishing operations at the

[6] “Opportunistic” is used to refer to one type of retention because an opportunity has arisen while targeting another species. It does not imply anything improper about the retention.

relevant maximum MRA, while the term intensive margin will be used to refer to activity by fishing operations operating at levels below the maximum MRA.

The distinction is important in this analysis, because the impact of tightening the relevant extensive margin (that is, lowering the MRA) may be undercut in the absence of limits at the intensive margin, if fishermen increase skate retention up to the new MRA.[7] The justification for the use of the two technical terms extensive and intensive margins is that they help focus attention on two different issues that need to be considered when evaluating a reduction in an MRA. These terms will be used mostly in Section 4.8 and Section 4.9, which discuss the impacts of the alternatives to reduce the MRA to 5, 10, or 15 percent.

4.5 Description of Fisheries

4.5.1 Catch

4.5.1.1 Big Skate Catch History

Catch histories for skates (including both retained and discarded skates), are summarized and compared to OFLs and ABCs/TACs in the EA. This information is summarized for big, longnose, and other skates in the RIR in Figure 4-1, Figure 4-3, and Figure 4-5.

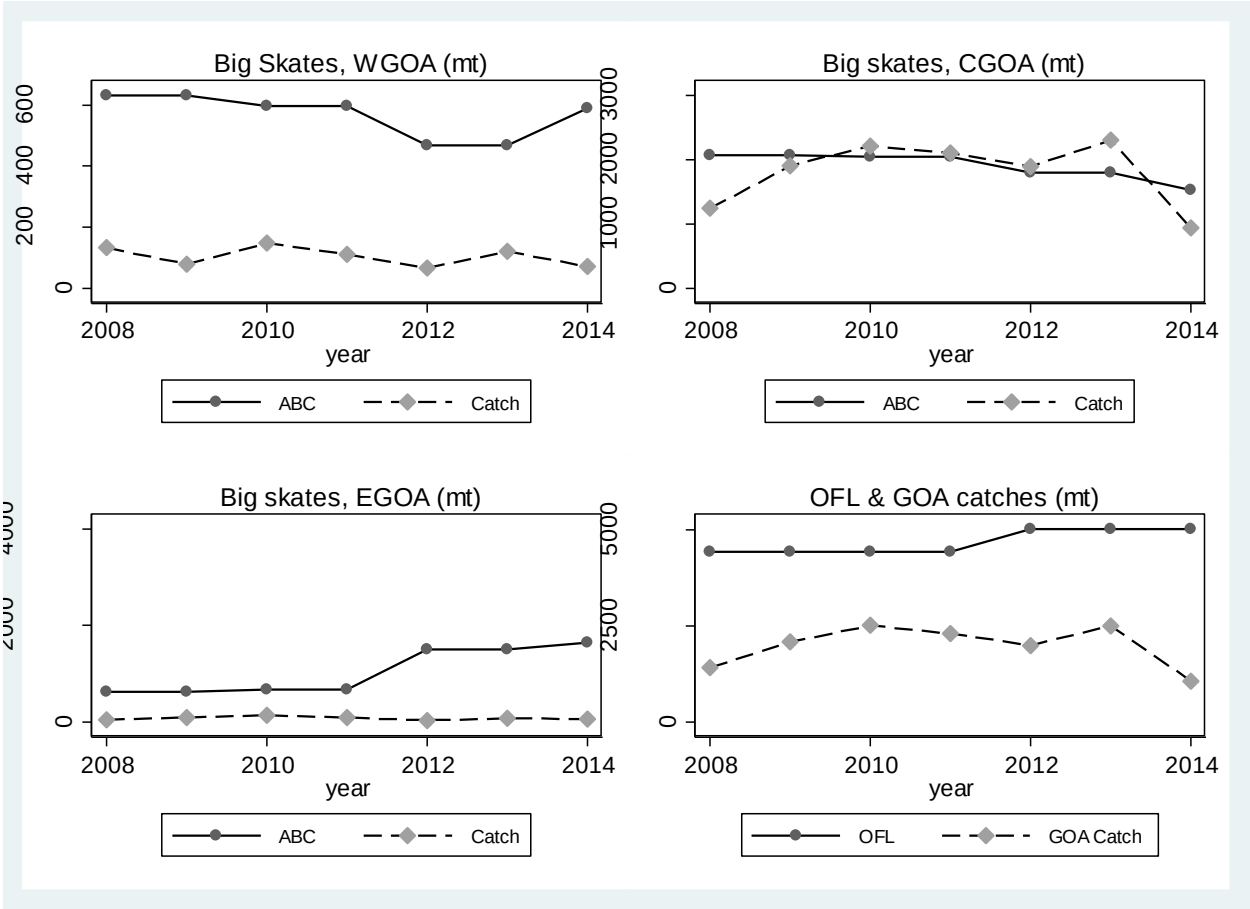
Figure 4-1 summarizes the information for big skate catches, including both discards and retained skates. Big skate catches have been below the ABC/TAC in both the Western and the Eastern GOA management areas in all years, and have been below the GOA-wide ABC and OFL in all years.

However, in the years 2010 to 2013, big skate catches exceeded the ABC/TAC in the Central GOA management area. As of August, 2014, NMFS staff does not know whether or not big skate catches will exceed the Central GOA ABC/TAC again in 2014 (NMFS In-season management staff, pers. comm.). The comparability of the estimated catches across years may be affected by the changes to observer coverage which became effective in 2013. Catch estimates prior to 2013 are less likely to fully capture unobserved discarded catches.

Big skate catches exceeded the Central GOA ABC/TAC from 2010 through 2013 despite increasingly tight management restrictions applied to skate catches. In 2011, the retention of big skates was not prohibited, but in 2012 retention was prohibited on December 17. More significantly, retention was prohibited on May 8 in 2013, and prohibited on February 5 in 2014. (NMFS AKRO Information Bulletins; retrieved from http://alaskafisheries.noaa.gov/cm/info_bulletins/ on July 8, 2014.)

[7] A similar issue arises in a license limitation program. The number of licensed inputs, for example, vessels, may be limited, but unregulated capital and effort may be used to upgrade the fishing effectiveness of each of the licensed vessels.

Figure 4-1 Catch of big skates, ABC, and OFL, by management area from 2008 through mid-2014



Source: NMFS catch accounting system and Harvest Specifications for groundfish of the Gulf of Alaska

The extent to which catch is discarded or retained in a fishery has implications for the efficacy of an MRA. If almost all catch for an MRA species is normally discarded, tightening an MRA will have little impact on overall catch. Discard rates are not an exogenously given parameter to a fishery, but depend on decisions made by fishermen after taking account of the price for the species, and the various costs associated with caring for it and storing it until it can be delivered (and in the case of catcher/processors, processing it).

Big skate discard rates vary by management area.[8] Over the period from 2008 to 2014 (through August 3), 32 percent of the big skates caught in the Eastern GOA by all gear types combined were discarded. The relatively low discard percentages rose to over 80 percent in 2013 through 2014, likely as a result of improved discard estimates associated with the observer restructuring that became effective at the start of 2013. These discard rates were also associated with very low catches and discarded catches, compared to the Central GOA. Discard rates in the Central GOA for all gear types combined were 26 percent over the period, but also showed increases to 33 percent and then 59 percent in 2013 and 2014.[9] Discard rates in the Western GOA for all gear types combined were relatively high in all years, averaging 79 percent during the period. Catches in the Western GOA were also small in comparison to catches in the Eastern GOA. (NMFS catch accounting system).

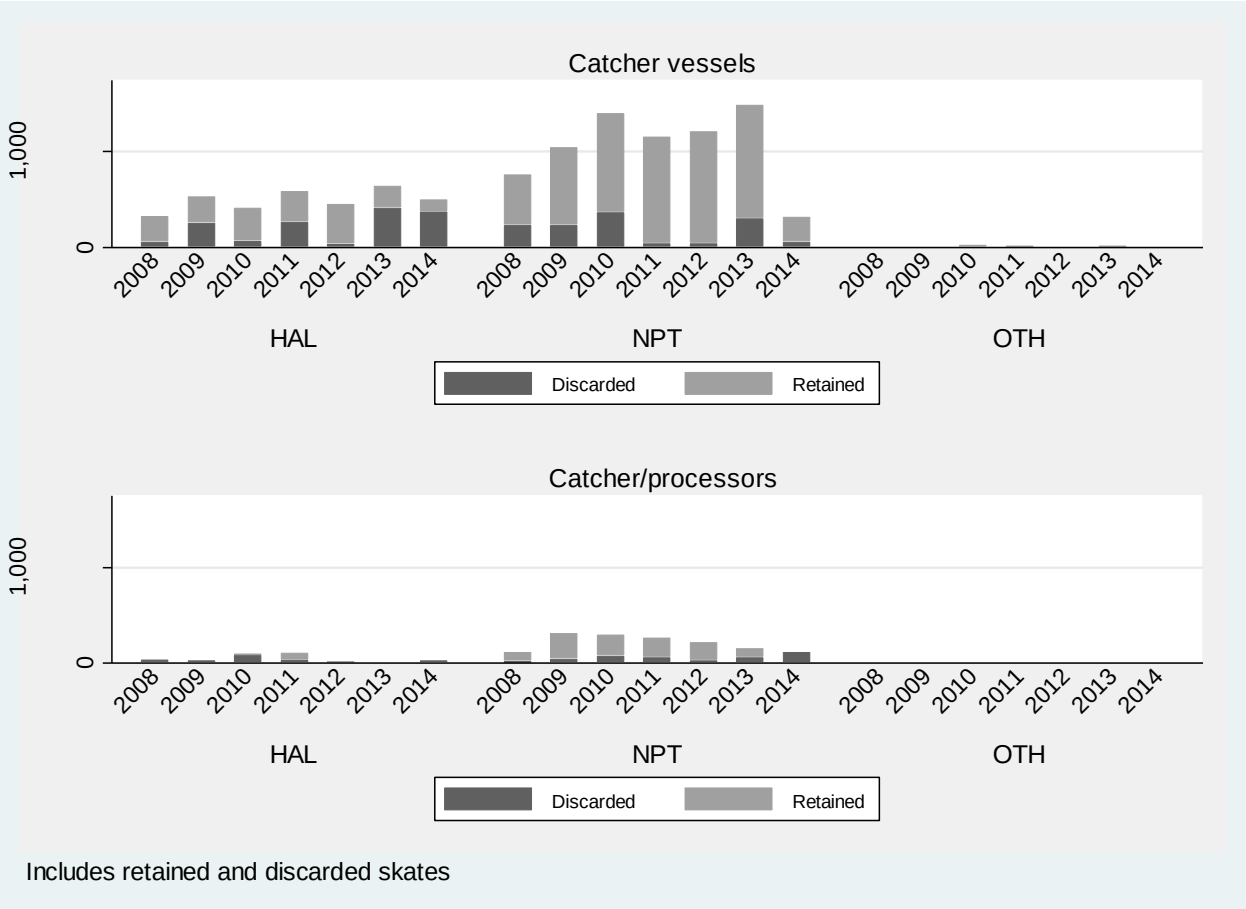
[8] The bias identified in Section 4.4 should not apply to the rates discussed in this paragraph. These are rates of skate discards to skate catches. The rates discussed in Section 4.4 are rates of skate retention to basis species retention, and estimates of basis species retention tend to be upward biased.
[9] These Central GOA big skate rates are illustrated with gear breakouts in Figure 4-2.

Figure 4-1 shows that big skate overages of the area specific ABC/TAC are an issue in the Central GOA, but not yet in the Western or Eastern GOA. Figure 4-2 shows that almost all of the big skates in the Central GOA are being caught by non-pelagic trawl (NPT) and hook-and-line (HAL) fishing operations. Most of this fish is taken from catcher vessels, rather than catcher/processors. In all fishing years except for 2014, for which the data are incomplete, non-pelagic trawl catches of big skates were substantially (by hundreds of metric tons) greater than those by hook-and-line fishing operations.

Figure 4-2 makes a second point about big skate catches in the Central GOA: retained catches are a relatively large part of the overall catch, particularly for non-pelagic trawlers. Since an MRA works by placing limits on the fishing vessel's ability to target and retain skates in a top-off fishery, the relatively high levels of retention in the Central GOA big skate fishery suggest that MRA restrictions could have a meaningful impact on big skate catch in that management area compared to other areas.

Catcher vessel operators participating in Central GOA fisheries indicate that big skates congregate in specific areas in the spring. This big skate congregation enables catcher vessels using non-pelagic trawl gear to engage in top off fishing when targeting arrowtooth flounder, Pacific cod, pollock, and shallow-water flatfish. Retention data on big skates confirm that these areas have higher retention of big skates by non-pelagic trawl gear when compared to other areas. Data from hook-and-line Pacific cod catcher vessels in 2013 and 2014 indicate top off fishing behavior in these same areas. (AKRO In-season management, pers. comm.)

Figure 4-2 Retained and discarded catch of big skates in the Central GOA, by gear and sector, 2008 through mid-2014. HAL – hook-and-line, NPT– non-pelagic trawl, OTH – other



Source: NMFS catch accounting system

Table 4-1 provides the hook-and-line and non-pelagic trawl big skate total catches on which Figure 4-2 is based, and includes catches by target fishery. Hook-and-line catches are made predominately in the Pacific cod and halibut target fisheries. The evaluation of these estimates, especially those for the halibut fishery, is complicated by the lack of observer coverage prior to 2013, and likely consequently underestimates big skate catches. Non-pelagic trawl gear big skate catches are greatest in the arrowtooth and shallow water flatfish target fisheries, although shallow water flatfish catches may have declined in recent years, while arrowtooth flounder catches appear to have increased. Other important sources of non-pelagic trawl skate catches are the Pacific cod, flathead sole, and rex sole fisheries.

Table 4-1 Hook-and-line and non-pelagic trawl catches of big skates in the Central GOA, 2008 through mid-2014

	Hook-and-line				Non-pelagic trawl							
Year	Pacific cod	Halibut	Other species	Total	Pollock (bottom)	Pacific cod	Shallow flats	Flathead	Arrowtooth	Rex sole	Other species	Total
2008	335	27	1	363	21	108	413	62	203	64	4	874
2009	384	137	32	553	30	51	535	47	416	264	4	1,346
2010	461	39	5	505	41	201	688	104	469	170	15	1,689
2011	550	128	1	679	89	193	190	28	795	106	10	1,410
2012	431	33	2	465	46	218	288	50	672	140	11	1,425
2013	364	291	2	657	197	192	139	8	949	145	5	1,635
2014*	350	159	1	511	167	73	4	-	157	25	-	426

*2014 through July 14 only.
Source: NMFS catch accounting system

Table 4-2 shows the percentages of big skates taken in different target species fisheries by non-pelagic trawlers operating in the Central GOA. Pacific cod, shallow water flats, and arrowtooth flounder are important sources of big skates for catcher vessels, while arrowtooth flounder and rex sole are important sources for catcher/processors. Recall, however, that catcher/processors account for smaller big skate catches than catcher vessels.

Table 4-2 Sectoral proportions of Central GOA non-pelagic trawl big skate catch (discarded and retained) by target species fishery and year

	Catcher vessels					Catcher/processors				
Year	Pollock (bottom)	Pacific cod	Shallow flats	Arrowtooth	Other species	Shallow flats	Flathead	Arrowtooth	Rex sole	Other species
2008	3%	14%	54%	22%	7%	0%	12%	32%	56%	0%
2009	3%	4%	49%	39%	4%	8%	11%	2%	76%	2%
2010	3%	14%	48%	30%	5%	4%	17%	18%	58%	2%
2011	8%	17%	14%	58%	3%	10%	4%	49%	35%	1%
2012	4%	18%	22%	52%	4%	9%	20%	18%	50%	2%
2013	13%	13%	9%	61%	3%	2%	5%	26%	66%	1%
2014	53%	23%	0%	23%	1%	4%	0%	76%	20%	0%

Source: NMFS catch accounting system

The action under consideration would reduce the skate MRA in the GOA to reduce the incentive for, and opportunity to pursue, a skate top-off fishery. To estimate the impacts of the alternatives under consideration, it would be helpful to have an estimate of an “intrinsic” catch rate for skates. As discussed in the methodology section (Section 4.4), the intrinsic rate is the rate (compared to basis species) at which skates would be caught in the absence of a market for them, or if their retention had been prohibited by

regulation. Such an operation would not be engaging in top off fishing for skates, or opportunistically retaining skates if the gear happened to intercept them while targeting another species.

Table 4-3 shows, for the years 2012 through mid-2014, the big skate catch (retained and discarded) as a percentage of groundfish catches (retained and discarded, and including skates in the Central GOA before and after the dates of the prohibited species catch (PSC) closures that occurred on May 8 in 2013 and on February 4 in 2014. Highlighted cells indicate periods when big skate retention was prohibited because of the PSC closure. Data are provided for hook-and-line gear targeting Pacific cod, hook-and-line gear targeting IFQ species, non-pelagic trawl gear targeting deep-water flatfish (this category includes arrowtooth flounder), and non-pelagic gear targeting shallow-water flatfish.

It is difficult to infer a specific big skate intrinsic catch rate from the information on hook-and-line Pacific cod fishing, however the rate does appear to be greater than zero. When big skate retention was not prohibited, the catch rate after February 5 varied from 2.8 percent to 7.0 percent, depending on how the time period was defined (in some time periods and years, there was no catch; this was especially true for the period from May 8 to August 3). When big skate retention was prohibited after February 5, catch rates were 3.0 percent and 5.9 percent, depending on the year and period. As noted above, lack of observer coverage for this fleet may have resulted in an underestimate of the skate catch in 2012 because at-sea discard data from this fleet were not available.

The intrinsic rates for the hook-and-line IFQ operations also appear to be greater than zero. The catch rates ranged between 1.5 percent and 6.3 percent during the years and periods when skate retention was prohibited. Catch rates appear to have increased between 2012 and 2013, and again between 2013 and 2014. The increase between 2012 and 2013 may be associated with the restructuring of the observer program that became effective in 2013. The increases from 2013 to 2014 suggest that year to year variation may be important.

The table suggests that the intrinsic retention rate for big skates in the non-pelagic trawl fisheries for arrowtooth flounder and deep-water flatfish after February 5 is close to zero. The information in the table is not sufficient to say that it is zero before February 5, but that cannot be ruled out. When big skate retention was not prohibited, the catch rate after February 5 varied from 0.5 percent to 8.0 percent, depending on the year and time period. However, in all of these time periods when retention was prohibited in 2013 and 2014, the catch rate dropped to less than one percent. Since the catch rate is based on discards as well as retained skates, this indicates that these operations could largely avoid intercepting big skates in their gear while pursuing these target species. In the period before February 5, the catch rate dropped off considerably in 2014. This may be a random fluctuation, however it could also be a result of restraint by the fleet, which was aware during this period that top off fishing could result in a prohibited species closure on big skates.

The intrinsic retention rate for skates in the non-pelagic shallow water flatfish fishery appears to be lower than rates often observed, however the data do not point to a zero intrinsic rate as strongly as they do for arrowtooth flounder and deep-water flatfish. When big skate retention was not prohibited, the catch rate after February 5 varied from 2.2 percent to 7.0 percent, depending on the year and time period. When retention was prohibited in these time periods, the catch rate dropped. In 2013, it was 0.9 percent or 3.0 percent, depending on the time period. However, in 2014 it dropped close to zero in each time period. Intrinsic rates prior to February 5 were close to zero in all three years. These results are indicative of a top-off fishery after February 5.

Table 4-3 Estimated rate of Central GOA big skate catch (retained and discarded) in relation to groundfish catch (retained and discarded) before and after (shaded cells) PSC closures

	Before Feb 5	Feb 5 to May 8	May 8 to August 3	August 3 to December 31
		Hook-and-line cod		
2012	3.3%	3.1%	No catch	7.0%
2013	5.7%	2.8%	No catch	3.0%
2014	6.9%	5.9%	No Catch	NA
		Hook-and-line IFQ		
2012	No Catch	0.5%	0.4%	1.4%
2013	No Catch	1.1%	1.5%	6.3%
2014	No Catch	2.6%	3.3%	NA
		Non-Pelagic Trawl Arrowtooth flounder and deep-water flatfish		
2012	10.3%	8.0%	0.5%	3.5%
2013	8.6%	7.9%	0.8%	0.5%
2014	4.8%	0.0%	0.1%	NA
		Non-Pelagic Trawl Shallow-water flatfish		
2012	0.0%	5.2%	6.19%	7.0%
2013	0.4%	2.2%	0.9%	3.0%
2014	0.0%	0.0%	0.2%	NA

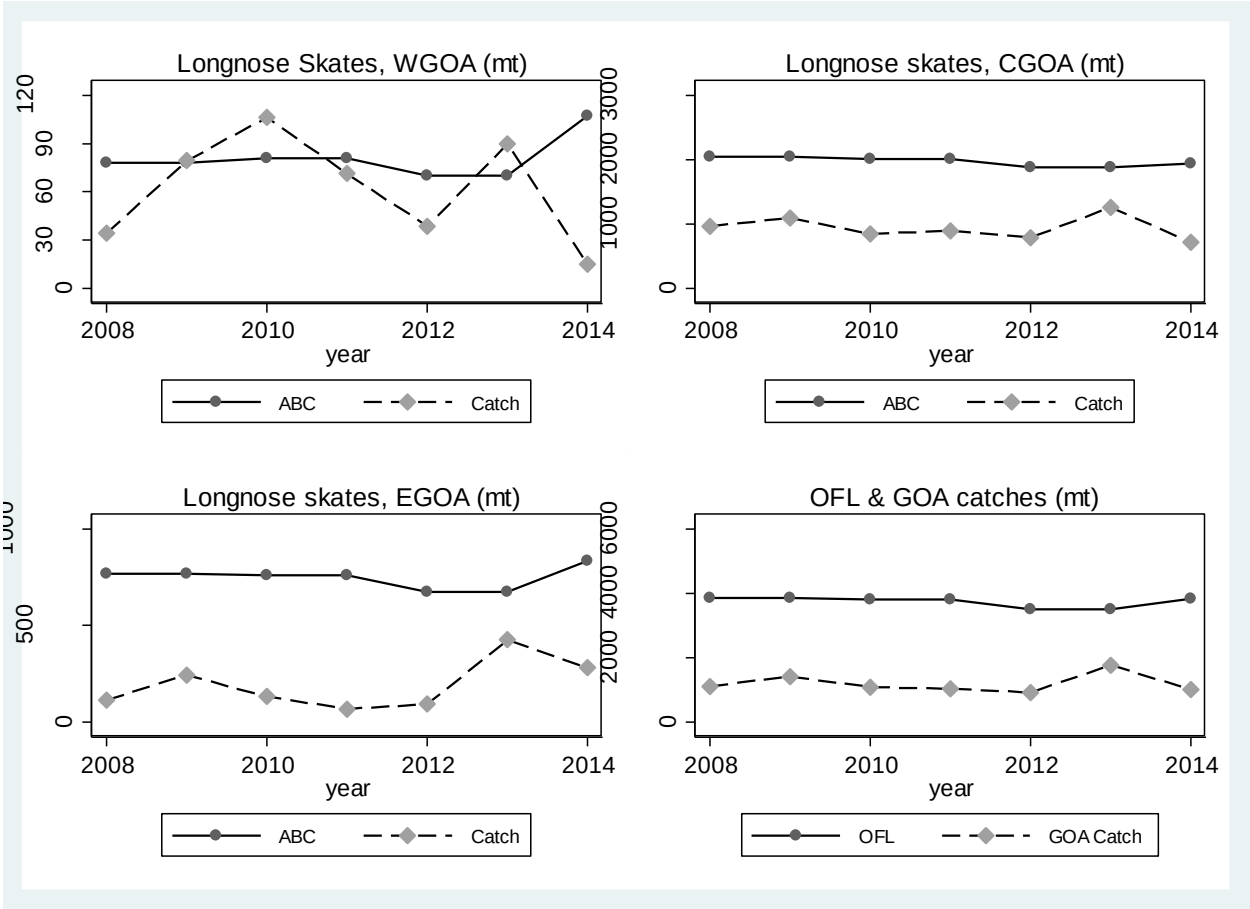
Source: NMFS catch accounting system.

Note: August 3 was chosen as the closing date for one of the periods since 2014 data end on that date. Use of the same closing date across years facilitates comparison. These rates are not comparable to MRA rates since they include discards and skates are included into total groundfish.

4.5.1.2 Longnose Skate Catch History

Longnose skate catches are reported by management area, and compared to area ABCs/TACs and the GOA OFL in Figure 4-3. Longnose skate catches have exceeded the ABC/TAC in the Western GOA in three years, 2009, 2010, and 2013. From 2008 through mid-2014, catches have not exceeded the ABC/TAC in the Central or Eastern GOA, or the GOA-wide ABC or OFL.

Figure 4-3 Catch of longnose skates, ABC, and OFL, by management area from 2008 through mid-2014



Source: NMFS catch accounting system and Harvest Specifications for groundfish of the Gulf of Alaska

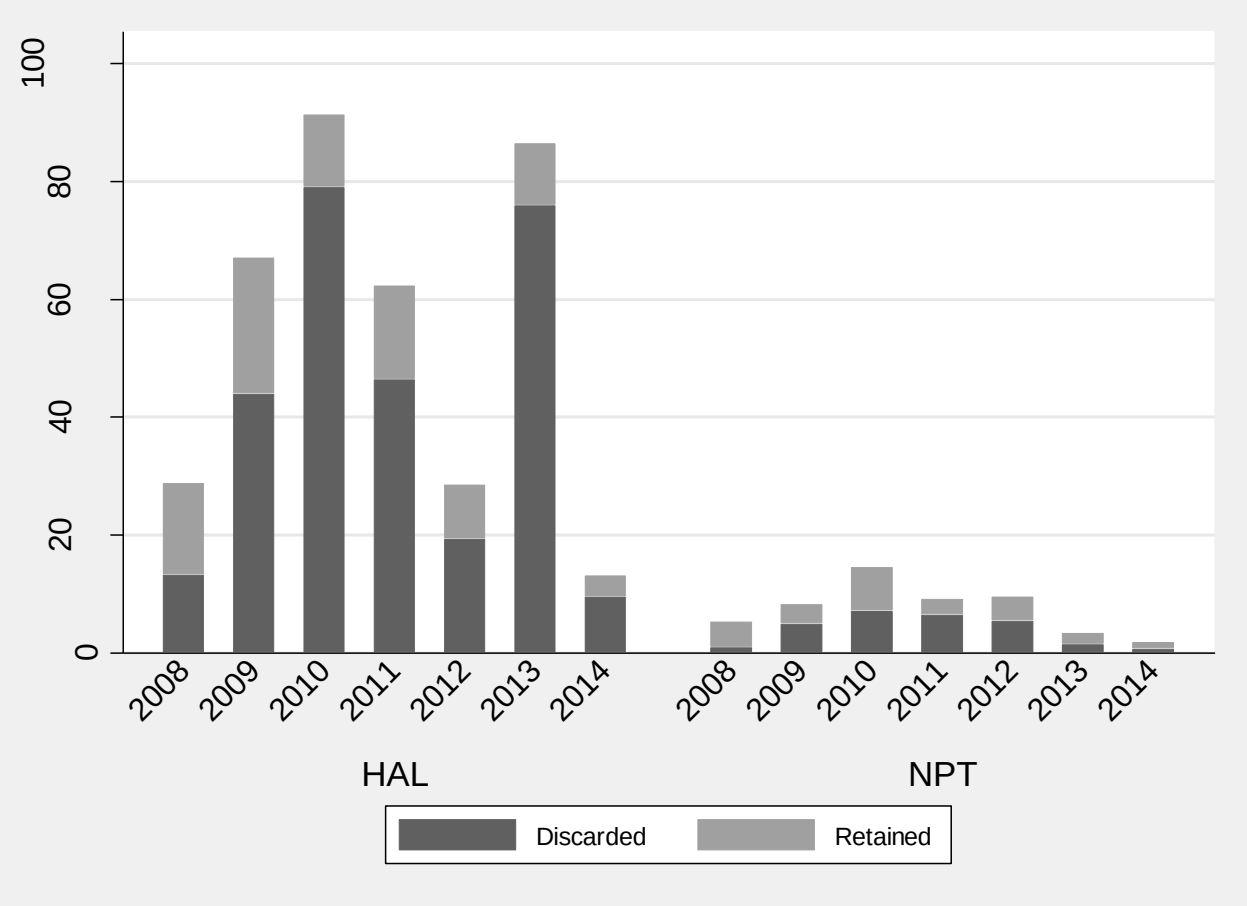
Discard rates for longnose skates vary by management area.[10] Discard rates are relatively high in the Eastern and Western GOA areas. In the Eastern GOA, the discard rate averaged 89 percent from 2008 through the first half of 2014, while in the Western GOA, the discard rate averaged 73 percent. Discard rates were considerably lower in the Central GOA where discards averaged 36 percent of total longnose skate catch (NMFS catch accounting system).

Figure 4-4 shows retained and discarded longnose skate catch by gear type and sector in the Western GOA. Most catches are taken by hook-and-line gear. Significant proportions of the hook-and-line catch come from both hook-and-line catcher vessels and catcher/processors. Some additional catch comes from non-pelagic trawl catcher/processors, but this is relatively small in proportion to hook-and-line catches by either sector. Catches by non-pelagic trawl catcher vessels were *de minimus*.

Figure 4-4 makes a second point about longnose skate catches in the Western GOA: retained catches make up a relatively small part of the overall longnose skate catch. Since an MRA works by placing limits on the fishing operation's ability to target and retain skates in a top-off fishery, the relatively limited retention of longnose skates in the Western GOA suggests that MRA restrictions may have a relatively limited impact on longnose skate catch in that management area.

[10] The bias identified in Section 4.4 should not apply to the rates discussed in this paragraph.

Figure 4-4 Retained and discarded catch of longnose skates in the Western GOA, by gear and sector, 2008 through mid-2014



Source: NMFS catch accounting system. (Separate catcher vessel and catcher/processor data not reported to protect confidential data; other gear not reported to protect confidential data)

Table 4-4 summarizes information on longnose skate catch in target fisheries for the hook-and-line gear and non-pelagic trawl gear fishing operations. Hook-and-line longnose skate catches are concentrated in Pacific cod target fisheries, while the much smaller non-pelagic trawl catches appear concentrated in the flathead sole, arrowtooth flounder, Rex sole, and rockfish target fishery categories.

Table 4-4 Hook-and-line and non-pelagic trawl catches of longnose skates in the Western GOA, 2008 through mid-2014

	Hook-and-line				Non-pelagic trawl
Year	Pacific cod	Halibut	Sablefish	Total	Total
2008	19	3	6	29	5
2009	50	8	9	67	8
2010	65	10	16	91	14
2011	52	5	6	62	9
2012	16	7	6	28	9
2013	18	61	7	86	2
2014*	8	3	2	13	2

*2014 through August 3 only.
Source: NMFS catch accounting system

Table 4-5 shows the percentages of longnose skates taken in different target species fisheries by hook-and-line operators. Pacific cod, halibut, and sablefish target fisheries provide most catcher vessel longnose skate catches, while Pacific cod and sablefish provide most catcher/processor catches.

Table 4-5 Sectoral proportions of Western GOA longnose skate catch (discarded and retained) by gear, target species fishery, and year

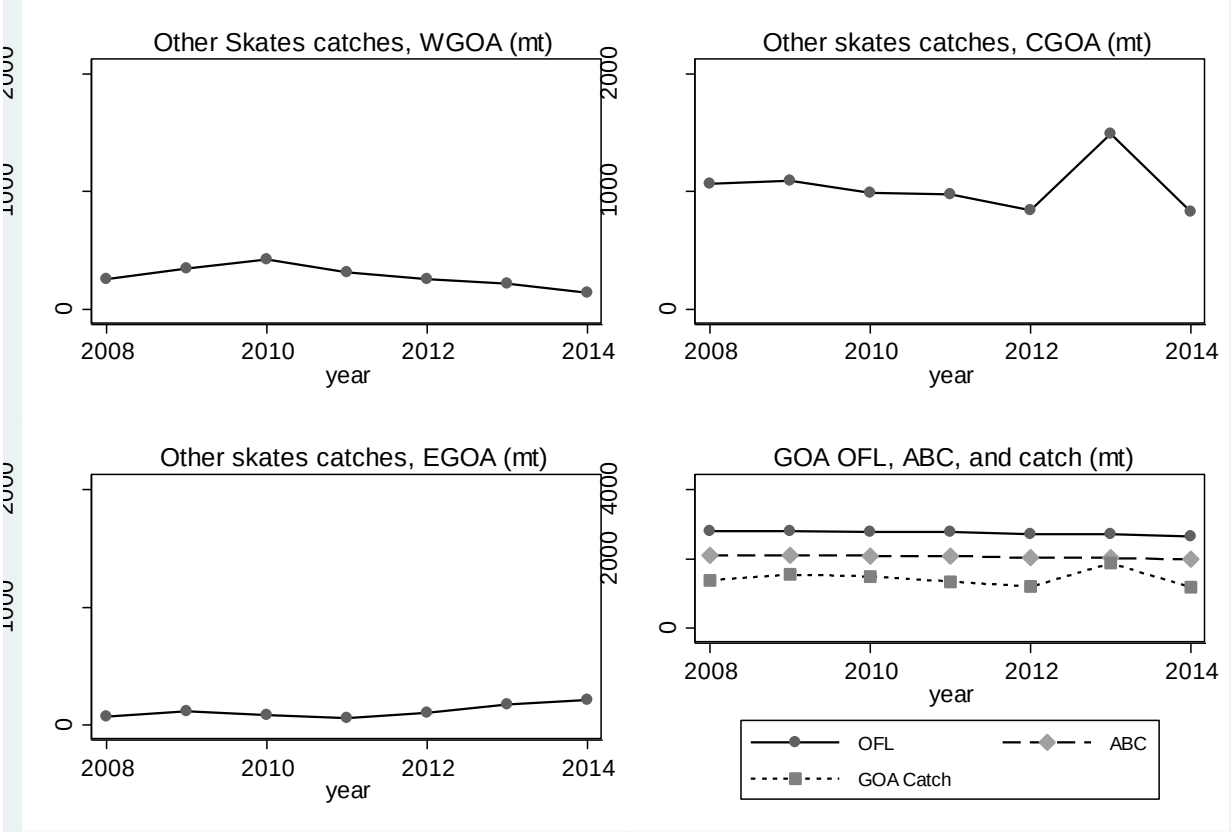
	Hook-and-line			All trawl gear
Year	Pacific cod	Halibut	Sablefish	
2008	57%	8%	19%	16%
2009	63%	10%	12%	15%
2010	62%	9%	15%	14%
2011	73%	6%	8%	13%
2012	41%	17%	15%	26%
2013	20%	68%	8%	4%
2014*	51%	22%	14%	13%

*2014 through August 3 only.
Source: NMFS catch accounting system

4.5.1.3 Other Skate Catch History

Figure 4-5 summarizes other skate catches from 2008 through mid-2014, and compares them to the GOA OFL and ABC/TAC for other skates (there are no specific Eastern, Central, or Western GOA skate ABCs/TACs). Most other skate catches are made in the Central GOA. The GOA-wide OFL and ABC/TAC have not been exceeded in any year.

Figure 4-5 Catch of other skates OFL, ABC/TAC and OFL by and management area from 2008 through mid-2014



Catches include retained and discarded skates

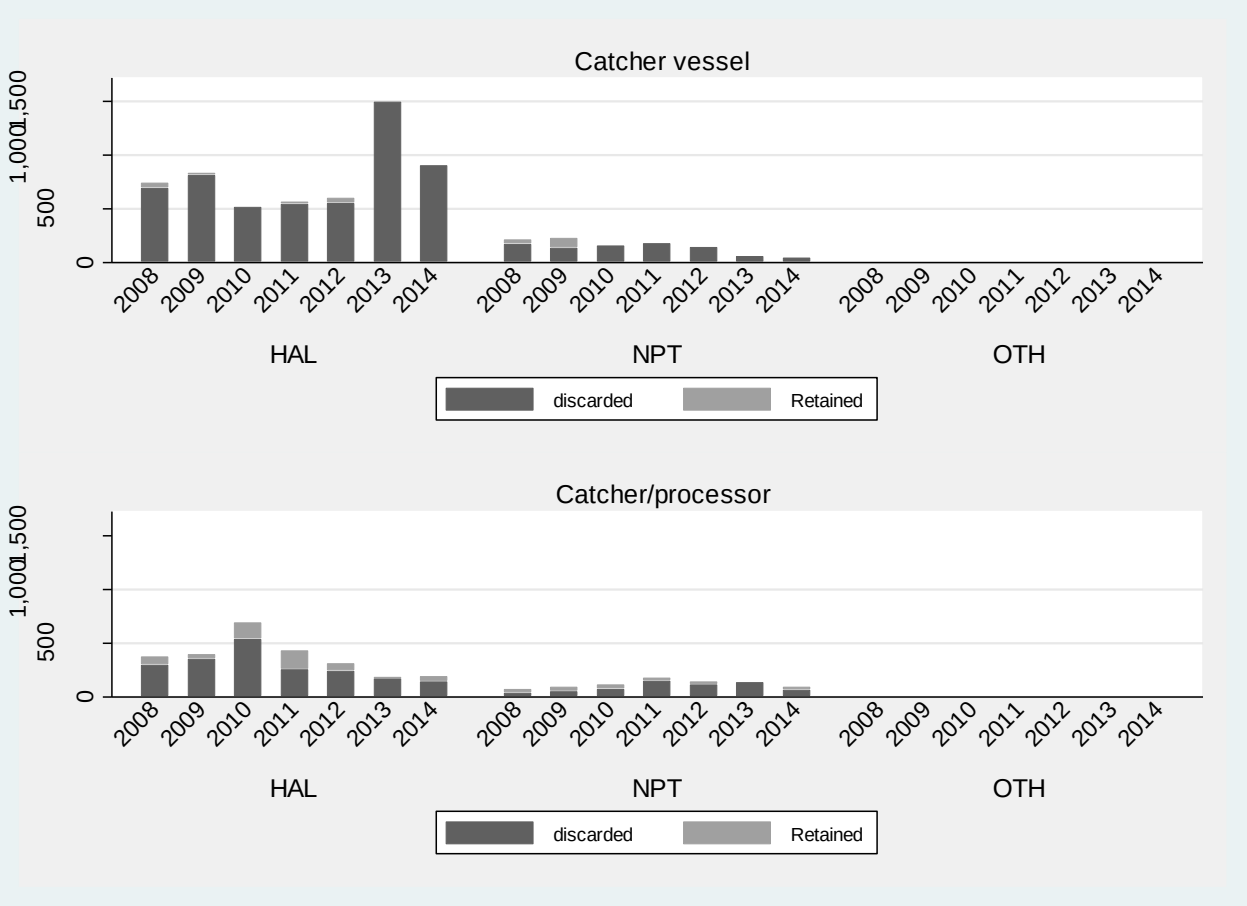
Source: NMFS catch accounting system and harvest specifications for groundfish of the Gulf of Alaska

Discard rates for other skates, as a proportion of the other skate catch, were high in all management areas[11]. They averaged 98 percent of catch in the Eastern GOA, 90 percent of the catch in the Central GOA, and 81 percent of the catch in the Western GOA (NMFS Catch accounting system).

Figure 4-6 shows the GOA-wide retained and discarded catch of other skates, by gear type and sector from 2008 through mid-2014. Other skate catches are mostly made with hook-and-line gear. Catcher vessel catch is larger than catcher/processor catch. Most catches, and almost all of the hook-and-line catcher vessel catches, are discarded. Thus, changes in MRA levels are unlikely to have much impact on retention of other skates.

[11] The bias identified in Section 4.4 should not apply to the rates discussed in this paragraph.

Figure 4-6 Retained and discarded catch of other skates catches by gear and sector for the entire GOA, from 2008 through mid-2014



Source: NMFS catch accounting system

4.5.1.4 Retention rates

The discussion so far has focused on the retained and discarded catches of specific species by specific gears in specific management areas. This is necessary since management area catches of skate species that are retained and discarded are counted against species and area specific TAC and ABC limits, and GOA-wide, but species-specific, OFL limits. However, this definition of catch is not what is directly regulated by the MRA limits under consideration.

The changes to the MRA under consideration limit catcher vessel trip or catcher/processor weekly amounts of retained catches of skates. The same MRA applies to all skate species, all management areas of the GOA, and all gear types. Figure 4-7 provides information about the distribution of retained skate catch in the GOA for all gear types in 2013. This figure includes all skate species, all Federal management areas, and all gear types.

Figure 4-7 was prepared by identifying, for each catcher vessel trip, or each catcher/processor fishing week, the amount (kg) of skates retained for hypothetical MRA rates ranging from one percent of basis species to 20 percent of basis species. These are shown in part (a) of the figure. Clearly, these amounts get smaller as the MRA becomes more restrictive. It is important to remember the distinction between the extensive and intensive margins while examining this figure. Amounts in this figure decline as the MRA becomes more restrictive because operations between the old MRA and the new MRA are assumed to

reduce skate retention to comply with the new MRA. However, most operations are operating below any given MRA and are not constrained by the reduced MRAs. These operations may even expand skate retention if skate prices are increased by the action. This potential expansion is not considered in the figure.

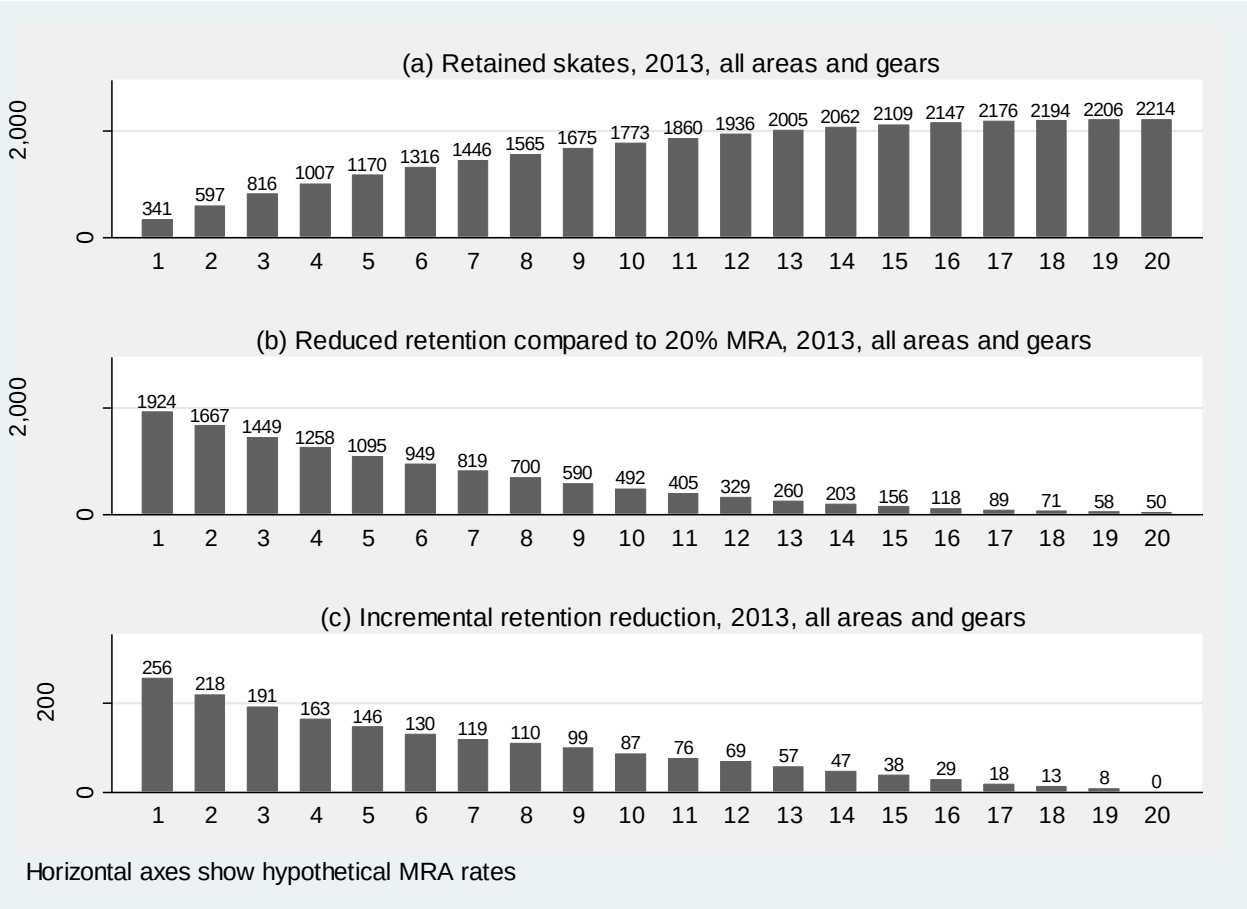
Part (b) of the figure shows the reduction in retained skates, for the reasons described above, as the MRA is reduced from the 20 percent level. Thus, the amount for the MRA of 19 percent (58 metric tons) shows the difference between the amount of skates retained at the 20 percent MRA and the amount retained at the 19 percent MRA. Note that the MRA level of 20 percent shows a reduced reduction of 50 metric tons. This indicates that, at an MRA of 20 percent, 50 metric tons of skates were delivered by operations delivering skates in excess of the 20 percent MRA[12].

Part (c) of the figure shows the incremental reduction in skate retention associated with a move from one MRA percentage to the next lower MRA percentage. Thus, for example, a shift to an MRA of 19 percent reduces retained skate by 58 tons compared to 50 tons for an MRA of 20 percent. Part (c) captures the difference between these, 8 metric tons[13].

Part (a) of Figure 4-7 shows that over a large range, reductions in the MRA have relatively little impact on skate retention. The amount of skates retained starts to change more with the lower MRAs, from an MRA of 10 percent to an MRA of 1 percent. This would be the case if many fishing operations currently retaining skates are not retaining the maximum amount they are allowed under the 20 percent MRA. Part (b) shows the amounts of skates in excess of any given MRA (which would presumably no longer be retained at that MRA). This suggests that the MRA would have to be reduced to about five percent to reduce skate retention by about half. Finally, Part (c) shows the reduction in skate retention associated with a change from one MRA percentage to the next lower percentage. Reducing the MRA does not produce a linear change in retention of skates: the impact of a change from two percent to one percent is much larger than the impact of a change from 20 percent to 19 percent.

[12] The figure shows “retention” at the 20 percent level. This would occur if fishing operations accidentally returned with skates in excess of the MRA and were required to surrender income earned from the sale of those skates. At the current 20 percent MRA, some fishermen retain skates in excess of 20 percent of the basis species. Unless a violation is egregious, these fishermen are only required to surrender the value of the excess skates. Part (b) of Figure 4.9 shows about 50 metric tons of fish landed in this way. Part (a) only shows the volume retained below a given MRA rate. Thus, total retention at the 20 percent level is the sum of the volumes show in Parts (a) and (b).
[13] This may be thought of as the incremental reduction in retention from a one percent change in the MRA.

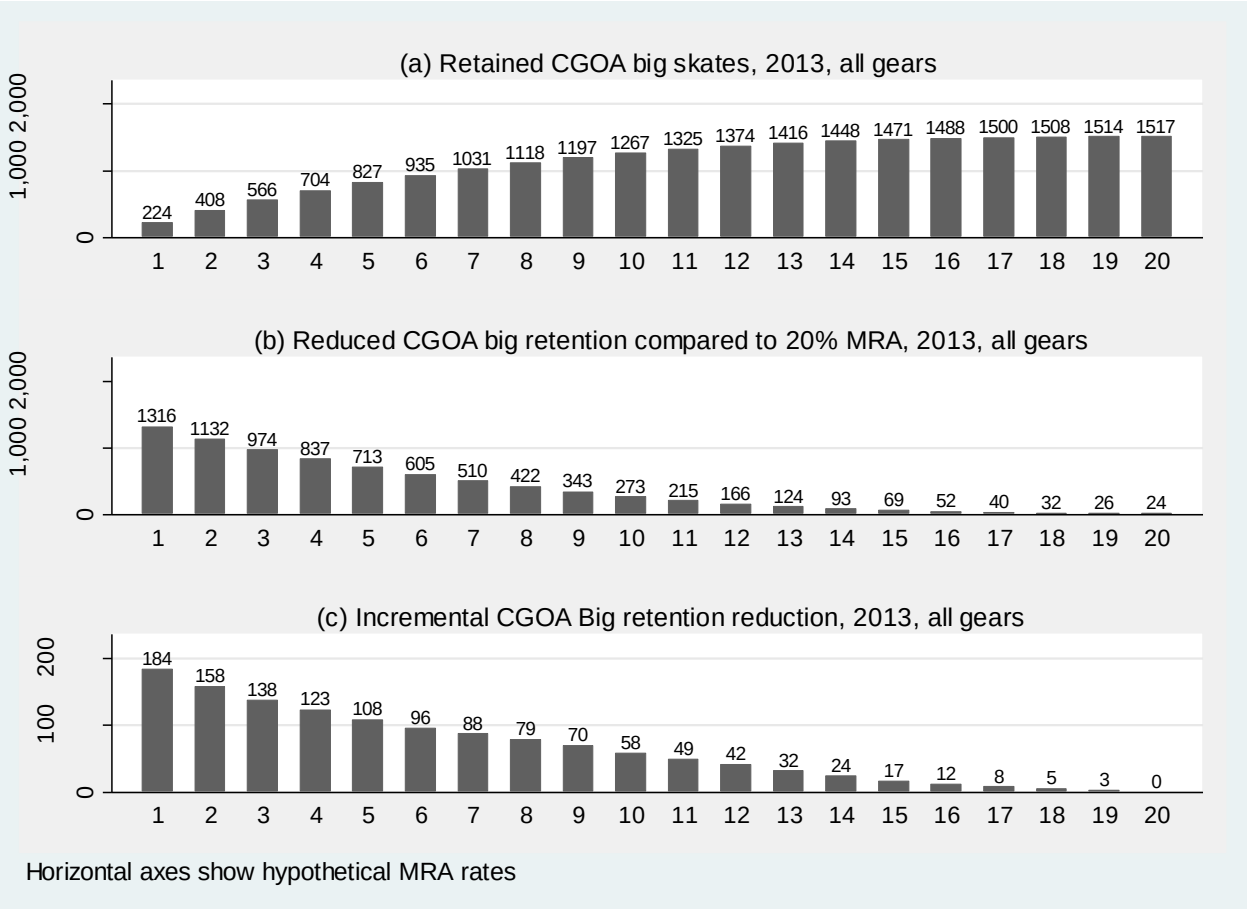
Figure 4-7 2013 GOA Skate retention (all species, all areas, all gears) by hypothetical MRA rate



Source: NMFS calculations based on NMFS catch accounting system

Figure 4-8 duplicates the calculations in Figure 4-7 for big skates in the Central GOA. Again, this figure suggestions that MRA reductions from 20 percent to 10 percent would have relatively limited impacts on retained catches of Central GOA big skates at the extensive margin. Beyond 10 percent, the potential impacts are larger.

Figure 4-8 2013 Central GOA Big Skate retention (all gears) by hypothetical MRA rate



Source: NMFS calculations based on NMFS catch accounting system

4.6 Description of management

Federal skate management in the GOA

Prior to 2003, skates in the GOA were managed as part of the "Other Species" FMP category (skates, sharks, squids, sculpins, and octopuses). Harvest within this category was historically limited by a total allowable catch (TAC) calculated as 5% of the sum of the TACs for GOA target species. The Other Species category was established to monitor and protect species groups that are not currently economically important in North Pacific groundfish fisheries but are considered ecologically important.

In response to a developing fishery in the GOA for big and longnose skates in 2003, FMP amendments to re-define the acceptable biological catch (ABC), overfishing level (OFL), and TAC setting process for skate species in the GOA were completed. In 2004, big and longnose skates were managed together under a single TAC in the Central GOA, and the remaining skates in the Central GOA and all skates, including big and longnose skates, in the Western and Eastern GOA were managed as an "other skates" species complex GOA-wide. As identification of skate species in the fisheries improved, skate management became more specific.

Since 2005, GOA skates have been managed in three groups. Big skates and longnose skates each have separate harvest specifications, with OFLs defined GOA-wide and ABCs/TACs specified for Western, Central, and Eastern regulatory areas. All remaining skate species are managed as an "Other Skates"

species group with GOA-wide harvest specifications due to difficulty in identification of these species. TACs for all skate species have been set equal to ABCs in all years since 2005.

Before 2013, data on the incidental catch of skate species from fisheries that were largely unobserved were limited or not available. These largely unobserved fisheries included IFQ halibut and small catcher vessel hook-and-line Pacific cod. Both of these fisheries were expected to have large amounts of incidental catch of skates, based on overlap of the fisheries with skate habitat and anecdotal reports.

The North Pacific observer program was restructured in 2013, allowing deployment of observers in the IFQ halibut fishery and on smaller vessels. As expected, the reported skate harvest increased in IFQ fisheries, due to observer data and halibut landings being included in the NMFS catch accounting system. Caution should be used as these data are based on one year, however 2014 is showing similar skate harvest increases compared to years prior to the 2013 program observer restructuring (NMFS AKRO in-season managers, pers. comm.). For that reason, skate harvest is analyzed from 2008 through 2012 and 2013/2014.

Topping off fishing behavior is a recognized and generally accepted activity associated with species on incidental catch status. Topping off fishing involves ostensibly fishing for a target species, while also retaining a species that contributes to the value of the total trip catch. The incentive for fishermen to engage in this activity is directly related to the value of, and available market for, the incidental catch species relative to the associated operation costs of fishing for and retaining the target species. Retention of the bycatch species is allowed up to the maximum retainable amount (MRA), a percentage of total weight of the incidental catch species relative to the target species catch. From a management perspective, MRA percentages are a tool used to slow down the harvest rate of a species. These rates do not necessarily reflect an “intrinsic” incidental catch rate, but reflect a balance between the recognized need to slow harvest rates, minimize the potential for discards, and, in some cases, provide an increased opportunity to harvest available TAC through limited topping off fishing behavior.

State skate management in the GOA

The 2012 GOA SAFE chapter for skates provides the following information:

> *Prior to 2006, directed fishing for skates in state waters was allowed by [ADF&G] Commissioner’s Permit; in 2006 skates were placed on bycatch status only. In 2008, the Alaska state legislature appropriated funds for developing the data collection necessary to open a state-waters directed fishery [for skates]. In 2009 and 2010, the state conducted a limited skate fishery in the eastern portions of the Prince William Sound (PWS) Inside and Outside Districts. In 2009, the guideline harvest level (GHL) was based on skate exploitation rates in federal groundfish fisheries and NMFS survey estimates of skate biomass. This was changed for 2010, when GHLs were based on ADF&G trawl survey results….*
>
> *The big skate GHL was exceeded by a substantial amount in 2009. In 2010, trip limits for big skates were imposed to reduce the potential for exceeding the GHL. The improved management resulted in a much smaller overage in the Inside District and no overage in the Outside District. The state-waters skate fishery was discontinued in 2011.*

Currently fishermen in state waters are not allowed to target skate species. Allowable skate retention levels vary in different parts of the GOA. In Southeast Alaska, in 2014, skates are limited by a 20 percent MRA that applies to groups of species, including species other than skates. In Prince William Sound, in

2014, skates are subject to a 15 percent MRA. In Kodiak and in the Western GOA, in 2014, the state applies a 20 percent MRA, consistent with the federal rate.

State skate catches are not counted against Federal GOA skate harvest limits and are not included in the federal stock assessment or ABC determination. However, a 2013 Council discussion paper on skates and octopus directed fishing in the GOA notes that, had 2013 catches from state waters in Prince William Sound and Southeast Alaska been counted against the federal catch limits, the ABC for longnose skates in the Eastern GOA would have been exceeded (NPFMC 2013, page 11).

4.6.1 Vessels

Table 4-6 shows the numbers of vessels by gear type and catcher/processor or catcher vessel, with retained skate catch of any species for each of the three management areas. A review of the table shows that catcher/processor and trawl catcher vessel information in the Eastern GOA will be confidential, and that other area-gear-sector information may be confidential for certain years.

Table 4-6 Vessels with retained skate catch by sector and gear type, 2008 through mid-2014 (in number of vessels)

	Catcher/processor		Catcher vessel		
Year	HAL	TRW	HAL	OTH	TRW
Central GOA					
2008	7	6	141	8	39
2009	3	6	122	5	36
2010	4	6	126	10	37
2011	6	5	124	6	42
2012	3	5	139	5	49
2013	3	3	111	1	53
2014	2	2	81	3	44
Eastern GOA					
2008	1		51		1
2009	1	1	29		
2010	2		24		1
2011			23		1
2012			25		
2013			18		
2014			17		
Western GOA					
2008	10	3	8	2	19
2009	6	3	23	3	17
2010	8	5	12		25
2011	8	3	5		18
2012	3	3	6		25
2013	5	2	6		19
2014	3	2	3	2	12

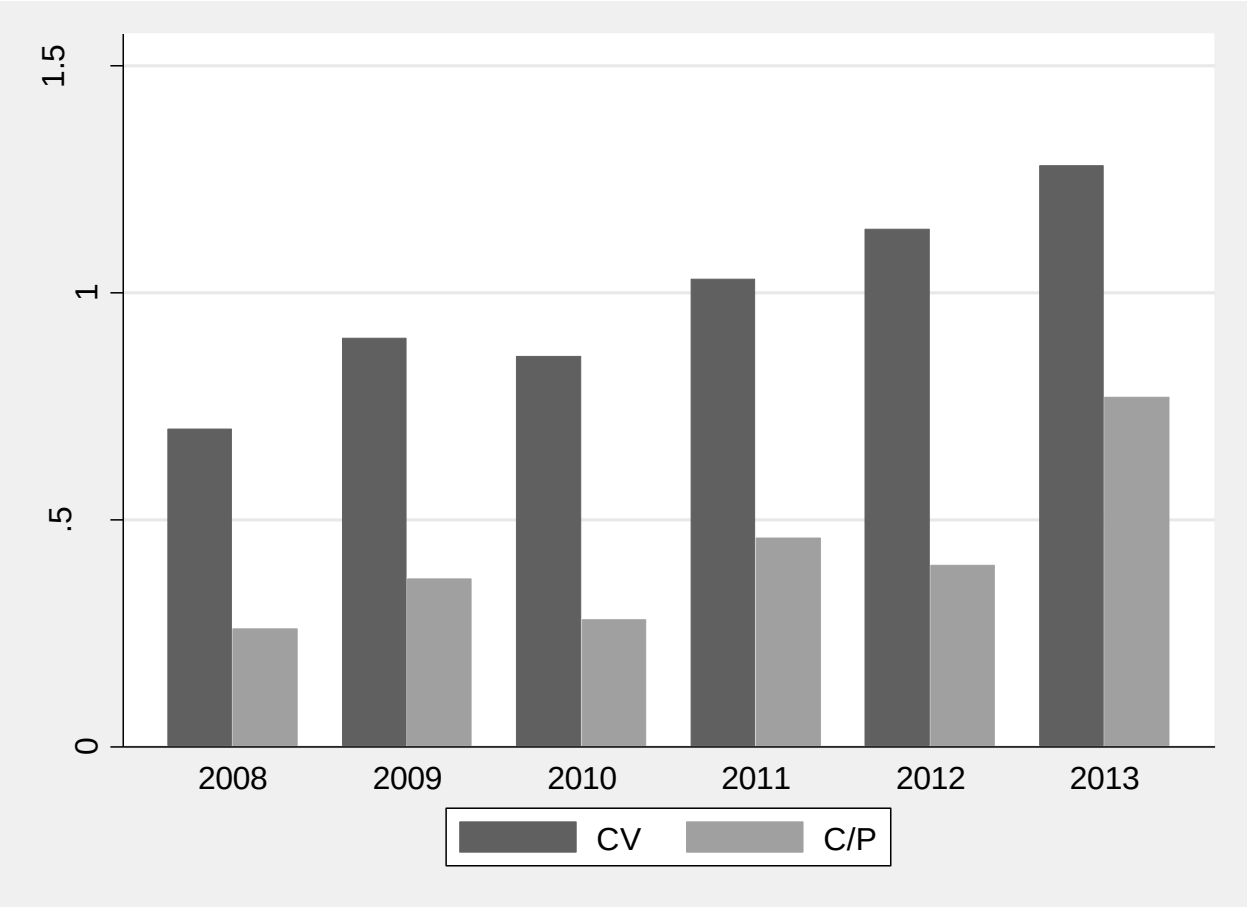
Source: NMFS Catch accounting system

4.6.1.1 Vessel Dependency

During 2008 through 2013, skate revenues to GOA catcher vessels (ex-vessel revenues) averaged about $1.6 million a year, while average revenues to GOA catcher/processors (wholesale revenues) were about $0.6 million a year. Average revenues to both categories of fishing operations were thus about $2.2 million a year. (AKFIN revenue estimates)

In general, vessels show relatively little dependence on GOA skates for their revenues. Figure 4-9 shows the share of gross revenues from GOA skates for vessels in the GOA with retained skates in the years 2008 through 2013, broken out separately for catcher vessels and catcher/processors. The shares ranged between 0.7 percent and 1.28 percent of all gross revenues for catcher vessels, and between 0.26 percent and 0.77 percent for catcher/processors. The figure also shows that the proportion of gross revenues from this source was rising during this period for both groups of vessels, but especially for the catcher vessels.

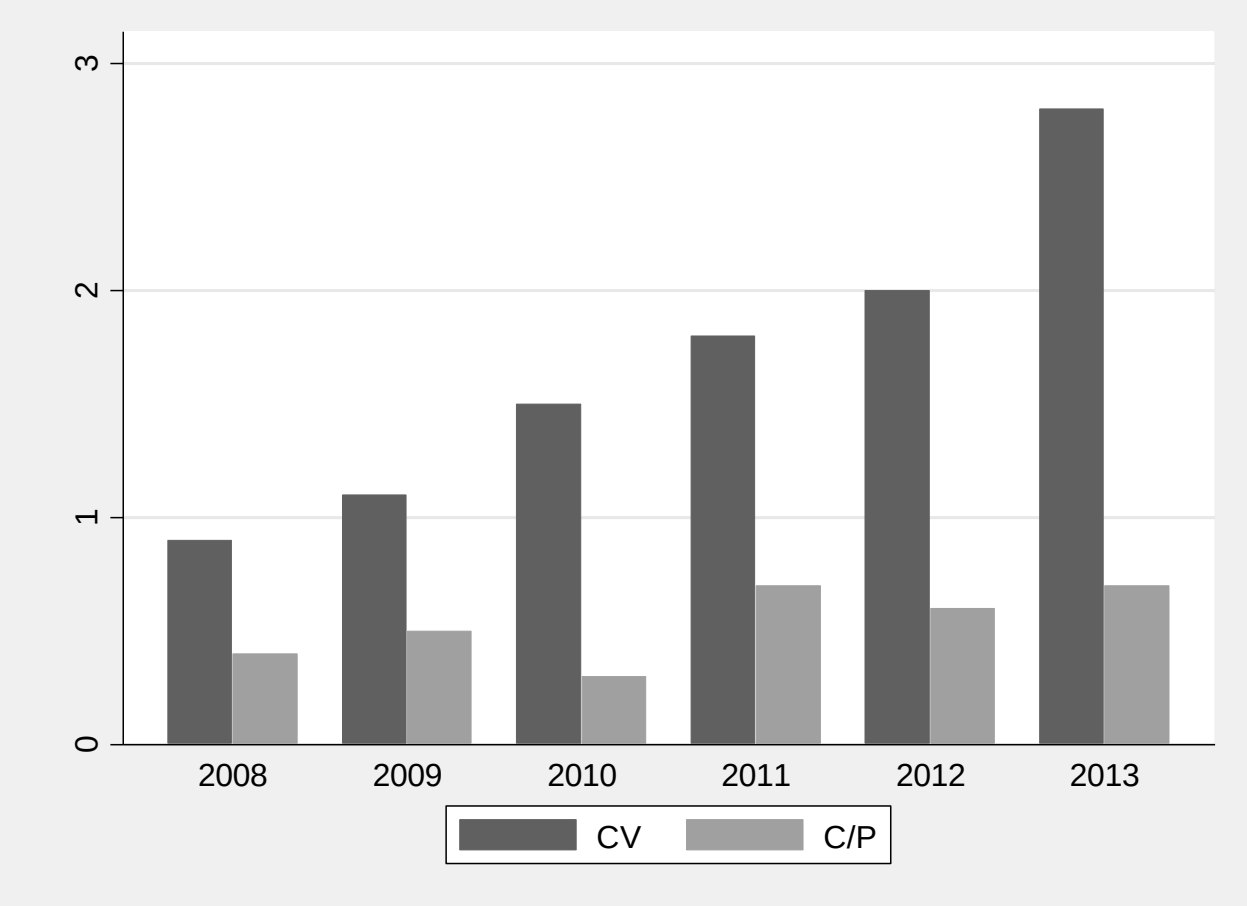
Figure 4-9 Percent of gross revenues from skates for CVs and C/Ps with retained skates, 2008 through 2013



Source: AKFIN revenue estimates.

As discussed in earlier sections, non-pelagic trawlers in the Central GOA that retain big skates may have the most interest in the top-off fishery for skates. Figure 4-10 shows that the relative importance of big skate revenues to the trawl catcher vessels increased each year from 2009 through 2013, rising from almost 1 percent of revenues in 2008 to almost 3 percent in 2013.

Figure 4-10 Percent of gross revenues from CGOA big skates for CVs and C/Ps with retained CGOA big skates, 2008 through 2013



Source: AKFIN revenue estimates

4.6.2 Communities

Most skates retained by catcher vessels are delivered at Kodiak. The percentage delivered at Kodiak ranged between 87 percent and 93 percent (in 2008) for the years 2008 through 2014 (through August 3, 2014). The remaining skates were delivered at 13 other places during those years, but only in small amounts. Only recent deliveries to Seward and Cordova have amounted to more than one or two percent of the total skate catch (NMFS catch accounting system)[14] .

Shoreside processing of GOA skates is concentrated in Kodiak, but is done by processors from Petersburg to Unalaska. Kodiak is the only shoreside community with enough processors to make it possible to report the value of skate production. Over the years 2010 through 2013, the first wholesale value of shoreside skate processing in Alaska ranged between $3.2 million and $5.1 million, the value in Kodiak ranged between $2.7 and $4.6 million. Kodiak accounted for between 84 percent and 91 percent of the value of shoreside skate production. Skates accounted for between 0.98 percent and 1.38 percent of the first wholesale value of production at Kodiak. This percentage rose in each year from 2011 through 2013 (AKFIN data evaluated by AKRO).[15]

[14] Based on ADF&G disposition codes 60, 61, 62, 63, and 95, but not including codes 41 (for fish meal production) or 99 (discard onshore after delivery but before processing – not sold).
[15] Ex-vessel vessel revenues, and the wholesale value of the processor production to which they give rise, are not additive for the purposes of cost-benefit or distributional analysis. The two revenue estimates are estimates of the

Community profiles for Kodiak, Seward, and Cordova have been prepared by the social scientists at the Alaska Fisheries Science Center, and are included here by reference. The profile for Kodiak starts on page 64 of Himes-Cornell et. al. (2013a), the profile for Seward is on page 411 of Himes-Cornell et. al. (2013b), and the profile for Cordova is on page 35 of Himes-Cornell et. al. (2013c). They may be accessed from the following Internet URLs:

Kodiak: http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communityprofiles/Regional_Kodiak_Island_Archipelago.pdf
Seward: http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communityprofiles/Regional_Kenai_Cook_Inlet.pdf
Cordova: http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communityprofiles/Regional_Prince_William_Sound.pdf

The State of Alaska imposes a Fisheries Business Tax of 3 percent of the ex-vessel value on groundfish delivered in its boundaries. This tax is divided in half between the State of Alaska and the communities within which the fish are landed. Given the ex-vessel value of $1.6 million provided above in Section 4.6.1.1, the estimated value of the Fisheries Business Tax revenues accruing to the State of Alaska and its communities is $48,000, of which $24,000 would be retained for the State, and $24,000 would be distributed to communities, predominately Kodiak.

The State of Alaska also imposes a Fishery Resource Landing Tax of 3 percent of the inferred ex-vessel value of processed fishery resources landed within the State. Again, half of this tax is retained by the State of Alaska, and half is distributed to the communities in which the processed products were landed. The first wholesale value of skates purchased and processed at sea ranged from about $0.7 million to about $1.9 million (AKFIN data evaluated by AKRO). This value peaked in 2011, and declined in 2012 and 2013. The value of the Fishery Resource Landings Tax, and its allocation among communities, is difficult to estimate because of limited information about the locations where processed products are landed. If these were all landed in Alaska, the tax revenues would have ranged from about $21,000 to about $57,000. As with the Fisheries Business Tax, these revenues would have been divided equally between the state and the communities in which the processed skates were landed.

From a national cost-benefit analysis accounting stance, taxes are transfer payments from one party to another. They impose no benefits or costs in this context, since the cost to one party is offset by the benefit to another. Nevertheless, they need to be accounted for in examining the distributional impacts of a program, and the community impacts, since they do provide a benefit to the recipient communities.

4.7 Analysis of Impacts: Alternative 1, No Action

In-season management under the no action alternative

Under the no action (or status quo) alternative, the GOA skate MRA would remain at 20 percent of the basis species. However, the MRA tool is used in conjunction with the Regional Administrator's decision about whether and when to prohibit retention and place skates on prohibited species status. As explained earlier, in recent years the Regional Administrator has found it necessary to place big skate in the Central GOA on prohibited species status increasingly early in the year. In 2014, big skate in the Central GOA was placed on prohibited species status on February 5.

In 2015, and in subsequent years, if fishing conditions are found similar to those in 2014, it is likely that big skate in the Central GOA would be placed on prohibited species status and retention prohibited early

value of a single flow of product at two levels. Ex-vessel values are implicit in the wholesale value estimates. Adding the estimates would lead to "double-counting" the value of the product.

in the fishing year, perhaps earlier than in 2014. A prohibition on retention might be lifted later in the year if it becomes apparent that the annual TAC would not be reached (NMFS AKRO in-season managers, pers. comm.).

In-season decisions about whether or not to prohibit retention of skates early in the year depend on many factors, including: total catches in relation to the TACs for skate species in the current and preceding year, stock size estimates of skate species, and the expected stock size of GOA target species in which skates are caught (e.g. Pacific cod and IFQ halibut). Additionally any expected change in effort or change in incentives to top off on skates could influence this decision (NMFS AKRO in-season managers, pers. comm.).

Controlling catches within OFLs and ABCs

As discussed in Section 4.4, the baseline for this analysis is the state of the groundfish fishery from 2008 through the first half of 2014. Thus, the impact of the no action alternative is the difference between the way the fishery was conducted from 2008 through 2014, and the conduct of the fishery if skate retention is prohibited. This is made a little less clear cut by the likelihood that, if recent conditions continue, prohibited species management may be similar to that in 2013 and 2014.

Under the no action alternative, as described, and if conditions remain similar to those in the baseline years, it is unlikely that the GOA-wide skate OFLs would be exceeded[16]. Figure 4-1, Figure 4-3, and Figure 4-5 compare skate species and species-group OFLs and ABCs/TACs to species catches from 2008 through 2014 (as of August 3, 2014). In no case did skate catches approach OFL levels. If skate retention were prohibited for most, or all of a year, during that period, catches would have fallen even further below the OFL levels. To the extent that experience in these years provides some guidance about what might happen in the future: OFLs are unlikely to be exceeded. It is more difficult to say whether or not catches would exceed area-species specific ABCs/TACs

Big skate ABCs/TACs in the Eastern or Western GOA are unlikely to be exceeded under the no action alternative, assuming conditions similar to those in the baseline years. They were not exceeded in any year from 2008 through 2013 (2014 is not yet complete) and, since retention is a relatively large part of the catch for this species, a retention prohibition may have some impact on catches in these areas, further reducing catches below ABCs/TACs.

Big skate ABCs/TACs are more likely to be exceeded in the Central GOA. In 2013, big skate retention was prohibited after May 8, yet the Central GOA ABC/TAC was still exceeded that year. NMFS remains concerned at this writing (August 2014) that the Central GOA ABC/TAC might be exceeded in 2014, even though retention was prohibited after February 5. Prohibition of retention may reduce the likelihood of exceeding the Central GOA ABC/TAC in any given year, however, this likelihood, and the change in it, cannot be estimated with available information. The possibility that the ABC/TAC might be exceeded cannot be ruled out.

Longnose skate catches raise issues in the Western GOA, and in this area they are largely discarded, so a prohibition on retention may have a relatively limited impact on Western GOA catches. Experience in the years 2008-2014 suggests that there would be little chance of exceeding longnose skate ABCs/TACs in the Eastern and Central GOA. However, the longnose skate ABC/TAC has been exceeded three times

[16] Conditions could change from those in the baseline years in ways that reduce their relevance for evaluation of the alternatives. For example, a large increase in skate biomass, and a large increase in fishing for a target species, could lead to increased skate discards and, possibly, to catch levels that would exceed TACs more often. It would be unlikely to see an OFL exceeded because of the additional precautionary measures that would be taken in the harvest specifications and accountability measures.

during those years in the Western GOA. In 2013, the only year so far with relatively complete information about discards (because of the implementation of the observer program restructuring in 2013), the catch in the Western GOA was almost entirely discarded, yet the ABC/TAC was exceeded. Since a prohibition on retention for all or part of the year under Alternative 1 would not affect discards, the likelihood of exceeding the longnose skate ABC/TAC in the Western GOA may not be affected by the no action alternative. Note that if it is not affected by the no action alternative, under which retention might be prohibited all year, it might not be affected by any alternative with a lower MRA.

As shown in Figure 4-5, the only ABC/TAC for the other skates species group is GOA-wide. This has not been exceeded in any year. As shown in Figure 4-6, most other skates catches are discarded. Based on experience during 2008 through 2014, it is unlikely that the other skates ABC/TAC will be exceeded GOA-wide, although it is also unlikely that a prohibition of retention will have a large impact on catch. As noted above, if prohibition of retention is unlikely to have a significant effect on catch, more limited measures, such as a 15 percent, 10 percent, or 5 percent MRA will not have a significant effect either.

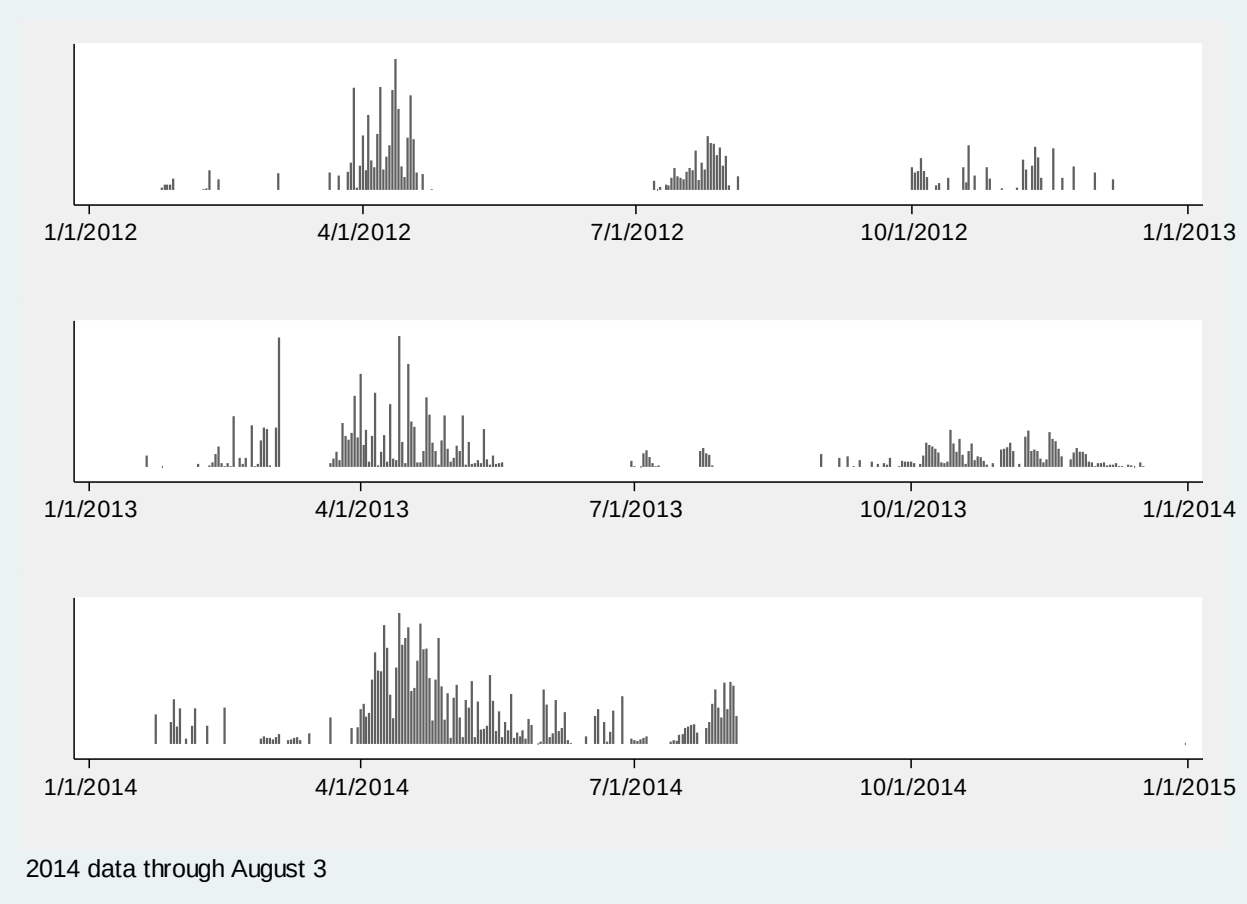
Response of fishing operations to changed incentives

In a top-off fishery for skates, a prohibition on retention of skates will change the incentives for fishing operations. Revenues from a day spent fishing for the MRA incidental catch species targeted in the top-off fishery would be reduced compared to those in other activities; fishing vessel operators may respond by changing their pattern of fishing activities away from those whose relative return has gotten smaller, and towards those whose relative return is now higher.

In particular, non-pelagic trawl catcher vessels in the Central GOA spring arrowtooth flounder target have taken big skates in top off fisheries while they were using arrowtooth flounder as the MRA basis species. Under a prohibition on retention of skates these vessels would no longer earn revenues from big skates. Some vessels may continue to find the arrowtooth flounder fishery viable without the big skate top off retention; these vessels may continue to fish for arrowtooth flounder. Other vessel operators may withdraw from these fisheries in the absence of big skate revenues. Vessels that no longer find the spring arrowtooth flounder fishery viable without the big skate top off retention have relatively limited alternative fishing opportunities. These vessels may target shallow-water flatfish, but this has not been a valuable fishery, and has relatively high halibut PSC. Vessels may want to reserve halibut PSC limits for fall fishing for Pacific cod and, possibly, shallow-water flatfish. Alternatively, vessels may remain in port. Opportunities for fishing in the BSAI are likely to be relatively limited by overlap in time between important BSAI and GOA fisheries.

There is limited information on potential changes in target fisheries in response to changing big skate retention levels, however the available information on arrowtooth flounder does not suggest the fishery would no longer be viable if big skates could not be retained in top off fishing. The years 2012 through 2014 have seen Central GOA retention prohibited for big skates on December 17, May 8, and February 5, respectively. Figure 4-11 shows big skate retention in the arrowtooth targets (without regard to area or gear type) in each of these three years. It is difficult to pick out any clear cut impact of big skate retention prohibitions in any one of these years. Even in 2014, when big skate retention was prohibited on February 5, there is no obvious impact on the volume of groundfish retained in arrowtooth targets.

Figure 4-11 Seasonal patterns of groundfish retention in GOA arrowtooth, deep water flatfish, and rex sole target fisheries, 2012 through mid-2014



Source: NMFS catch accounting system (vertical scale not shown to preserve confidentiality)

Fishing operation and shoreside plant revenues

Average annual aggregate revenues received by fishing vessels during the years 2008 through 2013 were $2.2 million ($1.2 million ex-vessel revenues received by catcher vessels, and $0.6 million wholesale revenues received by catcher/processors). This suggests the magnitude of the potential revenue at risk for fishing operations under the status quo. In the years from 2010 to 2013, processors buying skates retained by catcher vessels realized from $3.5 million to $5.3 million in gross wholesale revenues. After deducting the cost of their purchases of skates from catcher vessels, that left processors from $2.2 million to $3.3 million for processing labor, and other expenses. This suggests both the overall level of revenue impact faced by the fishing and processing sectors together (the wholesale value received by processors) and the potential impact on the processing sector alone (the wholesale value net of the cost of ex-vessel purchases). Actual revenue impacts may vary quite a bit and depend on the assessment of skate biomass and harvest specifications; market conditions and price; the currently unknown elasticity of demand for Alaskan skates at the ex-vessel and wholesale levels; and the actions taken by in-season managers. If skate species are placed on prohibited species status at the start of the fishing year, then skate revenues would be zero.

Value of ecosystem impacts

The industry has historically had difficulty developing lucrative markets for arrowtooth flounder. Arrowtooth flounder may compete with more valuable species for available ecosystem resources or may

prey on more valuable species (Spies and Turnock, 2013: Appendix B). If this is so, arrowtooth flounder retention associated with skate top off fisheries may have created value for fishermen targeting other species. However, potential value from this source is speculative and unknown.

Community impacts

In the past, most skates taken by catcher vessels have been delivered at Kodiak. Small amounts have been delivered in other ports. Prohibition of skate retention is likely to have the greatest adverse impact at Kodiak. As discussed earlier, during the years from 2010 to 2013, the wholesale value of skates processed by Kodiak firms ranged from $2.7 million to $4.6 million (rising each year from 2011 to 2013). During these years, skates provided from about 0.7 percent to about 1.0 percent of the Kodiak wholesale revenues from fish processing. This suggests the magnitude of the impact that would be faced at Kodiak.

4.8 Analysis of Impacts: Alternatives 2 and 3 (15 and 10 Percent MRAs)

Reducing the MRA for skates to 15 percent, or to 10 percent, would not have a large impact on skate retention along the extensive margin. Part (a) of Figure 4-7 showed the volumes of skates retained by vessels that retained fewer skates than a set of designated MRA levels (ranging from 1 percent to 20 percent) in 2013. A visual inspection of the figure shows a relatively gradual reduction in aggregate skate retention from the 20 percent MRA level to the 10 percent level. In fact, this visual inspection is misleading, since only retained skates are shown in the figure. If the figure were revised to include discarded skates, as well as retained skates, in the columns, the impact would appear to be even less.

The actual retained tonnage in 2013, which can be read from the figure, would have decreased from about 2,214 metric tons at a 20 percent MRA, to about 2,109 metric tons at 15 percent MRA, a decline of 105 metric tons. A change in the MRA from 20 percent to 10 percent would have decreased retention to an estimated 1,773 metric tons, or by about 441 metric tons. In 2013, the big skate retained and discarded catches in the Central GOA exceeded the ABC/TAC by about 497 metric tons[17]. Thus, even if the entire impact of this measure, a reduction to a 10 percent MRA, had been used for 2013, it would not have kept the total catch within the ABC/TAC for big skates in the Central GOA.

Given the relatively small impact of the MRA constraints on retention along the extensive margin, it seems likely that, under conditions similar to those prevailing in 2013, the Regional Administrator would find it necessary to prohibit retention of big skates in the Central GOA under Alternatives 2 and 3. Much of the analysis of Alternative 1, the status quo, is applicable to Alternatives 2 and 3.

The actual reduction in the MRA may affect fishing incentives along the intensive margin. While this consideration probably is not too important for 10 percent and 15 percent MRAs, because of the relatively small amounts of skates taken by vessels in excess of 10 percent and 15 percent of their basis species, it may be more important for lower MRAs which could constrain more fishing operations (NMFS catch accounting system).

It is fairly common for groundfish vessels to catch skates, less common for them to retain them. Of 1,647 vessels active from 2008 through mid-2014, 66 percent caught skates on at least one trip during the period, but only 27 percent retained skates on at least one trip. Of the trips (for catcher vessels) or weeks fishing (for catcher/processors) taken during that period, 56 percent resulted in a catch of skates, while only 21 percent resulted in the retention of skates. Vessels retaining skates tended to retain small amounts in relation to their potential 20 percent MRA. On 11,302 trips and weeks fishing during this period, in

[17] The big skate retained and discarded catch was 2,290 metric tons in 2013, and the ABC/TAC was 1,793 metric tons (see the EA).

which the vessel retained less than the 20 percent of basis species worth of skates which it was permitted to retain, the average retention rate was 6 percent. Focusing more tightly on the 9,505 trips and weeks in the Central GOA, the percentage is 6 percent. Focusing even more tightly on the non-pelagic trawlers in the Central GOA, the number of trips is 4,716, and the retention rate is 4 percent. These are average retention rates; significant numbers of vessels have rates below these (NMFS catch accounting system).

Suppose a 10 percent MRA limited production of skates by vessels formerly retaining in excess of 10 percent. If this reduction in marketable skates led to increases in skate prices, the vessel capacity would exist for an expansion of retained skate catches, which would offset the gains at the extensive margin to an unknown extent. Vessels could start to retain skates on trips, they could increase their retention on individual trips, they could take additional trips, in part, to harvest more skates. The magnitude of this potential behavioral response cannot be predicted, but it is likely to increase with the reduction in the skate MRA.

The point of this is not that this action would fail to achieve the objective of constraining skate catches within ABC/TAC levels. This is a rough analysis, and it is based on 2013 data. Alternatives 2 and 3, in combination with in-season management changes in the retention status of skate catches may allow this. More to the point, however, even a 10 percent MRA may not be enough to guarantee keeping catches within ABC/TAC levels.

4.9 Analysis of Impacts: Alternative 4 (5 Percent MRA)

As noted, Figure 4-7 shows that a change from an MRA of 20 percent to an MRA of 10 percent (a 50 percent cut) only reduces retained skate catch at the extensive margin by about 20 percent. However, the reduction in the amount of retained skates increases rapidly with reductions in the MRA beyond 10 percent, and when the MRA reaches 1 percent, the retained catch at the extensive margin has been reduced to 15 percent of its original total.

The difference between the 2013 big skate ABC/TAC and the big skate 2013 catch (retained and discarded) was about 497 metric tons. This amount is reached by extensive margin adjustments at a MRA of between 9 percent and 10 percent (see Figure 4-7 (b)). However, some of these reductions would apply to longnose and other skates, as well as to big skates. This analysis suggests that, to reduce the big skate catch at the extensive margin below the ABC/TAC in the Central GOA, the MRA would have to be lower than 10 percent. Figure 4-8 provides similar information, not for all skates, but only for big skates in the Central GOA. This implies that the MRA would have to be reduced to 7 percent to achieve a 497 metric ton reduction in big skate catch through greater control on the extensive margin. Given the uncertainties associated with this analysis, and the year-to-year fluctuations that occur in a fishery, this method of comparing the estimated extensive margin reduction with the excess of catch over the ABC/TAC can only be indicative of general tendencies.

Moreover, as noted above, reductions in the MRA only directly impact fishing operations with retention rates between the current MRA, and a new MRA. They would not affect retention by vessels with skate retention rates below a new MRA. Following the discussion of methodology, these vessels are described as operating at the intensive margin. Figure 4-7 only reflects impacts on vessels operating at the extensive margin. Vessels with retention rates below a new MRA have room to expand production if skate retention incentives increase. Substantial reductions in harvest associated with direct impacts of a MRA reduction, could raise skate prices and provide increased incentives for vessels with rates formerly below the new MRA to increase their retention rates. This offset is more likely to be important with a reduction in the MRA to 5 percent than that it would be for reductions to 10 percent or 15 percent.

Many operations retain skates at rates less than 5 percent of their basis species. GOA-wide, during trips in which this was the case, the average rate was 1.6 percent; in the Central GOA this average was 1.7 percent, for non-pelagic trawl gear in the Central GOA the average rate was 1.6 percent (NMFS catch accounting system). These operations have the capacity to expand their skate retention within the 5 percent MRA limit.

4.10 Enforcement

Enforcement

The alternatives proposed by the Council are changes in the aggregate skate MRA throughout the GOA from 20 percent to 5, 10, or 15 percent. This MRA applies to skate catch, without differentiating among the species, and it applies across areas and gear types. NOAA OLE does not foresee that these alternatives will raise significant enforcement issues. There may be transitional issues raised by a reduction in the MRA, as it may take time to inform all participants of the rate change. When a vessel lands skates in excess of the MRA, the value of the overage will be confiscated; punitive fines are only likely in the case of egregious overages (B. Pristas, pers. comm.)[18].

As discussed above, the issue motivating this action is big skate overages in the Central GOA. This is primarily a problem for catcher vessels, and non-pelagic trawlers have larger retained catches of big skates in this area than hook-and-line vessels. Other fleet sectors do not contribute significantly to the catch. A reduction in the skate MRA in the Central GOA alone is also unlikely to raise significant enforcement issues, so long as it applies to aggregate retained skate catch, and is not species-specific (B. Pristas, pers. comm.). In this case, if a vessel fishes in multiple GOA areas, for example in both the Eastern and Central GOA, in a single trip, the MRA from the area with the lowest MRA would be applicable. (CFR 679.20(e)(3)(i)) As with changes in a global skate MRA, a change in a species specific MRA would create some relatively minor transitional enforcement issues until all participants are informed of the new MRA.

More serious enforcement issues would be raised for a species-specific MRA. Fishermen and processors may have difficulty identifying skate species. Moreover, a 5 percent MRA for big skates, and a 20 percent MRA for longnose or other skates, may create incentives for fishermen or processors to misreport skate species (B. Pristas, pers. comm.).

A vessel may fish in both state and federal waters in a single trip, and deliver skates caught in both jurisdictions. The state has not opened a directed fishery for skates in the GOA since 2010. Federal MRAs are currently as large as, or larger than state MRAs. A reduction in the federal MRAs below the state MRAs could create an incentive to misreport the area of catch in some instances. However, where the federal MRA is already higher, as in Prince William Sound, this incentive may already exist in reverse. Potential impacts for enforcement would depend on whether the state reduces its allowable bycatch levels, and the extent to which it prohibits retention in reaction to federal in-season management prohibitions.

[18] Pristas, Brent. Criminal Investigator. NOAA Office of Law Enforcement, Kodiak, Alaska. August 18, 2014.

4.11 Summation of the Alternatives with Respect to Net Benefits to the Nation

Table 4-7 Summary of Alternative impacts and net benefits estimates

Impact	Baseline	Status quo (20% MRA)	10% or 15% MRA	5% MRA
Impact of the action on retained catch	Significant proportions of Big skate catches retained; less so of Longnose and other skates.	No change from the baseline.	Not likely to see any significant change from the baseline for fishing operations newly constrained by tighter limits. Moreover, the alternatives have no ability to change constraints on fishing operations fishing under new MRA limit.	May see more significant constraints imposed on retained catches at the extensive margin. However, the alternatives have no ability to change constraints on fishing operations fishing under new MRA limit.
Effect on in-season management ability to limit catch to designated catch limits	Recent problems limiting big skate catches to the ABC in the Central GOA, and limiting longnose catches to the ABC in the Western GOA. No current problems limiting catches of any skate species within OFL levels. Control currently requires prohibition of retention for some or all of year. Under current conditions this may allow limiting big skates in the Central GOA to the ABC, but ability to limit longnose skates to ABC in western GOA is limited by large proportion of these skates which are not retained.	No change from the baseline.	Not likely to see any significant change from the baseline.	Rates at this level may permit more control. Key problem that can be addressed by smaller MRA is retention of big skates in Central GOA. However, the MRA is a general one applying to all skates as a group. Moreover, even with tighter MRAs, there appears to be opportunity for operations under the MRA to expand skate catch. Probably little ability to address longnose skate problem in the Western GOA given the large proportion of these that are discarded.
Cost to fishing and processing industries	Loss of big skate top off opportunities in CGOA because of prohibition of retention. Loss may be on the order of between $3.2 million and $5.1 million to shoreside processors and the vessels that deliver to them. Catcher/processor production has averaged about $0.6 million at the first wholesale level. Shoreside impacts felt most in Kodiak.	No change from the baseline.	Not likely to see any significant change from the baseline.	May permit some additional retained catch and revenues therefrom. Potential increase as a proportion of baseline revenues lost is very uncertain.
Impact on enforcement	No significant enforcement issues.	No significant enforcement issues.	No significant enforcement issues; may see some short term transitional overages until industry becomes accustomed to the new MRAs.	No significant enforcement issues; may see some short term transitional overages until industry becomes accustomed to the new MRAs.
Net benefits to the nation	Not applicable.	None compared to baseline.	Not likely to see any compared to baseline.	May see some benefits if fishing operations have increased opportunities to retain catch.

5 Initial Regulatory Flexibility Analysis

5.1 Introduction

This Initial Regulatory Flexibility Analysis (IRFA) addresses the statutory requirements of the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (5 U.S.C. 601-612). This IRFA evaluates the potential adverse economic impacts on small entities directly regulated by the proposed action.

The RFA, first enacted in 1980, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a federal regulation. Major goals of the RFA are: (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities.

The RFA emphasizes predicting significant adverse economic impacts on small entities as a group distinct from other entities, and on the consideration of alternatives that may minimize adverse economic impacts, while still achieving the stated objective of the action. When an agency publishes a proposed rule, it must either 'certify' that the action will not have a significant adverse economic impact on a substantial number of small entities, and support that certification with the 'factual basis' upon which the decision is based; or it must prepare and make available for public review an IRFA. When an agency publishes a final rule, it must prepare a Final Regulatory Flexibility Analysis, unless, based on public comment, it chooses to certify the action.

In determining the scope, or 'universe', of the entities to be considered in an IRFA, NMFS generally includes only those entities that are directly regulated by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (e.g., user group, gear type, geographic area), that segment would be considered the universe for the purpose of this analysis.

5.2 IRFA Requirements

Until the North Pacific Fishery Management Council (Council) makes a final decision on a preferred alternative, a definitive assessment of the proposed management alternatives cannot be conducted. In order to allow the agency to make a certification decision, or to satisfy the requirements of an IRFA of the preferred alternative, this section addresses the requirements for an IRFA. Under 5 U.S.C., section 603(b) of the RFA, each IRFA is required to contain:

- A description of the reasons why action by the agency is being considered;
- A succinct statement of the objectives of, and the legal basis for, the proposed rule;
- A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply (including a profile of the industry divided into industry segments, if appropriate);
- 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 that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
- An identification, to the extent practicable, of all relevant federal rules that may duplicate, overlap, or conflict with the proposed rule;
- A description of any significant alternatives to the proposed rule that accomplish the stated objectives of the proposed action, consistent with applicable statutes, and that would minimize any significant

economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives, such as:

1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
3. The use of performance rather than design standards;
4. An exemption from coverage of the rule, or any part thereof, for such small entities.

In preparing an IRFA, an agency may provide either a quantifiable or numerical description of the effects of a proposed action (and alternatives to the proposed action), or more general descriptive statements, if quantification is not practicable or reliable.

5.3 Definition of a Small Entity

The RFA recognizes and defines three kinds of small entities: (1) small businesses, (2) small non-profit organizations, and (3) small government jurisdictions.

Small businesses. Section 601(3) of the RFA defines a 'small business' as having the same meaning as 'small business concern', which is defined under Section 3 of the Small Business Act (SBA). 'Small business' or 'small business concern' includes any firm that is independently owned and operated and not dominant in its field of operation. The SBA has further defined a "small business concern" as one "organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor…A small business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the firm is a joint venture there can be no more than 49 percent participation by foreign business entities in the joint venture."

The SBA has established size criteria for all major industry sectors in the United States, including fish harvesting and fish processing businesses. Effective July 14, 2014, a business involved in *finfish harvesting* is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual gross receipts not in excess of $20.5 million for all its affiliated operations worldwide. A business involved in *shellfish harvesting* is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual gross receipts not in excess of $5.5 million for all its affiliated operations worldwide. (79 *FR* 33647; June 12, 2014) A *seafood processor* is a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. A business that *both harvests and processes* fish (i.e., a catcher/processor) is a small business if it meets the criteria for the applicable fish harvesting operation (i.e., finfish or shellfish). A wholesale business servicing the fishing industry is a small business if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide.

The SBA has established "principles of affiliation" to determine whether a business concern is "independently owned and operated." In general, business concerns are affiliates of each other when one concern controls or has the power to control the other, or a third party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or

firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question. The SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic and foreign affiliates, regardless of whether the affiliates are organized for profit, in determining the concern's size. However, business concerns owned and controlled by Indian Tribes, Alaska Regional or Village Corporations organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601), Native Hawaiian Organizations, or Community Development Corporations authorized by 42 U.S.C. 9805 are not considered affiliates of such entities, or with other concerns owned by these entities solely because of their common ownership.

Affiliation may be based on stock ownership when (1) a person is an affiliate of a concern if the person owns or controls, or has the power to control 50 percent or more of its voting stock, or a block of stock which affords control because it is large compared to other outstanding blocks of stock, or (2) if two or more persons each owns, controls or has the power to control less than 50 percent of the voting stock of a concern, with minority holdings that are equal or approximately equal in size, but the aggregate of these minority holdings is large as compared with any other stock holding, each such person is presumed to be an affiliate of the concern.

Affiliation may be based on common management or joint venture arrangements. Affiliation arises where one or more officers, directors, or general partners, controls the board of directors and/or the management of another concern. Parties to a joint venture also may be affiliates. A contractor and subcontractor are treated as joint venturers if the ostensible subcontractor will perform primary and vital requirements of a contract or if the prime contractor is unusually reliant upon the ostensible subcontractor. All requirements of the contract are considered in reviewing such relationship, including contract management, technical responsibilities, and the percentage of subcontracted work.

Small organizations. The RFA defines "small organizations" as any not-for-profit enterprise that is independently owned and operated, and is not dominant in its field.

Small governmental jurisdictions. The RFA defines "small governmental jurisdictions" as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of fewer than 50,000.

5.4 Reason for Considering the Proposed Action

During public testimony, in December 2013, on an agenda item that considered establishing a directed fishery for skates and octopus in the GOA, the Council was made aware that the catch of skates (primarily big skates (Raja binoculata), and longnose skates, (Raja rhina)) in Gulf of Alaska groundfish fisheries has exceeded the acceptable biological catch (ABC) and total allowable catch (TAC) in some years.

Testimony indicated that this is because the maximum retainable amount (MRA) for skates in the GOA (20 percent) allows industry to top off on skates while fishing for groundfish. Since 2008, the estimated catch of big skates has exceeded the ABC in the Central GOA in 2010, 2011, 2012, and 2013, and estimated catch of longnose skates has exceeded the ABC in the Western GOA in 2009, 2010, and 2013.

The purpose of this action is to slow the harvest rate of skates by reducing the MRA to levels that more accurately reflect the intrinsic rate of bycatch in the GOA, thereby reducing the incentive for vessels to top off on skates.

5.5 Objectives of Proposed Action and its Legal Basis

Under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the Secretary of Commerce (NMFS Alaska Regional Office) and the North Pacific Fishery Management Council have the responsibility to prepare fishery management plans and associated regulations for the marine resources found to require conservation and management. NMFS is charged with carrying out the Federal mandates of the Department of Commerce with regard to marine fish, including the publication of Federal regulations. The Alaska Regional Office of NMFS, and Alaska Fisheries Science Center, research, draft, and support the management actions recommended by the Council. The Gulf of Alaska (GOA) groundfish fisheries are managed under the Fishery Management Plan for Groundfish of the GOA Management Area. The proposed action represents amendments to Federal regulations, consistent with the provisions of the GOA Groundfish FMP.

The objective of this action is to reduce the opportunity for top-off fishing of skates in the GOA, thereby reducing the rate of harvest, reducing the potential for exceeding skate species ABCs/TACs, and potentially allowing the agency to use less conservative management measures.

5.6 Number and Description of Directly Regulated Small Entities

This action, a change in the MRA for skates, directly regulates all entities fishing for groundfish in the Gulf of Alaska which may take any species of skate as bycatch or incidental catch. While these are primarily vessels fishing with non-pelagic trawl gear or with hook-and-line gear, skate catches may occur in pelagic trawl, pot, and jig gear fisheries as well. Thus, the directly regulated fisheries are assumed to be those directly regulated by the GOA groundfish harvest specifications.

The IRFA in the GOA groundfish harvest specifications defines the directly regulated fleet as: Entities directly regulated by the groundfish harvest specifications include: (a) Entities operating vessels with groundfish federal fisheries permits (FFPs) catching FMP groundfish in Federal waters; (b) all entities operating vessels, regardless of whether they hold groundfish FFPs, catching FMP groundfish in the state-waters parallel fisheries; (c) all entities operating vessels fishing for halibut inside three miles of the shore (whether or not they have FFPs).[19] (NMFS 2014)

Table 5-1 summarizes estimates of the numbers of small entities active in the GOA groundfish fisheries in 2013. These estimates account for corporate affiliations among vessels, and for cooperative affiliations among fishing entities. Since NMFS may have been unable to identify all relevant affiliations among entities, these estimates may overstate the numbers of small entities. Moreover, these counts of small entities take into account all estimates of all fishing revenues for the entities in Federal and state waters off of Alaska, and off of the U.S. West Coast. However, to the extent that entities may have non-fishing revenues, or of fishing revenues from other regions of the country, the analysis may have counted some large entites as small. To the extent this occurred, this would also tend to lead to an overstatement of the number of small entities.

[19] This definition is assumed to include all vessels directed fishing for halibut.

Table 5-1 Numbers of small entities directly regulated by this action

Gear type	All vessels	Catcher/processors	Catcher vessels
All Gear	1,156	3	1,153
Hook & Line (including jig)	1,075	2	1,073
Pot	116	0	116
Trawl	33	1	32
Source: AFSC preliminary estimates for 2014 Groundfish Economic SAFE; based on activity in 2013.			

Revenue data for catcher/processor gear types is confidential. However, average gross revenue data for 2013 may be reported for catcher vessels: average gross revenues were $380,000 for small hook-and-line vessels, $960,000 for small pot vessels, and $2.8 million for small trawl vessels.[20]

5.7 Recordkeeping and Reporting Requirements

This action does not create new recordkeeping and reporting requirements, or alter existing requirements.

5.8 Federal Rules that may Duplicate, Overlap, or Conflict with Proposed Action

This section will be prepared following the identification of a preferred alternative.

5.9 Description of Significant Alternatives to the Proposed Action that Minimize Economic Impacts on Small Entities

An IRFA should include a description of any significant alternatives to the proposed rule that accomplish the stated objectives, are consistent with applicable statutes, and that would minimize the significant economic impact of the proposed rule on small entities.

This section will be completed following the identification of a preferred alternative by the Council.

[20] These vessel count and revenue estimates take account of known affiliations between entities, including corporate affiliations of individual fishing vessels, and cooperative affiliations. Gross revenues include gross revenues from all known fishing sources, including fishing in Federal waters off of Alaska, in Alaskan state waters, and in federal and state waters off of the U.S. West Coast.

6 Preparers and Persons Consulted

Preparers

Steve A. MacLean, North Pacific Fishery Management Council

Contributors

Josh Keaton, National Marine Fisheries Service, Alaska Region
Mary Furuness, National Marine Fisheries Service, Alaska Region
Peggy Murphy, National Marine Fisheries Service, Alaska Region
Ben Muse, National Marine Fisheries Service, Alaska Region

Persons Consulted

7 References

Alaska Department of Fish and Game. 2013. Fishery Update. 2014 Central Region Groundfish Fisheries Outlook. News Release. Homer, Alaska. December 18. Downloaded from http://www.adfg.alaska.gov/static/applications/dcfnewsrelease/378425150.pdf on August 18, 2014.

Alaska Sea Grant. 2014. Web page describing a research project titled, "Economic Viability of a Directed Skate Fishery in the Gulf of Alaska. Downloaded from https://seagrant.uaf.edu/research/projects/summary.php?id=995 on August 13, 2014.

Brander, K., 1981. Disappearance of common skate *Raja batis* from Irish Sea. Nature 290: 48-49.

Dulvy, N.K., J.D. Metcalfe, J. Glanville, M.G. Pawson, and J.D. Reynolds, 2000. Fishery stability, local extinctions, and shifts in community structure in skates. Conservation Biology 14(1): 283-293.

Eschmeyer, W.N., E.S. Herald, and H. Hammann, 1983. A field guide to Pacific coast fishes of North America. Houghton Mifflin Co., Boston: 336 pp.

Frisk, M.G., T. J. Miller, and M. J. Fogarty, 2001. Estimation and analysis of biological parameters in elasmobranch fishes: a comparative life history study. Can. J. Fish. Aquat. Sci. 58: 969-981.

Frisk, M. G. , T. J. Miller, and M. J. Fogarty, 2002. The population dynamics of little skate *Leucoraja erinacea*, winter skate *Leucoraja ocellata*, and barndoor skate *Dipturus leavis*: predicting exploitation limits using matrix analysis. ICES J. Mar. Sci. 59: 576-586.

Gburski, C.M., S.K. Gaichas, and D.K. Kimura. 2007. Age and growth of big skate (*Raja binoculata*) and longnose skate (*R. rhina*) and implications to the skate fisheries in the Gulf of Alaska. Env. Bio. Fishes 80: 337-349.

Himes-Cornell, A., K. Hoelting, C. Maguire, L. Munger-Little, J. Lee, J. Fisk, R. Felthoven, C. Geller, and P. 2013a. Community profiles for North Pacific fisheries - Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-259, Volume 5, 210 p. Downloaded from http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communityprofiles/Regional_Kodiak_Island_Archipelago.pdf on August 7, 2014.

Himes-Cornell, A., K. Hoelting, C. Maguire, L. Munger-Little, J. Lee, J. Fisk, R. Felthoven, C. Geller, and P. Little. 2013b. Community profiles for North Pacific fisheries - Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-259, Volume 9, 514 p. Downloaded from http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communityprofiles/Regional_Kenai_Cook_Inlet.pdf on August 7, 2014.

Himes-Cornell, A., K. Hoelting, C. Maguire, L. Munger-Little, J. Lee, J. Fisk, R. Felthoven, C. Geller, and P. 2013c. Community profiles for North Pacific fisheries - Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-259, Volume 3, 187 p. Downloaded from http://www.afsc.noaa.gov/REFM/Socioeconomics/Projects/communityprofiles/Regional_Prince_William_Sound.pdf on August 7, 2014.

King, J.R., and G.A. McFarlane, 2003. Marine fish life history strategies: applications to fishery management. Fish. Man. And Ecology, 10: 249-264.

Kotwicki, S., and Weinberg, K.L. 2005. Estimating capture probability of a survey bottom trawl for Bering Sea skates (*Bathyraja spp.*) and other fish. Alaska Fishery Research Bulletin 11(2): 135-145.

Love, M.S., C.W. Mecklenberg, T.A. Mecklenberg, and L.K. Thorsteinson. 2005. Resource inventory of marine and estuarine fishes of the West Coast and Alaska: a checklist of north Pacific and Arctic

Ocean species from Baja California to the Alaska-Yukon Border. U.S. Department of the Interior, U.S. Geological Survey, Biological Resources Division, Seattle, Washington, 98104, OCS Study MMS 2005-030 and USGS/NBII 2005-001.

Moyle, P.B., and J.J. Cech, Jr., 1996. Fishes, an introduction to ichthyology (Third edition). Prentice Hall: New Jersey, 590 pp.

NMFS [National Marine Fisheries Service]. 2004. Programmatic Supplemental Environmental Impact Statement for the Alaska Groundfish Fisheries Implemented Under the Authority of the Fishery Management Plans for the Groundfish Fishery of the Gulf of Alaska and the Groundfish of the Bering Sea and Aleutian Islands Area. NMFS Alaska Region, P.O. Box 21668, Juneau, AK 99802-1668. June 2004. Available at http://www.alaskafisheries.noaa.gov/sustainablefisheries/seis/intro.htm.

NMFS. 2007a. Environmental impact statement for the Alaska groundfish harvest specifications. January 2007. National Marine Fisheries Service, Alaska Region, P.O. Box 21668, Juneau, Alaska 99802-1668. Available at: http://www.alaskafisheries.noaa.gov/index/analyses/analyses.asp.

National Marine Fisheries Service (NMFS). (2007b) Guidelines for Economic Review of National Marine Fisheries Service Regulatory Actions. Downloaded from http://www.nmfs.noaa.gov/sfa/domes_fish/EconomicGuidelines.pdf on January 12, 2014.

North Pacific Fishery Management Council (Council). 2013. Gulf of Alaska Skate and Octopus Directed Fishery Considerations. Council staff discussion paper. Anchorage, Alaska. November. Downloaded from http://legistar2.granicus.com/npfmc/meetings/2013/12/875_A_North_Pacific_Council_13-12-09_Meeting_Agenda.pdf on August 18, 2014.

NPFMC [North Pacific Fishery Management Council]. 2014. Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/Aleutian Islands Regions. North Pacific Fishery Management Council. Anchorage, Alaska.

Ormseth, O.A. 2011. Gulf of Alaska skates. In: Stock Assessment and Fishery Evaluation Report for the Groundfish Resources of the Gulf of Alaska Region. North Pacific Fishery Management Council, 605 W. 4th Ave., Suite 306, Anchorage, AK 99501.

Queirolo, L. (2013) Conducting Economic Impact Analyses for NOAA Fisheries Service. Downloaded from http://alaskafisheries.noaa.gov/analyses/RIR_RFAAguidance.pdf on January 12, 2014

Sosebee, K. 1998. Skates. In Status of Fishery Resources off the Northeastern United States for 1998 (Stephen H. Clark, ed.), p. 114-115. NOAA Technical Memorandum NMFS-NE-115.

Spies, Ingrid, and Benjamin J. Turnock. 2013. Assessment of the arrowtooth flounder stock in the Gulf of Alaska.

Stevenson, D. E., Orr, J. W., Hoff, G. R., and McEachran, J. D. 2007. Field guide to sharks, skates, and ratfish of Alaska. Alaska Sea Grant.

Walker, P.A., and R. G. Hislop, 1998. Sensitive skates or resilient rays? Spatial and temporal shifts in ray species composition in the central and north-western North Sea between 1930 and the present day. ICES J. Mar Sci., 55: 392-402.

Wikipedia. 2013. Margin (economics). Article last updated September 26, 2013. Downloaded from http://en.wikipedia.org/wiki/Margin_(economics) on August 22, 2014.

Winemiller, K.O., and K.A. Rose, 1992. Patterns of life history diversification in North American fishes: implications for population regulation. Can. J. Fish. Aquat. Sci. 49: 2196-2218.