AGENDA C-7
APRIL 2003

MEMORANDUM

TO: Council, SSC, and AP

FROM: Chris Oliver
Executive Director

DATE: April 1, 2003

SUBJECT: IR/IU

ESTIMATED TIME
8 HOURS

ACTION REQUIRED

(a) Review proposal for Amendment 'A' (multi-species H&G co-ops), and associated allocation issues

(b) Initial review of Amendment 'C' (minimum groundfish retention standards)

(c) Discuss relationship of Amendment 'A' and Amendment 'C'

(d) Final action on Amendment 'D' (5% exemption from flatfish IR/IU requirements)

BACKGROUND

In October 2002 the Council voted to delay implementation of IR/IU flatfish regulations for the BSAI until June of 2004, and initiated analyses for a suite of trailing amendments designed to mitigate, or potentially replace, full retention requirements for flatfish in the BSAI. The Proposed Rule for the delay was published last week, with comments due by early May. Amendment A, originally to establish PSC cooperatives for the H&G sector, was discussed at the February 2003 meeting, and expanded to be a multi-species cooperative for that sector. Recognizing the necessary allocations which would be required to make such a cooperative viable, the Council expanded the membership of the IR/IU Technical Committee and requested they develop a specific proposal (alternatives, elements, and options) for a multi-species cooperative for review by the Council in April. At the February 2003 meeting, the Council put on hold further development of proposed trailing Amendment B (to create specific bycatch/discard caps for BSAI flatfish).

In February 2003 the Council reviewed an initial discussion paper for Amendment C, which would establish a minimum groundfish retention standard as a possible replacement for the 100% flatfish retention requirements. Monitoring and enforcement concerns identified by the agency last fall were further addressed in the February draft and included provisions for additional scale and observer requirements intended to make the H&G cooperative a viable alternative. In February the Council passed a motion to continue development of Amendment C, including further analysis of several issues identified by the AP and the IR/IU Committee, and bring that document to the April meeting for initial review. At the February meeting the Council also reviewed Amendment D, which would establish exemptions to the IR/IU flatfish retention requirements for sectors with less than 5% bycatch rates of the relevant flatfish species, and released that document for public review and final action at this meeting.

The Council has requested expedited development of Amendments C and D, with Amendment A to be developed as soon as practicable. The status of each of these amendments, and the relationship among them, is discussed further below.

Amendment A

The IR/IU Technical Committee has met twice since the February meeting to focus on development of a multi-species cooperative proposal for the H&G sector. The minutes from those meetings are attached as Item C-7(a)(1), and the specific list of elements and options (in the form of decision points) developed by the Committee is under Item C-7(a)(2). That list of decision points would form the basis for formal analysis after review and approval by the Council. The list includes options for necessary allocations of target and PSC species to the H&G sector in order for the proposed co-op to operate (but does not address allocations of these species to other sectors operating in the BSAI fisheries). Staff and the Committee Chair will provide an overview for the Council at this meeting. Completion of a formal analysis could be done by the October meeting for initial review, and final action in December. Implementation might be possible by June of 2004, assuming that all monitoring and enforcement issues are adequately addressed, and that the necessary management structures can be in place by that time, though this is likely an overly optimistic timeline.

Amendment C

This Amendment was scheduled for initial review at this meeting, and possible final action in June. Due to a number of factors, staff were unable to fully develop the analysis of Amendment C and the additional issues identified in February into a comprehensive EA/RIR/IRFA in time for this meeting. However, the major portions of the analysis, including the relevant information and data, are contained in the analysis, and are not significantly changed from the February draft. We will present a summary of the analysis at this time and identify the issues which would benefit from further clarification. For example, the specific fisheries/sectors to which this amendment would apply should be clarified, given the implicit relationship to Amendments A and D. For example, to affect other than the H&G sector, the retention standard would have to be set at such a high level as to likely render compliance by the H&G sector impossible (unless different standards were established by sector). The analysis could then be streamlined and focused in the appropriate context, and possibly completed after this meeting for release to the public in May, and still take final action in June. Alternately, the analysis could be brought back in June for formal initial review, with action delayed until October. Implementation by June 2004 should be possible under either scenario. Further considerations in this regard are discussed below.

Relationship and Timing of Amendments A, C, and D

One issue raised in February was whether, from a NEPA process perspective, Amendments A, C, and D were all alternatives to 100% flatfish retention requirements, and therefore should be combined in a single NEPA document for consideration at one time. As developed by the Council, these trailing amendments are not mutually exclusive, and could be implemented either separately or in combination, or not at all. From a strict NEPA perspective, it does not appear that it is necessary to combine these proposed amendments. However, from a practical perspective, it may be prudent to consider at least two of them in combination, Amendments A and C. This does not require that the analytical documents be combined, simply that they be considered, approved, and implemented on a parallel track, particularly if implementation of Amendment C is viewed to be impractical without concurrent implementation of Amendment A; i.e., that cooperatives are necessary to comply with minimum groundfish retention standards. It is also true that Amendment C could be approved ahead of Amendment A, with the intent that A would be subsequently approved, and implemented either concurrently or as soon as possible after implementation of C.

Amendment D will provide exemptions for certain sectors if 100% flatfish retention requirements go into effect in 2004 in the BSAI (these exemptions would also apply in the GOA, which was not included in the delay). There does not appear to be any downside to moving forward with final action on Amendment D at this meeting.

Amendment D

Amendment D was reviewed in February, including approval by the SSC, and released for public review following the February meeting. Final action is scheduled at this meeting. The Executive Summary is included as Item C-7(d)(1). Staff will review the analysis and alternatives at this time.

Summary of IR/IU Technical Committee Meeting; March 20-21, Seattle, WA

Committee members present: Dave Hanson (Chair); John Henderschedt, Premiere Pacific Seafoods; Teressa Kandianis, Kodiak Fish Company; Bill Orr, Signature Seafoods; Gerry Merrigan, Prowler Fisheries (by phone); Donna Parker, Arctic Storm; Ed Richardson, At-sea Processors Association; Susan Robinson, Fishermen's Finest; Dave Woods (for Matt Dougherty); Greg Baker, Westward Seafoods; Geoff Shester, Oceana (by phone half-day); and, Eric Olsen, BBEDC.

Other attendees included: Brent Paine, Thorn Smith, Mike Szymanski, Paul McGregor, Ed Luttrell, Lori Swanson, Jan Jacobs,

Staff present: Chris Oliver, NPFMC; Marcus Hartley, Northern Economics (contractor); and, Jeff Hartman, NMFS.

The Committee focused its discussion on further development of a specific proposal for Amendment A (multi-species cooperatives for the H&G CP sector). The specific proposal, in the form of Decision Points (alternatives, elements, and options), is attached. Major issues discussed by the Committee in developing this proposal included:

- Subdivision of co-op permits: Committee recognized that permits are not permanently subdividable/transferable, as that would be an IFQ model; however, transfers within co-ops will be critical to success of co-ops.

- LLP requirement: Committee agreed that options should be included that (a) maintain LLP requirements, and (b) do not require LLP, or relax length/area LLP designations.

- Gear conversion: Committee agreed to leave in option to alter gear types once in a co-op mode of operation (with one objection). Analysis should discuss various factors associated with potential gear conversion.

- Excessive share caps: Committee did not specify a percentage, but agreed that the analysis should inform whether and what the cap should be. Analysis should discuss range of options, potential for consolidation, and not be limited to what the highest percentage is currently. Committee assumes cap would apply to all species combined, not on a species-by-species basis, but analysis should address this issue.

- Sideboards: Analysis should include discussion of potential GOA Rationalization program, and implications for altering sideboards if that program is implemented.

- Monitoring and Enforcement: Committee recognizes that certain requirements will be imposed by NMFS, and requests that those requirements be specified as early as possible in the analysis.

- Cooperative authority: Analysis should examine the 1934 Act and discuss the relevant

authority under which this cooperative would operate.

- Basis for catch history: Recognizing the implications to the analysis, the Committee would still like the analysis to examine both total and retained catch as the basis for cooperative allocations.

Amendment C Discussion

The Committee did not have a revised Amendment C analysis, but staff provided a summary of primary issues and decision points for discussion and clarification. The Committee recommended the following with regard to Amendment C:

- Amendment C should only be applicable to the H&G CP sector, because Amendment A is only applicable to that sector. Amendment C would apply to all co-op eligible vessels in that sector.

- Reference to including other sectors via a 'goals and objectives policy statement' should be deleted. Council discussion in February included language creating such a minimum retention 'goal and objective' for all vessels, indicating that such objective would not be enforced via regulation (except for the H&G CP sector).

- Number of H&G vessels currently with scales should be groundtruthed.

- Regarding the timing and relationship to Amendment A, the Committee did not have a specific recommendation on whether they should be explicitly combined, or whether action on Amendment C should be delayed to coincide with Amendment A; however, the Committee believes that implementation of Amendment C will be problematic without implementation of Amendment A.

Executive Summary

This analysis examine groundfish retention standard (GRS) as an alternative to implmentation of IR/IU regulations for flatfish that are scheduled to be enforced in the BSAI beginning June 1, 2004. The NPFMC approved the delay of IR/IU regulations in the BSAI because they concluded that the regulation would create significant negative economic impacts, particularly on the HT-CP Sector

Specifically Alternative 2 would add a minimum Groundfish Retention Standard (GRS) for all groundfish fisheries (excluding the pollock target fisheries) to the Goals and Objectives section of the BSAI Groundfish FMP. The GRS would apply in principle to all vessels harvesting groundfish in the BSAI. The GRS would be set at a point within the range of 65 percent to 90 percent of the total amount of groundfish caught. The specific GRS percentage will be determined by the Council in it final decision. The GRS would not supercede the 100 percent retention standards already set for pollock and Pacific cod under existing IR/IU regulations. In addition to meeting the GRS, all groundfish retained would have to be processed into primary products that comprise 15 percent or more of the round weight of each fish retained. In addition to changes in the FMP Goals and Objectives, regulations would be promulgated and enforced on certain vessels and sectors in the fleet based on the guidance from NMFS that certified scales and 100 percent observer coverage will be required to enforce GRS regulations.

It is instructive to note the overall retention rates that would be implied under the status quo (Alternative 1) and compare those to rates proposed under Alternative 2. Table 1 shows the hypothetical situation assuming all rock sole and yellowfin sole (IR/IU Flatfish) were retained by all sectors from 1995-2001. As seen in the table, the HT-CP sector had 41.5 mt of IR/IU Flatfish discards in 1995. Those discards accounted for 13.7 percent of the sectors total catch. If the HT-CP had retained all of the IR/IU Flatfish, the sector's overall retention rate would have increased to 72.4 percent. This table then provides an additional perspective regarding the GRS. For example setting the GRS at 80 percent would be nearly equivalent to requiring 100 percent retention of IR/IU Flatfish. Additionally it can be inferred that the economic impacts of an 80 percent GRS would be approximately equilvalent to imposing 100 percent retention of IR/IU flatfish. Setting the GRS at less than 80 percent would provide some relief for the HT-CPs relative to IR/IU regulations slated to be imposed in June, 2004.

Table 1. Relationship to 100 Percent Retention of IR/IU Flatfish to the GRS

Target Fishery And Sector	1995	1996	1997	1998	1999	2000	2001
Surimi & Fillet Trawl Catcher Processors							
RSOL &YSOL Discards (1,000 mt)	12.1	13.9	16.4	6.0	1.8	2.6	0.7
Percent of Total Groundfish	1.4	1.8	2.3	0.9	0.4	0.5	0.1
Retention Percent if Retained	91.8	94.1	93.4	97.8	98.7	98.5	99.2
Head & Gut Trawl Catcher Processors							
RSOL &YSOL Discards (1,000 mt)	41.5	34.1	47.6	32.9	31.3	36.3	15.0
Percent of Total Groundfish	13.7	10.4	13.5	12.1	11.7	12.3	5.6
Retention Percent if Retained	72.4	72.0	77.0	82.5	78.4	81.5	80.8
Pot Catcher Processors							
RSOL &YSOL Discards (1,000 mt)	0.0	0.1	0.0	0.1	0.0	0.1	0.0
Percent of Total Groundfish	0.2	0.8	0.7	2.0	0.9	2.0	0.6
Retention Percent if Retained	96.6	96.6	99.2	99.1	96.9	97.9	94.1
Longline Catcher Processors							
RSOL &YSOL Discards (1,000 mt)	0.1	0.2	0.2	0.3	0.2	0.3	0.7
Percent of Total Groundfish	0.1	0.2	0.2	0.2	0.2	0.2	0.5
Retention Percent if Retained	84.2	85.6	85.1	84.5	86.2	84.1	85.9
All Sectors and Fisheries							
RSOL &YSOL Discards (1,000 mt)	61.2	55.5	72.0	41.9	38.1	41.4	17.4
Percent of Total Groundfish	3.2	3.0	3.9	2.6	2.7	2.6	1.0
Retention Percent if Retained	89.0	89.8	89.7	94.5	93.4	94.2	95.5

Source: NPFMC Sector Profiles Database, 2001

HT-CP Sector Summary

The HT-CP fleet consists of a relatively wide variety of vessels that ranges from 103 feet to 295 feet in length. In recent years the 23-24 vessels from the fleet have fished in the BSAI with approximately 33 percent less than 125 feet and 67 percent greater than 125' (Table 2). As would be expected the smaller vessels are relativley less productive than the larger vessels. From 1995-2001 the smaller vessels generated approximately 12 percent of both catch and product value. By contrast the smaller vessels have accounted for roughly 18 percent of the total discards for the sector from 1995-2001. Vessels less than 125' have discarded 48 percent of their catch of the seven year period, while vessels > 125' have discarded 38 percent. Industry sources indicate that the smaller vessels are not able to keep as many fish as larger vessels because of limitations in hold size and processing space.

Table 2. Distribution of Activity between HT-CPs <125' and HT-CPs> 125'

Length Class	1995	1996	1997	1998	1999	2000	2001
				Number of Vessels			
< 125'	9	8	11	8	9	8	4
> 125'	23	20	17	15	15	15	15
				Product Value ($ Millions)			
< 125'	8.1	17.2	18.3	16.4	18.8	23.4	11.4
> 125'	141.3	153.6	127.1	88.2	96.6	103.3	122.0
				Product Value as a Percent of HT-CP Value			
< 125'	5.5	10.1	12.6	15.7	16.3	18.5	8.5
> 125'	94.5	89.9	87.4	84.3	83.7	81.5	91.5
				Total Catch (1,000 mt)			
< 125'	20.5	40.0	55.6	41.8	38.3	45.7	20.9
> 125'	282.8	287.4	298.1	229.3	230.0	248.3	244.5
				Percent of HT-CP Total Catch			
< 125'	6.7	12.2	15.7	15.4	14.3	15.6	7.9
> 125'	93.3	87.8	84.3	84.6	85.7	84.4	92.1
				Discards as a Percent of Total Catch of Length Class			
< 125'	58.7	57.5	53.5	46.3	40.6	38.5	41.1
> 125'	40.0	35.7	33.2	26.6	32.0	29.4	27.9
				Discards as a Percent of HT-CP Total Discards			
< 125'	9.6	18.3	23.1	24.1	17.4	19.4	13.8
> 125'	90.4	81.7	76.9	75.9	82.6	80.6	86.2

Impact of GRS Rates

The effectiveness of the various rates will depend on the distribution of retention rates among the various vessels–the more vessels that have historically retained less than the standard, the greater the improvement. Table 3 provides insights into the distribution of retention among the various catcher processor sectors in different fisheries and the additional tons that would need to be retained in order to meet the standard based on catches in 2001. If for example the GRS is set at 70 percent then 11 HT-CPs would need to improve their retention to comply with the standard, but none of the CPs in other sectors would be affected. At 70 percent approximately 6,500 mt more groundfish would have been retained and overall, the HT-CP retention rate would have improved from 75.1 pecent (see Table 5) to 77.6 percent.

If the GRS is set at 80 percent then vessels in sectors other than the HT-CP sector would be affected. The actual effectiveness of increasing retention will depend on whether regulation will be imposed on all CPs or just HT-CPs. If the GRS regulations are imposed on all CPs then based on 2001 results, 14 HT-CPs, 2 P-CPs and 8 L-CPs would be required to improve their groundfish retention rates, and an additional 17,000 mt would be retained, 16,400 by HT-CPs, less than 50 mt by P-CPs and 600 mt by L-CPs. Overall an 80 pecent GRS would have increased the HT-CPs retention rate in 2001 from 75.1 percent to 81.3 percent.

Table 3. Catcher Processors Below Specified Standards in 2001 and Additional Tons that Would Have to be Retained to Meet the Standard

Standard	65 Percent	70 Percent	75 Percent	80 Percent	85 Percent	90 Percent
Sector	Number of Vessels Below Retention Standard					
ST/FT-CP	0	0	0	0	0	0
HT-CP	9	11	11	14	19	22
P-CP	0	0	0	2	2	2
L-CP	0	0	1	8	22	36
All CPs	9	11	12	24	43	60
	Additional Tons (1,000s) That Would Need to be Retained to Meet Standard					
ST/FT-CP	0.0	0.0	0.0	0.0	0.0	0.0
HT-CP	2.9	6.5	10.7	16.4	26.8	39.5
P-CP	0.0	0.0	0.0	0.0	0.0	0.1
L-CP	0.0	0.0	0.0	0.6	2.5	7.1
All CPs	2.9	6.5	10.7	17.0	29.4	46.8

Source: NPFMC Sector Profiles Database, 2001

Within the HT-CP fleet there is considerable variation between larger and smaller vessels. (see Table 11), and it has been proposed that the GRS regulation exempt vessels < 125'. Table 4 shows how the various retention standards would affect vessels by size class. As is demonstrated in the table, all of the HT-CPs < 125' retained less than 65 percent of their groundfish catch in 2001, while only 3 of the 15 vessels > 125 retained less than 65 percent. If vessels < 125' are exempt then the effectiveness of the GRS is diminished, but the ability of small HT-CPs to remain economically viable will continue.

Table 4. HT-CPs by Length Below Specified Standards in 2001 and Additional Tons that Would Have to be Retained to Meet the Standard

Standard	65 Percent	70 Percent	75 Percent	80 Percent	85 Percent	90 Percent	95 Percent
HT-CP by Length	Number of Vessels Below Retention Standard						
< 125'	6	6	6	6	6	7	7
> 125'	3	5	5	8	13	15	15
	Additional Tons (1,000s) That Would Need to be Retained to Meet Standard						
< 125	2.1	3.4	4.7	6.0	7.3	8.9	10.6
> 125'	0.9	3.1	6.0	10.5	19.5	30.6	42.2

Source: NPFMC Sector Profiles Database, 2001

EXECUTIVE SUMMARY

In October 2002, the NPFMC approved Amendment 75 to the BSAI FMP, delaying implementation of IR/IU flatfish regulations for the BSAI until June 1, 2004. IR/IU rules for shallow-water flatfish harvested in the GOA became effective January 1, 2003. In delaying the full implementation of IRIU for flatfish in the BSAI, the NPFMC cited the likelihood that IR/IU for flatfish could result in severe economic losses to certain participants in the fishery, while less than 100 percent retention of only these species is not enforceable. The NPFMC also initiated four trailing amemdments that would mitigate the potentially detrimental socioeconomic effects of full implementation, while ensuring that discards of groundfish continue to decline to a practicable level.

This document is an EA/RIR/IRFA of one of the four IR/IU trailing amendments initiated at the October 2002 Council meeting. It examines the effects of exempting fisheries from IR/IU Flatfish regulations that exhibit low levels of flatfish discards. Fisheries with higher flatfish bycatch (i.e., BSAI flathead sole fishery, BSAI rock sole fishery, BSAI yellowfin sole fishery are not within the scope of this analysis and will not be affected by the alternative actions considered. The analysis examines two alternatives.

Alternative 1(status quo/no action): The IR/IU regulations for flatfish in the BSAI would be implemented beginning June 1, 2004 in fisheries with low levels of bycatch. These regulations would require that all rock sole and yellowfin sole harvested in the BSAI be retained and that processors create products that yield at least 15 percent from each fish. Existing IR/IU regulations for flatfish in the GOA would remain in effect.

Alternative 2: Exempt fisheries from IR/IU flatfish regulations in the BSAI and GOA if flatfish discards are less than 5 percent of total groundfish catch—implementation of IR/IU flatfish regulations would take place beginning June 1, 2004, but would apply only to fisheries in which discards of IR/IU flatfish species are 5 percent of total catch or greater. The time period used to calculate the discard rate for each fishery would be the most recent three years for which there are estimates of the amount of IRIU flatfish discarded. Fisheries would be defined by standard TAC/gear/area definitions with the exception that the BSAI Pacific cod trawl catcher processor fishery would be divided according to eligibility to harvest BSAI pollock under the American Fisheries Act. Two sub-alternatives developed for reviewing the exemption status of fisheries are listed below.

Subalternative 2.1 Under this subalternative, there would not be a regular schedule for reviewing the exemption status of each fishery. However, the NPFMC could request that NOAA Fisheries provide an annual report of discards of IRIU flatfish in all fisheries, both exempt and non-exempt. In addition, the NPFMC could, at its discretion, proceed with a regulatory amendment to remove a fishery from the exempt list. The removal would be a Federal action requiring rulemaking. As such, all the analytical requirements of the National Environmental Policy Act, the Regulatory Flexibility Act, and Executive Order 12866 would apply, as well as the requirements of the Administrative Procedure Act (APA).

Subalternative 2.2 Under this subalternative, NOAA Fisheries would conduct a regularly scheduled assessment of fishery discard rates. If a fishery exceeded the 5 percent standard during the assessment period, a regulatory amendment to remove the fishery from the exempt list would follow. The removal would be a Federal action requiring rulemaking. As such, all the analytical requirements of the National Environmental Policy Act, the Regulatory Flexibility Act, and Executive Order 12866 would apply, as well as the requirements of the Administrative Procedure Act (APA).

Conclusions: The analysis concludes the most appropriate way to implement the exemption is to review flatfish discards in exempt fisheries through an annual management report provided byNOAA Fisheries. Then, if necessary, the NPFMC could initiate a regulatory amendment to change the fisheries that are exempt (Subalternative 2.1). The analysis also concludes that with the exemption (Alternative 2), all fisheries would be exempt from IRIU flatfish regulation with the exception of the following:

- BSAI non-AFA trawl CP Pacific cod fishery (assuming Non-AFA and AFA trawl catcher processor fisheries are defined as separate fisheries)
- BSAI flathead sole fishery (CDQ and non-CDQ)
- BSAI rock sole fishery (CDQ and non-CDQ)
- BSAI Non-AFA yellowfin sole fishery (CDQ and non-CDQ)

Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis

for Amendment ## to the Fishery Management Plan for Groundfish in the Bering Sea and Aleutian Islands

Minimum Groundfish Retention Standards

(IR/IU Trailing Amendment C)

NPFMC Review Draft

Prepared for the
North Pacific Fishery
Management Council

March 2003

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Abbreviations and Acronyms

ABC	Allowable biological catch
ADF&G	Alaska Department of Fish and Game
AFA	American Fisheries Act
AFSC	Alaska Fish and Science Center
AP	Advisory Panel
APAI	Alaska Peninsula and Aleutian Islands
BSAI	Bering Sea and Aleutian Islands
CDQ	Community Development Quota
CEQ	Council on Environmental Quality
CEY	Constant exploitation yield
CFEC	Commercial Fisheries Entry Commission
CFR	Code of Federal Regulations
CPUE	Catch per unit of effort
CRP	Comprehensive Rationalization Program
DMR	Discard mortality rate
DPSEIS	Alaska Groundfish Fisheries Draft Programmatic Supplemental Environmental Impact Statement
EA	Environmental Assessment
EA/RIR/IRFA	Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis
EEZ	Exclusive Economic Zone
EFH	Essential fish habitat
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FMP	Fishery management plan
FONSI	Finding of no significant impact
FR	Federal Register
GOA	Gulf of Alaska
GIS	Geographic information system
HMAP	Halibut Mortality Avoidance Program
IFQ	Individual Fishing Quota
IPHC	International Pacific Halibut Commission
IRFA	Initial Regulatory Flexibility Analysis
IR/IU	Improved Retention and Improved Utilization
LLP	License Limitation Program
LOA	Length overall
MMPA	Marine Mammal Protection Act
MPRSA	Marine Protection, Research, and Sanctuaries Act Title 1.
MRB	Maximum retainable bycatch
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MT	Metric tons
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOAA GC	National Oceanic and Atmospheric Administration General Counsel
NPFMC or Council	North Pacific Fishery Management Council
OY	Optimum yield
PSBRC	Prohibited Species Bycatch Reduction Cooperative
PSC	Prohibited species catch

RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
RPA	Reasonable and prudent alternative
RSW	Refrigerated sea water
SBA	U.S. Small Business Administration
TAC	Total allowable catch
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
VIP	Vessel Incentive Program
Species Aggregations	
AMCK	Atka mackerel
OFLT	Other flatfish
OTHR	Other groundfish species (skates, sculpin, squid, and other miscellaneous species)
PCOD	Pacific cod
PLCK	Pollock
ROCK	all Rockfish
RSOL	BSAI Rock sole
SABL	Sablefish
SFLT	GOA Shallow-water flatfish
YSOL	BSAI Yellowfin sole
Sectors/Vessels	
APAI-SP	Alaska Peninsula- Aleutian Islands shore plant
BSP-SP	Bering Sea pollock shore plant
CP	Catcher processor
CV	Catcher vessel
FT-CP	Fillet trawl catcher processor
HT-CP	Head and gut trawl catcher processor
INS	Shore plant or inshore floating processor
K-SP	Kodiak shore plant
MS	Mothership
SP	Shore plant
ST-CP	Surimi trawl catcher processor
TCV < 60	Trawl catcher vessels less than 60 feet in length
TCV BSP ≥ 125	Bering Sea pollock trawl catcher vessels greater than or equal to 125 feet in length
TCV BSP 60-124	Bering Sea pollock trawl catcher vessels 60 to 124 feet in length
TCV Div. AFA	Diversified AFA-eligible trawl catcher vessels
TCV Non-AFA	Non-AFA trawl catcher vessels
SC-SP	Southcentral Alaska inshore plant
SE-SP	Southeast Alaska inshore plant
FLT	Floating inshore plant
L-CP	Longline catcher processor
P-CP	Pot catcher processor
CDQ Groups	
APICDA	Aleutian-Pribilof Islands Community Development Association
BBEDC	Bristol Bay Economic Development Corporation
CBSFA	Central Bering Sea Fisherman's Association
CVRF	Coastal Villages Region Fund
NSEDC	Norton Sound Economic Development Corporation
YDFDA	Yukon Delta Fisheries Development Association

1.0 Introduction

This document examines the potential impacts of changes in the Fishery Management Plans for groundfish in the Bering Sea and Aleutian Islands that would implement groundfish retention standards for vessels harvesting groundfish. Vessels covered under the regulations would have to meet or exceed the retention standard or face penalties, fines or sanctions.

The groundfish fisheries in the Exclusive Economic Zone (EEZ) [3 to 200 miles offshore] off Alaska are managed under the Fishery Management Plan for the Groundfish Fisheries of the Gulf of Alaska and the Fishery Management Plan for the Groundfish Fisheries of the Bering Sea and Aleutian Islands Area. Both fishery management plans (FMPs) were developed by the North Pacific Fishery Management Council (NPFMC) under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The Gulf of Alaska (GOA) FMP was approved by the Secretary of Commerce and became effective in 1978, and the Bering Sea and Aleutian Islands Area (BSAI) FMP became effective in 1982.

Actions taken to amend FMPs or implement other regulations governing the groundfish fisheries must meet the requirements of Federal laws and regulations. In addition to the Magnuson-Stevens Act, the most important of these are the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), Executive Order (E.O.) 12866, and the Regulatory Flexibility Act (RFA). This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) is intended to satisfy the requirements of these laws and regulations.

An EA is required by the NEPA to determine whether a proposed action will result in a significant impact on the human environment. The human environment is defined by the Council on Environmental Quality as the natural and physical environment and the relationships of people with that environment (40 CFR 1508.14). This means that economic or social impacts are not intended by themselves to require preparation of an EA. However, when an EA is prepared and socio-economic and natural or physical environmental impacts are interrelated, the EA must discuss all of these impacts on the quality of the human environment. If the proposed action is determined not to be significant based on an analysis of relevant considerations, the EA and resulting finding of no significant impact (FONSI) would be the final environmental documents required by NEPA. An environmental impact statement (EIS) must be prepared for major Federal actions significantly affecting the human environment.

An EA must include a brief discussion of the need for the proposed action, the alternatives considered, the affected environment, the environmental impacts of the proposed action and the alternatives, and a list of document preparers. The purpose and alternatives will be in Sections 1.1 and 1.2. Section 2 describes the affected environment. Section 3 and 4 contain a discussion of the environmental impacts, including impacts on threatened and endangered species and marine mammals. Sections 5 and 6 provide the RIR/IRFA. The list of preparers is in Section 7.

1.1 Purpose of and Need for the Action

One of the goals of the NPFMC is to reduce discards in the groundfish fisheries they manage. Similarly National Standard 9 in the Magnuson-Stevens Fishery Conservation and Management Act (MSCFMA) requires that federally managed fisheries minimize bycatch (discards) to the extent practicable. The primary purpose of this action is to minimize bycatch and discards in the BSAI groundfish fisheries by establishing minimum groundfish retention standards.

In June 2002, the Council determined that IR/IU regulations requiring 100 percent retention of rock sole and yellowfin sole in the BSAI, that were scheduled to be implemented in January 2003, were likely to cause operations participating in those fisheries to suffer significant adverse economic impacts. Therefore in October 2002, the Council voted to delay implementation of IR/IU for rock sole and

yellowfin sole in the BSAI until June 1, 2004 or until the IR/IU regulations are superceded by other regulations that minimize discards but allow the continued prosecution of the flatfish fisheries in the BSAI.

1.1.1 Problem Statement

Discards of groundfish in most of the BSAI groundfish fisheries other than pollock and Pacific Cod, are currently unregulated within the total catch limits (TACs) to which all catch whether retained or discarded accrue. Without regulation the possibility exists that the current trend of groundfish discard reduction may not continue and may in fact revert to previous high levels. The problem is particularly acute in the trawl multi-species fisheries that target flatfish and Pacific cod. Participants in these fisheries have significantly reduced their levels of discards in recent years due to the impending implementation of IR/IU regulation for flatfish which would have required 100 percent retention of of rock sole and yellowfin sole in the BSAI. However the Council has determined that mandated full retention of flatfish is not practicable, and will place many of the participants in these fisheries in financial jeopardy. The Council is also concerned that unacceptably high discards rates could return unless some form of regulation mandating retention is approved and implemented.

1.1.2 Description of the Alternatives

The following alternatives are under consideration for initial review.

Alternative 1: (Status Quo/No Action) Allow the existing IR/IU regulations for flatfish in the BSAI to be implemented beginning June 1, 2004. The improved retention regulations would require that all rock sole and yellowfin sole in the BSAI be retained and that processors create products that yield at least 15 percent from each fish harvested.

Alternative 2: Add a minimum Groundfish Retention Standard (GRS) for all groundfish fisheries (excluding the pollock target fisheries) to the Goals and Objectives section of the BSAI Groundfish FMP. The GRS would apply in principle to all vessels harvesting groundfish in the BSAI. The GRS would be set at a point within the range of 65 percent to 90 percent of the total amount of groundfish caught. The specific GRS percentage will be determined by the Council in it final decision. The GRS would not supercede the 100 percent retention standards already set for pollock and Pacific cod under existing IR/IU regulations. In addition to meeting the GRS, all groundfish retained would have to be processed into primary products that comprise 15 percent or more of the round weight of each fish retained.

In additional to changes in the FMP Goals and Objectives, regulations would be promulgated and enforced on certain vessels and sectors in the fleet based on the guidance from NMFS that certified scales and 100 percent observer coverage will be required to enforce GRS regulations. The following decision points will determine the scope of the content of the GRS regulations.

Decision Point 1 To which sectors should the GRS enforceable regulations apply.

- 1.1 All Catcher Processors
- 1.2 All Catcher Processors > 125'
- 1.3 All Trawl Catcher Processors including AFA trawl catcher processors participating in non-pollock target fisheries
- 1.4 All Trawl Catcher Processors > 125' including AFA trawl catcher processors participating in non-pollock target fisheries
- 1.5 Non-AFA Trawl Catcher Processors > 125'
- 1.6 Non-AFA Trawl Catcher Processors (Head and Gut Trawl Catcher Processors) with exemptions and production limits for vessels < 125'.

What are maximum production levels for exempt (< 125') non-AFA trawl CPs?

1.6.1 Total catch in any week shall not exceed 600 mt.

1.6.2 Total catch in any week shall not exceed 700 mt.

1.6.3 Total catch for the year shall not exceed 13,000 mt

1.6.4 Total catch for the year shall not exceed 17,000 mt

The decision to include a specific sector under regulation implies that certified scales and 100 percent observer coverage will be required.

Decision Point 2 At what level of the fleet would the GRS be enforced?

2.1 Enforcement of standard across vessel pools.

2.2 Enforcement of standard by individual vessels.

Decision Point 3 Will there be a single GRS or multiple GRS for different seasons?

3.1 Establish a single standard for all fishing activity.

3.2 Establish different standards for the "A" Season and the "B" Season.

Decision Point 4 Over what period will attainment of the GRS for the vessel be calculated?

4.1 At the end of each week for each area and gear fished

4.2 At the end of each week over all areas and gears fished

4.3 At the end of fishing trip as defined by the offloading of fish

4.4 At the end of each month

4.5 At the end of each quarter

4.6 At the end of each fishing season

4.7 At the end of each year

Decision Point 5 At what percentage of total groundfish caught should the GRS be set?

5.1 65 percent of all groundfish caught must be retained

5.2 70 percent of all groundfish caught must be retained

5.3 75 percent of all groundfish caught must be retained

5.4 80 percent of all groundfish caught must be retained

5.5 85 percent of all groundfish caught must be retained

5.6 90 percent of all groundfish caught must be retained

Decision Point 6 Should the maximum retainable bycatch percentage (MRB) for pollock and Pacific cod be adjusted?

6.1 No, MRBs will remain at 20 percent

6.2 Yes, increase MRBs to reduce uncecessary discards of while discouraging topping off.

6.2.1 Increase to 25 percent

6.2.2 Increase to 30 percent

6.2.3 Increase to 35 percent

1.2 Overview of Previous Actions Related to Groundfish Retention Standards

In October 2002, the Council voted to delay implementation of IR/IU flatfish regulations for the BSAI until June 1, 2004. At the same time, the Council initiated analyses of four trailing amendments as a means to accomplish bycatch reductions and facilitate reductions in flatfish discards. One of these was Amendment C, which would establish minimum groundfish retention standards as an alternative to flatfish retention requirements in the BSAI.

To help guide the staff on the EA/RIR/IRFA, the IR/IU Technical Committee has met three times since October 2002. During this time, staff also began working on the EA/RIR/IRFA for Amendments C scheduled for initial review at the February 2003 Council meeting. However, due to the increasing complexity of Amendment C and the need for further guidance from the Council, a full EA/RIR/IRFA could not be completed in time for initial review at the February meeting. In its place was a discussion paper on Amendment C that outlines the work to date. The current draft is in the form of an EA/RIR/IRFA, however, some sections are still incomplete and may require additional guidance from the Council.

As noted above, during the last several months, staff have encountered some obstacles for establishing a minimum groundfish retention standard in the BSAI. The most significant of these obstacles is the legal weakness of self-reporting of catch and discards of groundfish by vessels, a crucial element in determining retention rates. After review of the initial alternative by NMFS, it has been determined that a minimum groundfish retention standard is not enforceable without requiring flow scales on all BSAI groundfish vessels.

The IR/IU Technical Committee meet on January 14th for the purpose of providing guidance to the Council on how to create a minimum groundfish retention standard in the BSAI given the requirement of flow scales.

The Committee focused on two actions that when combined would provide a minimum groundfish standard program for the BSAI fleet. The first action is to implement a FMP amendment that would set retention standards for the BSAI fleet and then encourage vessels to meet the these standards. The amendment would not require flow scales or additional observers, thus nothing in the amendment would be enforceable. The second action is to pursue retention standards that would be enforceable only for the non-AFA trawl catcher processor fleet. (The sectors/vessels to which GRS regulations will apply is a critical point of clarification necessary for completion of the analysis.) Approximately 80 percent of the trawl catcher processors over 125 feet already have approved flow scales on board. For vessels under 125 feet in length, the Committee recommended that these vessels should be exempt from having to install flow scales.

Based on input from the Committee, staff have revised the alternatives and options for consideration by the Council.

1.2.1 Original IR/IU Problem Statement and Need for Action

At its December 1995 meeting, while addressing IR/IU issues through Amendment 49/49, the NPFMC adopted a draft IR/IU problem statement for public review. The Statement reads as follows:

In managing the fisheries under its jurisdiction, the North Pacific Fishery Management Council is committed to: (1) assuring the long-term health and productivity of fish stocks and other living marine resources of the North Pacific and Bering Sea ecosystem; and (2) reducing bycatch, minimizing waste, and improving utilization of fish resources in order to provide the maximum benefit to present generation of fishermen, associated fishing industry sectors, communities, consumers, and the nation as a whole. These commitments are also reflected in the Council's comprehensive rationalization program. The Council's overriding concern is to maintain the health of the marine ecosystem to ensure the long-term conservation and abundance of the groundfish and crab resources. As a response to this concern, a program to promote improved utilization and effective control/reduction of bycatch and discards in the fisheries off Alaska should address the following problems:

- Bycatch and discard loss of groundfish, crab, herring, salmon, and other non-target species.
- Eonomic loss and waste associated with the discard mortality of target species harvested but not retained for economic reasons.

- Inability to provide for a long-term stable fisheries-based economy due to loss of fishery resources through wasteful fishing practices.
- The need to promote improved retention and utilization of fish resources by reducing waste of target groundfish species to achieve long-term sustainable economic benefits to the nation.

At its September 1996 meeting the NPFMC adopted Amendment 49 to the BSAI groundfish FMP. NMFS prepared a final rule to implement Amendment 49 to the BSAI FMP effective January 3, 1998 (62 FR 63880). The final rule requires all vessels fishing for groundfish in the BSAI management area to retain all pollock and Pacific cod beginning January 3, 1998 and retain all rock sole and yellowfin sole beginning January 1, 2003. In addition, the final rule establishes a 15 percent minimum processing standard with no limit on product form beginning January 3, 1998 for pollock and Pacific cod and establishes a 15 percent minimum processing standard with no limit on product form beginning January 1, 2003 for rock sole and yellowfin sole.

Concurrent with unanimously approving Amendment 49 to the BSAI groundfish FMP, the NPFMC recognized the need to develop a "substantially equivalent" IR/IU program for the groundfish fisheries of the GOA. At its December 1996 meeting the NPFMC formally adopted the following problem statement for the GOA IR/IU amendment proposal:

The objective of the Council in undertaking 'improved retention and improved utilization' regulations for Gulf of Alaska groundfish fisheries centers on the same basic concern that motivated an IR/IU program in the BSAI groundfish fisheries; that is, economic discards of groundfish catch are at unacceptably high levels. An IR/IU program for the GOA would be expected to provide incentives for fishermen to avoid unwanted catch, increase utilization of fish that are taken, and reduce overall discards of whole fish, consistent with current Magnuson-Stevens Act provisions.

In addition, the Council recognizes the potential risk of preemption of certain existing GOA groundfish fisheries which could occur in response to economic incentives displacing capacity and effort from BSAI IR/IU fisheries. This risk can be minimized if substantially equivalent IR/IU regulations are simultaneously implemented for the GOA.

At its September 1996 meeting the NPFMC adopted Amendment 49 to the GOA groundfish FMP. NMFS prepared a final rule to implement Amendment 49 to the GOA FMP effective January 12, 1998 (62 FR 65379). The final rule requires all vessels fishing for groundfish in the GOA management area to retain all pollock and Pacific cod beginning January 3, 1998 and retain all shallow-water flatfish beginning January 1, 2003. In addition, the final rule establishes a 15 percent minimum processing standard with no limit on product form beginning January 3, 1998 for pollock and Pacific cod and establishes a 15 percent minimum processing standard with no limit on product form beginning January 1, 2003 for shallow-water flatfish.

NMFS assessed the biological, economic, and social impacts of improved retention and utilization as part of their EA/RIR/IRFA for each amendment. The RIR found that the preferred retention option combined with any of the three proposed utilization options under consideration could result in a significant adverse economic impact on a substantial number of small entities, including a significant number of relatively small trawl catcher processors. Because of their size, these vessels are generally limited to freezing headed and gutted products.

To provide some mitigation of the effects that IR/IU rules could have, the NPFMC required 15 percent utilization, which allows the previously discarded catch that will be retained under the 100 percent retention rule to be processed into different product forms, including meal, surimi, and bait. In addition, the NPFMC delayed implementation of the rules on the most negatively affected fisheries (i.e., those fisheries in which IR/IU flatfish species-rock sole, yellowfin sole and shallow-water flatfish-are caught and discarded) for a period of five years. The expectation was that the five year delay in implementation of the flatfish retention requirement would provide the industry an opportunity to develop fishing methods and strategies to more effectively avoid catching unwanted flatfish and/or develop new

products and markets for the harvested flatfish that were being discarded. However, the full extent to which the IR/IU rules would affect the different sectors of the groundfish fleet that participate in these fisheries has not been determined.

In October 2002, the NPFMC took final action on Amendment 75, which entailed delaying implementation of IR/IU flatfish regulations for the BSAI until June 1, 2004. During this review, the NPFMC revised the IR/IU problem statement to state that 100 percent retention of rock sole and yellowfin sole results in severe economic losses to certain participants in the fishery, while less than 100 percent retention of only these species is not enforceable.

At the same time the Council took final action on Amendment 75, it initiated analyses of 4 trailing amendments as a means to accomplish bycatch reductions and facilitate reductions in flatfish discards. Amendment A would establish prohibited species bycatch reduction cooperatives operating in the BSAI. Amendment B would create bycatch caps (discard caps) for the flatfish fisheries in the BSAI. Amendment C would establish minimum groundfish retention standards as an alternative to flatfish retention requirements in the BSAI. Amendment D would establish a regulatory process for the routine review of flatfish bycatch in the BSAI and GOA fisheries and the exemption of fisheries with less than 5 percent bycatch of IR/IU flatfish from flatfish retention and utilization rules.

The purpose of this discussion paper is to evaluate a range of alternatives and options related to implementation of a minimum groundfish retention standard. The intent of this retention standard is to encourage fishermen to avoid unwanted catch, increase utilization of fish that are taken, and, thus, reduce discards of whole fish to the extent practicable. Establishing a minimum retention standard is thought to create incentives for increasing utilization of target and non-target species and increasing productivity and recovery rates. In addition, the fleet could potentially exercise more selectivity in fishing to avoid prohibited species.

2.0 Environmental Assessment

An environmental assessment (EA) is required by the National Environmental Policy Act of 1969 (NEPA) to determine whether a proposed action will result in a significant impact on the human environment. The human environment is defined by the Council on Environmental Quality as the natural and physical environment and the relationships of people with that environment (40 CFR 1508.14). This means that economic or social impacts are not intended by themselves to require preparation of an EA. However, when an EA is prepared and socio-economic and natural or physical environmental impacts are interrelated, the EA must discuss all of these impacts on the quality of the human environment.

If the proposed action is determined not to be significant based on an analysis of relevant considerations, the EA and resulting finding of no significant impact (FONSI) would be the final environmental documents required by NEPA. An environmental impact statement (EIS) must be prepared for major Federal actions significantly affecting the human environment.

An EA must include a discussion of the need for the proposed action, the alternatives considered, the impacts of the proposed action and alternatives on the human environment and a list of document preparers. The purpose is discussed in Section 1.1 of this document, and the alternatives are described in Section 1.2. The list of preparers is in Section 5.0.

This section describes the affected human environment as defined above, including the natural and physical environment (Section 2.1) and the relevant economic and fisheries data pertaining to fisheries in which discarding of IR/IU flatfish species occurs (Section 2.2). The impacts of the proposed action and alternatives are the subject of Section 3.0.

2.1 Natural and Physical Environment

2.1.1 Groundfish Species

Complete descriptions of the all groundfish stocks harvested in the BSAI are described in *Stock Assessement and Fishery Evaluation Report for the Groundfish Resources of the Bering Sea/ Aleutian Islands Regions*. November 2002, North Pacific Fishery Management Council. The report indicates that none of the groundfish stocks in the BSAI are depleted or currently overfished.

The alternatives are not expected to have any significant affect on groundfish stocks in the Bering Sea with the possible exception of stocks targeted in the trawl multi-species fisheries. These stocks include Pacific cod, rock sole, yellowfin sole, flathead sole, Alaska plaice and other flatfish species. If very strict retention standards (90 percent or higher) are approved, then it is conceiveable that the activity in the trawl multi-species fisheries will be curtailed and harvests of the stocks mentioned above will be reduced. However, as discussed in Section 3.2, any harvest reductions would be limited to the flatfish fisheries–harvests of Pacific cod are not likely to be affected. This is likely for two reasons:

1. It is possible to target Pacific cod using trawl with relatively low incidental catches of other groundfish species. This has been demonstrated by AFA trawl catcher processors that target Pacific cod at different times and locations than are typical in the trawl multi-species fisheries.
2. If trawl Cps are unable to harvest the amount of Pacific cod in their apportionment, the remainder is "rolled-over" and made available to other harvesting sectors. All such rollovers that have occurred in the past have been harvested by the Longline Catcher Processor sector.

If actual harvest reductions occur in flatfish fisheries, it is unlikely that there will be any resulting stock effect. Currently all flatfish stocks in the BSAI are harvested at levels well below established Acceptable Biological Catches (ABCs) and Overfishing Limits (OFLs). By definition, catches below ABC are not expected to affect stock levels.

Even if the alternatives have the effect of reducing discards of groundfish and flatfish in particular there is no indication that the stocks will be affected. The following excerpt from Amendment 75 provide the justification for this statement:

> "Discard quantities constitute less than one percent of the yellowfin survey biomass, less than two percent of the rock sole survey biomass and less than 0.1 percent of the shallow-water flatfish survey biomass. Eliminating these discard amounts would have no measurable effect on the health of the flatfish resources. Moreover, the species TACs would remain the same under all of the alternatives considered. To the extent that these TACs are sustainable, extraction of the TACs will have the same stock effects regardless of whether all the fish harvested are retained or a large portion of them is discarded. Fisheries data show that the IR/IU flatfish fisheries are currently sustainable. Annual harvests have been below species TACs in recent years, and TACs has been set below ABC estimates. If a portion of those fish discarded survives, then discarding results in fewer fish being removed from the biomass. However, there is no conclusive information regarding how many, if any, of the IR/IU flatfish discarded survive."

2.1.2 Prohibited Species

Prohibited species in the groundfish fisheries include Pacific salmon (chinook, coho, sockeye, chum and pink), steelhead trout, Pacific halibut, Pacific herring and Alaska king, Tanner and snow crab. The most recent review of the status of crab stocks may be found in the crab SAFE report. The status of other prohibited species is described in Section 3.5 of the Steller sea lion protection measures SEIS (NMFS

2001b). The effects of the groundfish fisheries in the BSAI and GOA on prohibited species are primarily managed by conservation measures developed and recommended by the NPFMC over the entire history of the FMPs for the BSAI and GOA and implemented by federal regulation. These measures include prohibited species catch (PSC) limits on a year round and seasonal basis, year round and seasonal area closures, gear restrictions and an incentive plan to reduce the incidental catch of prohibited species by individual fishing vessels. None of the alternatives affects management of prohibited species, nor or they likely to affect catch of prohibited species.

2.1.3 Forage Fish Species

The species referred to as forage fish species are limited to those species included in BSAI groundfish FMP Amendment 36 and GOA groundfish FMP Amendment 39. Management concerns with regard to forage fish, as well as current and planned research to address these concerns, are discussed in Section 4.5 of the 2001 DPSEIS (NMFS 2001a). Estimates of biomass and seasonal distribution of biomass are unavailable for forage fish species, although none of the alternatives considered are expected to have any adverse effects on forage fish species.

2.1.4 Benthic Habitat and Essential Fish Habitat

The 2001 DPSEIS (NMFS 2001a) describes the effects of commercial groundfish fishing on substrate and benthic habitat. All the marine waters and benthic substrates in the management areas comprise the habitat of groundfish. In addition, the adjacent marine waters seaward of the EEZ, adjacent State waters, shoreline, freshwater inflows and atmosphere above the waters constitute habitat for prey species, other life stages and species that move in and out of, or interact with, groundfish species. Distinctive aspects of the habitat include water depth, substrate composition, substrate infauna, light penetration, water chemistry (salinity, temperature, nutrients, sediment load, color, etc.), currents, tidal action, phytoplankton and zooplankton production, associated species, natural disturbance regimes and the seasonal variability of each aspect. Substrate types include bedrock, cobbles, sand, shale, mud, silt and various combinations of organic material and invertebrates that may be termed biological substrate. Biological substrates present in management areas include corals, tunicates, mussel beds and tubeworms. Biological substrate has the aspect of ecological state (from pioneer to climax) in addition to the organic and inorganic components. Ecological state is heavily dependant on natural and anthropogenic disturbance regimes. The BSAI and GOA groundfish FMPs contain descriptions of habitat preferences of the target species, and projects are underway to systematically present biological requirements for each known life history stage.

The marine habitat may be altered by changes in the amount and flow of energy with the removal and return (discarding) of fish in fisheries. In the eastern Bering Sea total catch biomass (including non-groundfish removals) is estimated to be one percent of the total system biomass (excluding dead organic material).

Auster and Langton (1999) reviewed the indirect effects of commercial fishing on EFH. Data are lacking on the spatial extent of commercial fishing-induced disturbance, the effects of specific gear types along a gradient of commercial fishing effort and the linkages between habitat characteristics and the population dynamics of fishes. Trawling on sea floor habitat and benthic communities in the GOA generally disturb sea floor habitats by displacing boulders, removing epifauna, decreasing the density of sponges and anthozoans and damaging echinoderms. However, the effect of this disturbance on fish and other living marine resources is not known.

A detailed analysis of interactions between groundfish fisheries and benthic habitat and EFH is provided in the 2001 DPSEIS (NMFS 2001a) and the EA for the 2002 TAC specifications for Alaska groundfish fisheries (NMFS 2001c). These analyses also provide the information necessary for an EFH (Essential

Fish Habitat) assessment, which is required by the Magnuson-Stevens Act for any action that may adversely affect EFH.

None of the alternatives would be expected to adversely affect marine benthic habitat or EFH in any manner or to any extent not already addressed in previous NEPA analyses. The alternatives would not change the species TACs or the gear type and general location of the fisheries in which IR/IU flatfish are caught.

2.1.5 Ecosystem Considerations

The 2001 DPSEIS (NMFS 2001a) provides updated information on biodiversity, essential fish habitat, sustainable yields and human considerations as they relate to the BSAI and GOA marine ecosystems. This information is to be used in making ecosystem-based management decisions such as establishing ABC and TAC levels.

Total commercial fishing removals in the BSAI and GOA are a small proportion of the total system energy budget and are small relative to internal sources of inter-annual variability in production. Energy flow paths do not seem to be redirected by discards and offal. Before improved retention requirements for Pacific cod and pollock were in place it was estimated that the total offal and discard production was one percent of the estimated unused detritus going to the ocean bottom. The level of discards relative to natural sources of detritus and the absence of evidence that would relate changes in scavenger populations to discard trends suggest that the BSAI and GOA groundfish fisheries have insignificant ecosystem impacts through energy removal and redirection (NMFS 2000b).

High rates of discards can have potential ecosystem effects. The discards could affect scavenger and predator populations by increasing the available food supply. In addition, discards will contribute to the total energy flow and, though they may be small when compared to the total flow, their effect is cumulative with other forms of energy flow such as offal production from processing and naturally occurring detritus. However, the level of IR/IU flatfish discards relative to natural sources of detritus and the absence of evidence that would relate changes in scavenger populations to discard trends suggest that IR/IU flatfish discards have insignificant ecosystem impacts through energy removal and redirection.

To the extent that IR/IU flatfish discards are concentrated in one area they could create localized ecosystem effects. The potential for such effects may require consideration of local energy flows rather than region-wide flows. Such localized ecosystem effects are currently not well understood.

2.1.6 Endangered or Threatened Species

The Endangered Species Act of 1973 as amended (16 U.S.C. § 1531 *et seq*), provides for the conservation of endangered and threatened species of fish, wildlife and plants. The program is administered jointly by the NMFS for most marine mammal species, marine and anadromous fish species and marine plants species, and by the USFWS for bird species and terrestrial and freshwater wildlife and plant species.

The designation of an ESA listed species is based on the biological health of that species. The status determination is either threatened or endangered. Threatened species are those likely to become endangered in the foreseeable future [16 U.S.C. § 1532(20)]. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range [16 U.S.C. § 1532(20)]. Species can be listed as endangered without first being listed as threatened. The Secretary of Commerce, acting through NMFS, is authorized to list marine fish, plants and mammals (except for walrus and sea otter) and anadromous fish species. The Secretary of the Interior, acting through the USFWS, is authorized to list walrus and sea otter, seabirds, terrestrial plants and wildlife and freshwater fish and plant species.

In addition to listing species under the ESA, the critical habitat of a newly listed species is designated concurrent with its listing to the "maximum extent prudent and determinable" [16 U.S.C. § 1533(b)(1)(A)]. The ESA defines critical habitat as those specific areas that are essential to the conservation of a listed species and that may be in need of special consideration. Federal agencies are prohibited from undertaking actions that destroy or adversely modify designated critical habitat. Some species, primarily the cetaceans, which were listed in 1969 under the Endangered Species Conservation Act and carried forward as endangered under the ESA, have not received critical habitat designations.

Federal agencies have an affirmative mandate to conserve listed species. Federal actions, activities or authorizations (hereafter referred to as Federal action) must be in compliance with the provisions of the ESA. Section 7 of the ESA provides a mechanism for consultation by the Federal action agency with the appropriate expert agency (NMFS or USFWS). Informal consultations, resulting in letters of concurrence, are conducted for Federal actions that may affect, but are not expected to adversely affect, listed species or critical habitat. A consultation conducted under Section 7 of the ESA, resulting in a biological opinion, is conducted for a Federal action that may have an adverse affect on the listed species. Through the biological opinion, a determination is made as to whether the proposed action is likely to jeopardize the continued existence of a listed species (jeopardy) or destroy or adversely modify critical habitat (adverse modification). If the determination is that the action proposed (or ongoing) will cause jeopardy, reasonable and prudent alternatives may be suggested which, if implemented, would modify the action to avoid the likelihood of jeopardy to the species or destruction or adverse modification of designated critical habitat. A biological opinion with the conclusion of no jeopardy may contain conservation recommendations intended to further reduce the negative impacts to the listed species. These conservation recommendations are advisory to the action agency [50 CFR 402.25(j)]. If a likelihood exists of any taking[1] occurring during promulgation of the action, an incidental take statement may be appended to a biological opinion to provide for the amount of take that is expected to occur from normal promulgation of the action.

Species currently listed as endangered or threatened under the ESA that may be present in the BSAI and GOA are presented in Table 6. The group includes great whales, pinnipeds, Pacific salmon and steelhead and seabirds. Of the species listed under the ESA and present in the action area, some may be negatively affected by groundfish commercial fishing. NMFS is the expert agency for ESA listed marine mammals and anadromous fish species. The USFWS is the expert agency for ESA listed seabirds. The fisheries as a whole must be in compliance with the ESA.

[1] The term "take" under the ESA means "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct" [16 U.S.C. § 1538(a)(1)(B)].

Table 1. ESA Listed Species in the BSAI and GOA

Common Name	Scientific Name	ESA Status
Northern Right Whale	*Balaena glacialis*	Endangered
Bowhead Whale [1]	*Balaena mysticetus*	Endangered
Sei Whale	*Balaenoptera borealis*	Endangered
Blue Whale	*Balaenoptera musculus*	Endangered
Fin Whale	*Balaenoptera physalus*	Endangered
Humpback Whale	*Megaptera novaeangliae*	Endangered
Sperm Whale	*Physeter macrocephalus*	Endangered
Snake River Sockeye Salmon	*Onchorynchus nerka*	Endangered
Short-tailed Albatross	*Phoebaotria albatrus*	Endangered
Steller Sea Lion	*Eumetopias jubatus*	Endangered and Threatened [2]
Snake River Fall Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Snake River Spring/Summer Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Puget Sound Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Lower Columbia River Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Upper Willamette River Chinook Salmon	*Onchorynchus tshawytscha*	Threatened
Upper Columbia River Spring Chinook Salmon	*Onchorynchus tshawytscha*	Endangered
Upper Columbia River Steelhead	*Onchorynchus mykiss*	Endangered
Snake River Basin Steelhead	*Onchorynchus mykiss*	Threatened
Lower Columbia River Steelhead	*Onchorynchus mykiss*	Threatened
Upper Willamette River Steelhead	*Onchorynchus mykiss*	Threatened
Middle Columbia River Steelhead	*Onchorynchus mykiss*	Threatened
Spectacled Eider	*Somateria fishcheri*	Threatened
Steller Eider	*Polysticta stelleri*	Threatened

[1] The bowhead whale is present in the Bering Sea area only.
[2] Steller sea lion are listed as endangered west of Cape Suckling and threatened east of Cape Suckling.

Section 7 consultations with respect to the actions of the Federal groundfish fisheries have been done for all the species listed above, either individually or in groups. An FMP-level biological opinion was prepared in November 2000 which resulted in significant changes to management of the pollock, Pacific cod, and Atka mackerel fisheries to accommodate concerns over fisheries interactions with Steller sea lions. The most recent Section 7 consultation and Biological Opinion (November 2001) evaluated all groundfish fisheries under the existing management regime, and concluded that the groundfish fisheries, as constituted, did not result in jeopardy or adverse modification. Flatfish species, while present in the diet of sea lions, do not constitute a significant prey source, and the fisheries for flatfish do not typically occur in the areas of sea lion critical habitat.

Therefore, none of the alternatives would be expected to adversely affect endangered or threatened species in any manner or to any extent not already addressed in previous consultations conducted under Section 7 of the ESA. None of the alternatives would change the TACs for IR/IU flatfish, the gear types used in the fisheries in which IR/IU flatfish are discarded, or the spatial or temporal distribution of these fisheries. Therefore, none of the alternatives are expected to have a significant impact on endangered or threatened species.

2.1.7 Impacts on Other Marine Mammals

Marine mammals not listed under the ESA that may be present in the BSAI and GOA include cetaceans [minke whale (*Balaenoptera acutorostrata*), killer whale (*Orcinus orca*), Dall's porpoise (*Phocoenoides dalli*), harbor porpoise (*Phocoena phocoena*), Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) and the beaked whales (e.g., *Berardius bairdii* and *Mesoplodon spp.*)] and pinnipeds

[northern fur seals (*Callorhinus ursinus*) and Pacific harbor seals (*Phoca vitulina*)] and the sea otter (*Enhydra lutris*).

Direct and indirect interactions between marine mammals and groundfish harvest occur due to overlap in the size and species of groundfish harvested in the fisheries that are also important marine mammal prey and due to temporal and spatial overlap in marine mammal foraging and commercial fishing activities. A detailed analysis of interactions between groundfish fisheries and marine mammals is provided in the 2001 DPSEIS (NMFS 2001a), Steller sea lion protection measures SEIS (NMFS 2001b) and EA for the 2002 TAC specifications for Alaska groundfish fisheries (NMFS 2001c).

None of the alternatives would be expected to adversely affect marine mammal, because none of the alternatives would change the TACs for IR/IU flatfish, the gear types used in the fisheries in which IR/IU flatfish are discarded, or the spatial or temporal distribution of these fisheries, relative to the presence of these marine mammal species.

2.1.8 Seabirds

In 1999, the U.S. Fish and Wildlife Service (USFWS) issued a biological opinion on the BSAI hook-and-line groundfish fishery and the BSAI trawl groundfish fishery for the endangered short-tailed albatross, pursuant to Section 7 of the ESA. The conclusion of the biological opinion continued a no jeopardy determination and the incidental take statement expressing the requirement to immediately reinitiate consultations if incidental takes exceed four short-tailed albatross over a two year period. Consultations on the short-tailed albatross were not re-initiated for the year 2000 TAC specifications because the 1999 biological opinion extended through the end of calendar year 2000. In September 2000, NMFS requested re-initiation of consultation for all listed species under the jurisdiction of the USFWS, including the short-tailed albatross, spectacled eider and Steller's eider for the GOA FMP and 2001-2004 TAC specifications. Based upon a review of the fishery action and the consultation material provided to USFWS, NMFS concluded that the GOA groundfish fisheries are not likely to adversely affect either the spectacled eider or the Steller's eider or destroy or adversely modify the critical habitat that has been proposed for each of these species.

None of the alternatives would be expected to adversely affect seabirds in any manner or to any extent not already addressed in previous consultations conducted under Section 7 of the ESA.

2.1.9 Summary of Impacts in the Physical Environment

None of the alternatives would be expected to adversely affect elements in the physical environment. None of the alternatives would change the TACs for groundfish, nor would the alternatives alter the gear types used in the fisheries, or the spatial or temporal distribution of these fisheries in any manner or to any extent not already addressed in previous consultations conducted under Section 7 of the ESA.

2.2 Economic and Social Conditions

This section contains discussions of the existing economic and social conditions of affected portions of the human environment and provides an overview of existing conditions of the BSAI fisheries with a focus on issues related to implementing a minimum groundfish retention standard in the BSAI. Included in this description is information on the number of catcher processors participating in each BSAI fishery by sector from 1995 to 2001, information on wholesale value, total catch and retention rates by fishery, and fleet distributions by retention rate during the 2001 fishing year for each fishery.

2.2.1 Description of Data and Processing

The data used for this analysis was from NMFS Blend Data. Blend data is a combination of Weekly Production Reports from catcher processors and motherships and NMFS Observer Data. Observers on

processor vessels report groundfish species composition, total catch, and estimates of retention and discards on a weekly basis for each separate reporting area and gear type. Total catch may be estimated using cod-end or bin volumetrics, scales, or conversion from production data. Species composition of the catch, is obtained by sampling the catch. The total catch is apportioned by species based on that sampling. The blend process combines data from the industry production reports and observer reports to make a comprehensive accounting of groundfish catch. Observer data are the only data source deemed reliable by NMFS for the calculation of discards, and since observer coverage on catcher vessels is quite limited, discard estimates are calculated for catcher vessels as a fleet and assigned to the processors that take CV deliveries. Because of this no discard estimates are available for catcher vessels.

In order to provide a thorough description of the groundfish fishery with regards to retention rates, information is presented for all processors. The BSAI fisheries were divided sectors including surimi and fillet catcher processors, head and gut processors, longline catcher processors, pot catcher processors. For purposes of completeness, all catcher vessels have been combined into a single sector—discard data are not estimated at the catcher vessel level and therefore it is not possible, using existing reporting requirements to implement a GRS on catcher vessels. A complete discussion of these fleet classifications can be found in *Sector and Regional Profiles of the North Pacific Groundfish Fisheries–2001* (Northern Economics, 2001).

- Surimi and Fillet Catcher Processors: These vessels primarily produce surimi and fillet products from the pollock fishery. These processors are typically the largest in the catcher processor category.
- Head and Gut Catcher Processors: These vessels typically concentrate on head and gut products or kirimi. Generally, the head and gut fleet tend to focus primarily on flatfish, Pacific cod, and Atka mackerel. Unlike the surimi and fillet fleet, the head and gut fleet tends to be the smallest of the trawl catcher processors.
- Longline Catcher Processors: These vessels use longline gear rather than trawl or pot gear. Also known as freezer longliners, their primary fishery is the Pacific cod and are generally limited to heading and gutting their fishery products.
- Pot Catcher Processors: These vessels typically focus on the crab fisheries, but increasingly are participating in the Pacific cod fisheries. They generally use pot gear, but may also use longline gear. They produce whole or headed and gutted groundfish products.
- BSAI Shorebased Processors, Floaters, and Motherships: This category is included as a proxy for catcher vessels. Although observer reports do report groundfish species composition, total catch, and estimates of retention and discard on a weekly basis, the level of coverage is limited since only 30 percent of catcher vessels have observers. BSAI shorebased processors includes the four major shorebased BSAI pollock processors in Dutch Harbor/Unalaska and Akutan and two inshore floating pollock processors–Arctic Enterprise and Northern Victor–. Shore plants in the Aleutians East Borough and in the Aleutians West Census area are also included. All other floating inshore plants and all motherships operating in the EEZ are also included.

2.2.2 Participation by Processing Sector

Table 2 shows participation in BSAI fisheries by the four catcher processing sectors described above. Counts of catcher vessels delivering BSAI groundfish are included rather than counts of processors since any GRS would be enforced at the point of harvest.

With the exception of pot CPs, the number of participants have declined in each of the sectors over the seven year period. For the surimi and fillet catcher processor fleet, the number of participants has declined from 33 in 1995 to 16 in 2001. Among the individual target fisheries in the surimi and fillet

catcher processor fleet, pollock has consistently attracted the most participation. In 1995, there were 33 permits fished in the midwater pollock fishery and 30 fished in the bottom pollock fishery. Seven years later, the number of permits fished declined to 15 for the midwater pollock and 15 for the bottom pollock fishery. Other fisheries that have had consistent participation were yellowfin sole and Pacific cod, although these fisheries have also seen dramatic declines in the number of permits fished.

Among the head and gut CP fleet there has only been a slight decline in participation in some target fisheries. Overall, 32 head and gut CPs participated in 1995, while only 22 participated in 2001. The fisheries with the largest number of participants were yellowfin sole, rock sole, flathead sole, and Pacific cod with each generally having 20 or more participants on any given year from 1995 to 2001.

The longline catcher processor fleet has remained relatively stable over the 1995 to 2001 period. The lowest participation was in 1999 when only 38 longline catcher processors targeted groundfish. Participation has been strongest in the Pacific cod fishery. The highest level was in 1995 and 2001 when 42 vessels targeted Pacific cod. Turbot has also experienced high levels of participation, but recently there has been a decline in participation. The sablefish fishery has also attracted a modest number of longline catcher processors during the seven year period.

Among the pot CPs, only one target fishery has attracted consistent numbers of participants. Between 1995 to 2001, there have been between 5 to 9 participants in the Pacific cod fishery.

The number of catcher vessels participating in the BSAI fisheries has varied up and down from 1995-2001 with a high of 318 in 1995 and a low of 236 in 1998. In 2001 there were 276 active catcher vessels. A more detaled description of catcher vessel activity in the BSAI can be found in the sector profiles (Northern Economcis, 2001).

Table 2. Participation in Major BSAI Fisheries by Catcher Processor Sectors,1995-2001

Target Fishery & Sector	1995	1996	1997	1998	1999	2000	2001
	Number of Vessels						
Surimi & Fillet Trawl Catcher Processors							
Pollock	33	32	29	28	16	14	15
All Fisheries	33	32	29	28	16	15	15
Head & Gut Trawl Catcher Processors							
Atka Mackerel	14	12	8	12	16	13	13
Pacific Cod	24	26	26	21	21	22	17
Other Flatfish	29	21	18	20	24	23	20
Rockfish	14	13	10	7	12	7	7
Rock Sole	29	26	25	18	22	23	20
Yellowfin Sole	27	24	24	20	23	23	22
All Fisheries	32	28	28	23	24	23	22
Pot Catcher Processors							
Pacific Cod	6	9	7	5	9	9	7
All Fisheries	6	9	7	5	9	9	7
Longline Catcher Processors							
Pacific Cod	42	38	38	36	36	38	42
Sablefish	15	18	12	10	17	18	10
All Fisheries	45	43	42	42	38	40	45
All Catcher Processors	116	112	106	98	86	87	87
All Catcher Vessels	318	289	270	236	265	298	276

Sources: Processor counts are from NMFS Blend Data and CV counts are from ADFG fish-tickets. Both blend and fish-ticket data were synthesized by Northern Economics for use in the Programmatic SEIS for Groundfish.

2.2.3 Fishery Wholesale Value

Table 3 shows wholesale value from catcher processors by sector and the combined shorebased/ floater/mothership category by selected BSAI fishery. For the surimi and fillet catcher processors fleet, the most significant contributor to wholesale value has historically been the pollock fishery. In 2001, the combined wholesale value of pollock was $407 million out of a total wholesale value for all groundfish of $410 million, a 95 percent contribution. Other fisheries that have contributed to the total wholesale value, although at a diminished level, are yellowfin sole and Pacific cod.

For the head and gut fleet no one fishery stands out. Several different fisheries have historically contributed relatively equal shares of the wholesale value for the fleet. Atka mackerel at $47 million and yellowfin sole at $32 million are two the largest contributors to total wholesale value in 2001, each contributing 35 percent and 24 percent, respectively to the wholesale value. Other fisheries which have historically contributed a smaller share of the total wholesale value for the head and gut fleet are rock sole, Pacific cod, and flathead sole.

For the longline catcher processor fleet, the largest contributor for wholesale value has been Pacific cod. In 1995, the wholesale value for Pacific cod was $68 million, which was 89 percent of the total wholesale value. In 2001, the contribution from Pacific cod was 96 percent of the total wholesale value. Total wholesale value for the pot catcher processor fleet was nearly all from the Pacific cod fishery. In 1995, the wholesale value from Pacific cod was approximately $3 million and $5 million in 2001.

Pollock has historically been the largest contributor of total wholesale value for the BSAI shoreplants, floaters, and motherships. In 1995, the pollock fishery contributed 84 percent of the total wholesale value for the BSAI shoreplants, floaters, and motherships, while in 2001 the contribution from pollock was 92 percent. In 2001, the combined wholesale value of the pollock fishery was $504 million. Other fisheries which contributed consistently over the seven year period were Pacific cod, and sablefish.

Table 3. Wholesale Product Value in Major BSAI Fisheries by Processor Sectors, 1995-2001

Target Fishery & Sector	1995	1996	1997	1998	1999	2000	2001
	Wholesale Product Value by Fishery ($Millions)						
Surimi & Fillet Trawl Catcher Processors							
Pollock	435.4	348.6	343.2	312.2	334.5	395.2	407.1
All Fisheries	474.5	377.4	377.8	333.3	346.4	402.0	410.3
Head & Gut Trawl Catcher Processors							
Atka Mackerel	43.7	71.3	35.6	21.3	25.7	23.6	46.6
Pacific Cod	10.3	8.2	9.5	7.5	20.4	21.1	17.3
Other Flatfish	14.3	14.5	10.2	18.8	19.3	23.4	15.2
Rockfish	11.7	12.2	8.2	4.0	7.2	4.5	4.0
Rock Sole	29.1	27.7	25.7	15.4	16.5	21.3	17.2
Yellowfin Sole	36.9	34.1	55.0	35.8	25.4	31.8	31.7
All Fisheries	149.4	170.8	145.4	104.6	115.4	126.7	133.4
Pot Catcher Processors							
Pacific Cod	2.9	6.5	3.2	3.3	4.3	3.6	4.7
All Fisheries	2.9	6.5	3.2	3.3	4.3	3.6	4.7
Longline Catcher Processors							
Pacific Cod	67.8	71.3	72.8	89.5	108.1	116.8	112.0
Sablefish	3.5	2.8	2.4	0.6	2.0	2.4	2.2
All Fisheries	75.7	80.6	82.6	98.9	117.1	127.6	116.7
All Shore Plants, Floaters, and Motherships							
Pollock	360.1	304.6	294.6	257.1	329.0	418.8	503.7
Pacific Cod	51.0	60.9	54.7	39.3	56.0	74.2	39.3
Sablefish	4.4	3.0	4.1	1.9	2.2	3.5	4.8
All Fisheries	429.3	372.7	363.0	299.5	388.5	498.0	548.3
All Sectors and Fisheries							
All Fisheries	1,131.8	1,008.0	972.0	839.6	971.6	1,157.9	1,213.4

Source: NMFS Blend Data, synthesized by Northern Economics for use in the Programmatic SEIS for Groundfish.

2.2.4 Total Catch and Retention by Fishery

Table 4 summarizes total catches in major BSAI target fisheries by sector from 1995-2001. The table very clearly demonstrates that the head and gut trawl CPs are the most diversified of all the sectors. During the 7-year period shown, the largest single target fishery in each year account for an average of 37 percent of the sector total. Pollock, the dominant fishery of shore plants, floaters and motherships, the next most diversfied sector accounted for an average of 87 percent of the sector's total during the period shown.

Table 4. Total Catch in Major BSAI Target Fisheries by Processor Sectors, 1995-2001

Target Fishery And Sector	1995	1996	1997	1998	1999	2000	2001
	Total Catch by Fishery (Tons-1,000s)						
Surimi & Fillet Trawl Catcher Processors							
Pollock	748.0	659.0	612.3	607.1	416.0	491.5	611.8
All Fisheries	855.9	761.4	718.9	669.7	444.5	507.4	619.2
Head & Gut Trawl Catcher Processors							
Atka Mackerel	78.5	109.3	59.4	56.7	63.4	55.8	70.8
Pacific Cod	25.1	15.7	26.1	15.5	30.8	29.5	23.8
Other Flatfish	31.5	33.7	23.6	44.4	38.5	45.6	33.9
Rockfish	13.5	19.0	12.3	9.5	15.0	9.7	9.8
Rock Sole	51.4	42.3	57.3	23.8	27.7	45.9	29.0
Yellowfin Sole	95.8	102.3	172.4	115.9	89.5	104.9	95.4
All Fisheries	303.3	327.4	353.7	271.1	268.3	294.0	265.4
Pot Catcher Processors							
Pacific Cod	4.7	8.0	4.5	3.5	3.6	2.9	4.2
All Fisheries	4.7	8.0	4.5	3.5	3.6	2.9	4.3
Longline Catcher Processors							
Pacific Cod	116.9	110.1	145.6	120.2	105.3	117.5	131.6
Sablefish	1.7	1.3	1.1	0.3	1.4	1.5	0.9
All Fisheries	122.0	115.2	151.7	128.3	113.0	125.8	136.0
All Shore Plants, Floaters, and Motherships							
Pollock	536.0	528.0	482.2	495.3	538.8	615.3	750.2
Pacific Cod	77.7	98.6	94.3	50.5	56.4	65.6	36.4
Sablefish	3.5	1.6	1.7	1.0	0.8	1.4	1.4
All Fisheries	643.8	636.6	601.7	547.9	597.9	684.4	788.2
All Sectors and Fisheries							
All Fisheries	1,929.7	1,848.6	1,830.6	1,620.5	1,427.3	1,614.4	1,813.1

Source: NMFS Blend Data, synthesized by Northern Economics for use in the Programmatic SEIS for Groundfish.

Table 5 summarizes retention rates for catcher processors by sector and a combined BSAI shorebase plants/floaters/motherships as a proxy for catcher vessels in selected BSAI fisheries from 1995 to 2001. In general, the most obvious trend is the improvement of retention rates. For surimi and fillet catcher processors, retention rates for pollock (midwater) have remained relatively high, ranging from a low of 95 percent in 1995 to a high of 99 percent in 2001. In the bottom pollock fishery, retention rates fluctuated between a low of 85 percent in 1997 to a high of 97 percent in 1999. The yellowfin sole and Pacific cod fisheries reported retention rates below 70 percent in 1995, but have increased to around 99 percent in the last few years.

Among the head and gut catcher processor fleet, retention rates have also shown improvement (Figure 1). In the yellowfin sole fishery, retention rates improved from a low of 53 percent in 1995 to a high of 73 percent in 2001. Other fisheries like the rock sole, flathead sole, Pacific cod, and other flatfish fisheries had retention rates below 50 percent in 1995. With the exception of the other flatfish fishery, retention rates have climbed to above 65 percent by 2001. Retention rates for the atka mackerel and rockfish fisheries have also improved over the seven year period. The atka mackerel fishery drifted upward from a low of 76 percent to a high of 86 percent in 2000, while retention rates for the rockfish fishery increased from a low of 80 percent in 1996 to a high of 95 percent in 2000.

Retention rates for the longline catcher processors have not shown similar increases. Retention rates in the Pacific cod has remained fairly constant, fluctuating between 84 and 88 percent. However, the turbot and sablefish fisheries have fluctuated more widely. In the turbot fishery, the lowest retention rate reported was 1999 at 61 percent and the highest was 85 percent in 1997. The 2001 retention rate was 76 percent. In the sablefish fishery, the lowest rate was reported in 1999 at 39 percent and the highest rate was 73 percent in 1998. The retention rate for 2001 was 68 percent.

For the pot catcher processors, retention rates for Pacific cod have increased from a low of 84 percent in 1998 to a high of 96 percent in 2000.

Retention rates for BSAI shoreplants, floaters, and motherships have also increased over the 1995 to 2001 time period. Like the other fleets, retention rates for fisheries other than pollock were much lower in 1995 and 1996, but many of these fisheries improved over the years. The sablefish and other flatfish fisheries reported retention rates below 30 percent. Three other fisheries, Pacific cod, Greenland turbot, and rock sole had retention rates below 70 percent. In 2001, the retention rate for each of these fisheries was greater than 85 percent for all but sablefish which had a 72 percent retention rate. Retention rates for the pollock fisheries have remained high over the seven years. For the mid-water pollock fishery, rates ranged between 98 to 100 percent, while rates for the bottom pollock fishery ranged between 90 and 98 percent.

Table 5. Retention Percentages in Major BSAI Fisheries by Processor Sectors, 1995-2001

Target Fishery And Sector	1995	1996	1997	1998	1999	2000	2001
	Percent of Groundfish Retained by Fishery						
Surimi & Fillet Trawl Catcher Processors							
Pollock	93.5	95.4	94.8	98.4	98.9	98.2	99.2
All Non-pollock Fisheries	68.8	72.3	70.3	82.8	90.3	91.9	92.4
All Fisheries	90.4	92.3	91.2	96.9	98.3	98.0	99.1
Head & Gut Trawl Catcher Processors							
Atka Mackerel	76.0	78.4	84.3	85.1	82.6	86.2	83.7
Pacific Cod	47.7	44.8	44.5	57.1	57.5	63.8	69.7
Other Flatfish	47.8	43.4	49.7	55.9	54.4	63.1	67.2
Rockfish	81.8	80.3	87.9	91.1	91.6	94.6	87.2
Rock Sole	46.2	45.3	46.6	60.6	53.0	52.9	69.5
Yellowfin Sole	52.8	54.4	65.0	70.5	63.8	68.4	73.1
All Fisheries	58.8	61.6	63.6	70.4	66.8	69.2	75.1
Pot Catcher Processors							
Pacific Cod	96.5	95.9	98.5	97.1	96.0	95.9	93.7
All Fisheries	96.5	95.8	98.5	97.1	96.0	95.9	93.5
Longline Catcher Processors							
Pacific Cod	84.8	85.8	85.2	84.3	88.2	85.2	85.8
Sablefish	54.8	53.5	52.6	72.6	39.0	42.1	67.9
All Fisheries	84.1	85.4	84.9	84.3	86.0	83.9	85.4
All Shore Plants, Floaters, and Motherships							
Pollock	97.6	98.1	98.2	99.7	99.1	99.5	99.7
Pacific Cod	66.5	69.2	63.6	85.1	74.1	85.4	89.8
Sablefish	22.1	36.8	35.1	55.3	58.4	57.5	71.0
All Non-pollock Fisheries	68.5	70.6	69.2	83.8	74.3	85.1	89.1
All Fisheries	92.7	93.4	92.4	98.2	96.7	98.0	99.2
All Sectors and Fisheries							
All Fisheries	85.8	86.8	85.7	91.9	90.7	91.7	94.6

Source: NMFS Blend Data, synthesized by Northern Economics for use in the Programmatic SEIS for Groundfish.

2.2.5 Summary of Impacts of Alternatives on the Affected Human Environment

The following summary of impacts of alternatives on the affected human environment is drawn from information in Section 2 as well as from information in the Regulatory Impact Review in Section 3 and the Initial Regulatory and Flexibility Analysis in Section 4. Additional information can be found in *Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for*

Amendment 75 to the Fishery Management Plan for Groundfish in the Bering Sea and Aleutian Islands: Changes in IR/IU Flatfish Requirements (Northern Economics, March 2003).

Alternative 1 imposes IR/IU flatfish rules beginning in June 2004. With respect to economic and social effects, the analysis indicates that the sectors and target fisheries within sectors listed in Table 6 would be potentially affected.

Table 6. Harvesting and Processing Sectors & Target Fisheries in the Impacts Analsyis Status Quo

Harvesting and Processing Sectors	BSAI rock sole Target Fisheries in which IR/IU Flatfish are Caught	BSAI yellowfin sole Target Fisheries in which IR/IU Flatfish are Caught
Surimi and fillet trawl catcher processors	Pollock, Pacific cod, rock sole	yellowfin sole
Head and gut trawl catcher processors	other flatfish, Pacific cod, rock sole, yellowfin sole	other flatfish, rock sole, yellowfin sole
Bering Sea pollock shore plants & CVs	Pacific cod	none
Alaska Peninsula-Aleutian Islands shore plants & CVs	Pacific cod	none

The impact analysis for Amendment 75 found that IR/IU rules for flatfish under Alternative 1, direct operational costs on certain sectors of the groundfish fleet that probably cannot be offset (in whole or in part) by expected revenues generated by the sale of the additional catch required to be retained. These affects will begin to be felt when the delay of IR/IU is lifted, presumeably in June 2004. No quantitative estimate can be made of these costs at present. In general, the impacts on any operation will vary inversely with the size and configuration of the vessel, hold capacity, processing capability, markets, and market access, as well as the specific composition and share of the total catch of the IR/IU flatfish species.

The burden will tend to fall most heavily upon the smallest, least diversified operations, especially smaller head and gut trawl catcher processors. The ability of these vessels to adapt to the IR/IU rules will be further limited due to regulatory actions such as the vessel moratorium, license limitation program and Coast Guard load-line requirements that place severe limits on reconstruction to increase vessel size and/or processing capacity. According to industry representatives, smaller HT-CP vessels would be placed at a significant competitive disadvantage to larger vessels and would likely be forced to exit or decrease their participation in fisheries with high levels of IRIU flatfish discards because of the vessels' very limited product hold capacity (Northern Economics, Inc. 2002).

Environmental impacts of the alternatives, are expected to be insignificant based on the information and assessments contained in this section. In terms of potential cumulative impacts, the proposed action..... **would not result in any changes to the fisheries relative to the way they are currently prosecuted. In essence, the basic action would simply postpone implementation of pending regulations which likely would have resulted in changes in the way the fisheries are prosecuted. By definition, therefore, cumulative impacts of the proposed action are non-existent.**

3.0 Regulatory Impact Review

Section 3.0 provides information regarding the economic and socioeconomic impacts of the proposed action and alternatives, including identification of the individuals or groups that may be affected by the action, the nature of these impacts, quantification of the economic impacts, if possible, and discussion of the trade-offs between qualitative and quantitative benefits and costs.

A Regulatory Impact Review (RIR) provides the analysis required under E.O. 12866. The following statement from the Executive Order summarizes these requirements:

> *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 nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that 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.*

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:

1 Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

2 Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

3 Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

4 Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

The primary source of information for this assessment of the effects of the alternatives on the human environment is the document, *Assessment of Changes in IR/IU Flatfish Requirements*, prepared for the NPFMC by Northern Economics, Inc. (2002).

3.1 Purpose and Need for Action

One of the goals of the NPFMC is to reduce discards in the groundfish fisheries they manage. Similarly National Standard 9 in the Magnuson-Stevens Fishery Conservation and Management Act (MSCFMA) requires that federally managed fisheries minimize bycatch (discards) to the extent practicable. The primary purpose of this action is to minimize bycatch and discards in the BSAI groundfish fisheries by establishing minimum groundfish retention standards.

In June 2002, the Council determined that IR/IU regulations requiring 100 percent retention of rock sole and yellowfin sole in the BSAI, that were scheduled to be implemented in January 2003, were likely to cause operations participating in those fisheries to suffer significant adverse economic impacts. Therefore in October 2002, the Council voted to delay implementation of IR/IU for rock sole and yellowfin sole in the BSAI until June 1, 2004 or until the IR/IU regulations are superceded by other regulations that minimize discards but allow the continued prosecution of the flatfish fisheries in the BSAI.

3.2 Description of the Fishery

The groundfish fisheries of the Bering Sea were summarized briefly in Section 2.2. Additional summary information is available in *Sector and Regional Profiles of the North Pacific Groundfish Fisheries–2001* (Northern Economics, 2001), and in *Alaska Groundfish Fisheries Draft Supplemental Environmental Impact Statement* NOAA Fisheries, January 2001. Groundfish retention and discards are the particular issue of concern for the current document, and therefore the summary of the fisheries shown below will examine trends in discards and retention over the last several years by processing sector. The processing sectors defined for this analsys are shown in Table 7.

Table 7. Defined Processor Sectors and Acronyms

ACRONYM	PROCESSOR CLASSES (all mutually exclusive)
ST&FT-CP	surimi trawl and fillet trawl catcher processors combined
HT-CP	head and gut trawl catcher processor
L-CP	longline catcher processor
P-CP	pot catcher processor
SP-FLT-MS	All shore plants, inshore floating processors and motherships

In general discards in the BSAI groundfish fishery have declined significantly–down 64 percent since since 1995. As shown in Figure 1 total discards of groundfish fell from 274,000 mt to 98,000 mt in 2001. Indications are that further reductions in discards were attained in 2002 and that the trend continue in 2003. By far the largest contributor of discards by volume is the HT-CP sector. Since 1995 this sector has accounted for an 55 percent of all groundfish discards in the BSAI while contributing for only 13 percent of the total revenue over the same period (See Table 3). In spite of the significant reduction in discard accomplished by the HT-CP sector–47 percent since 1995–the sector's proportion of discards has increased relative to the rest of the industry. In 1995 the HT-CP sector accounted for 46 percent of the total BSAI discards and in 2001 they acounted for 67 percent. Prior to 1998 when IR/IU was implemented for pollock and Pacific cod in the BSAI, discards of ST&FT-CP and SP-FLT-MS were relatively high tothether accounting for over 100,000 mt of discards each year from 1995-1997. With implementation of IR/IU discards by these sectors (and of the HT-CP sector as well) fell dramatically. Currently discards of ST&FT-CP and SP-FLT-MS combined are less than 12,000 mt. Compared to trawl gear sectors (including SP-FLT-MS), the two fixed gear CP sectors have not realized significant reductions in discards over the 7-year period shown. Discards by L-CPs have be relatively stable around 19,000 mt while P-CP discards have averaged 200mt.

Figure 1. Discards of Groundfish in the BSAI, 1995-2001

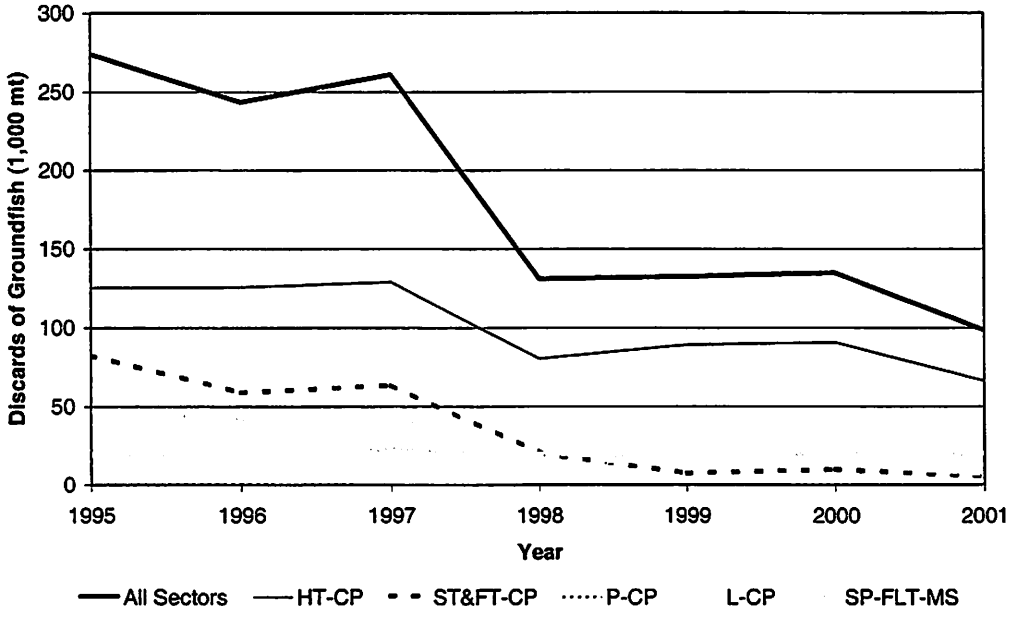
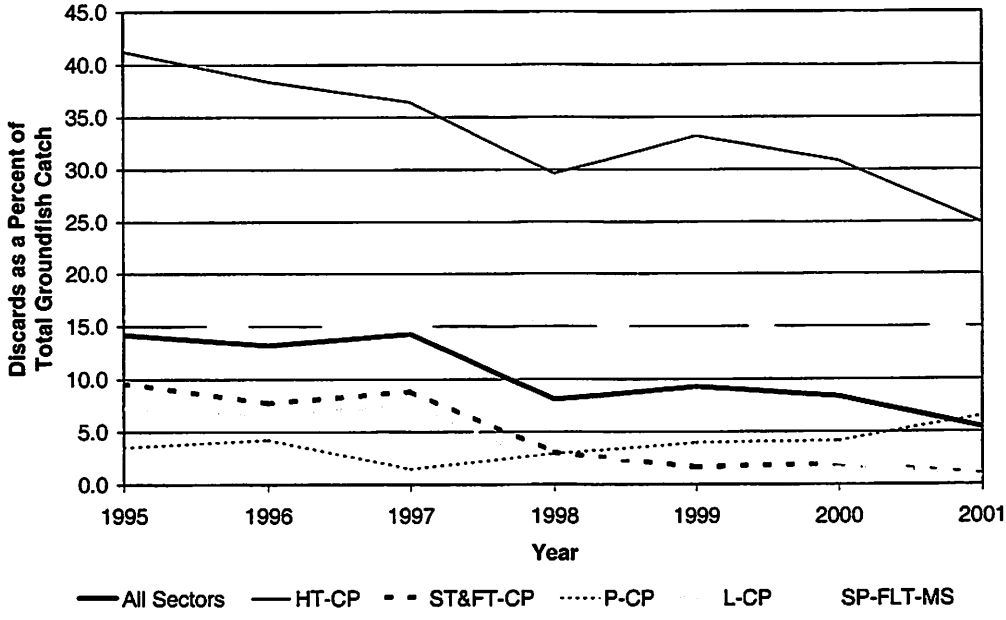


Figure 2 shows discards as a percentage of groundfish catch in by sector for 1995-2001. The relative stability of discards by L-CPs is also present in this figure. The figure also show an upward trend in discard percentages by P-CPs. All other processing sectors show a declining amount of discards relative to total catch. In 2001, approximately 10 percent of groundfish harvested in the BSAI was discarded.

Figure 2. Discards as a Percentage of Groundfish Catch in the BSAI, 1995-2001



3.2.1 Additional Details Regarding the HT-CP Sector

As seen in section 2.2.3, and in Table 8, the HT-CP sector is the most diverse of the processing sectors in the BSAI and the only sector that processes a significant amount of flatfish. As described in great detailed in the *EA/RIR/IRFA for Amendment 75* (Northern Economics, March 2003), the flatfish market has is characterized as having significant constraints. The rock sole market, for example, prefers females with roe over smaller males. Similarly larger yellowfin sole, flathead sole and Alaska place are preferred over small fish of the same species. In the "race for fish" regime under which the HT-CPs operate, there are few incentives to keep small fish, because they fill the limited frozen hold space with product that is largely unsaleable. If a vessel tries to minimize discards by reducing throughput and keeping and processing less valuable fish, its share of total catch will be reduced because others in the fleet are unlikely to reduce throughput. In addition, unlike other larger catcher processors, and shore-plants the HT-CP vessels are quite small and are generally not legally allowed to process "ready-to-eat" products or fish-meal. Because of their size constraints they have many fewer options for processing lower value products, and thus typically much more likely to discard less valuable fish.

Table 8. Wholesale Product Value in Major BSAI Fisheries by the HT-CP Sector, 1995-2001

	1995	1996	1997	1998	1999	2000	2001
Target Fishery	**Wholesale Product Value by Fishery ($Millions)**						
Atka Mackerel	43.7	71.3	35.6	21.3	25.7	23.6	46.6
Pacific Cod	10.3	8.2	9.5	7.5	20.4	21.1	17.3
Other Flatfish	14.3	14.5	10.2	18.8	19.3	23.4	15.2
Rockfish	11.7	12.2	8.2	4.0	7.2	4.5	4.0
Rock Sole	29.1	27.7	25.7	15.4	16.5	21.3	17.2
Yellowfin Sole	36.9	34.1	55.0	35.8	25.4	31.8	31.7
All Fisheries	149.4	170.8	145.4	104.6	115.4	126.7	133.4

Source: NMFS Blend Data, synthesized by Northern Economics for use in the Programmatic SEIS for Groundfish.

Tables 9 and 10 focus on discards in the HT-CP sector. Both tables show discards as a percent of groundfish, but Table 9 show discards of all species while Table 10 shows only discards that would have been affected under the delayed IR/IU regulations (rock sole and yellowfin sole). The comparison of the two tables shows that while the IR/IU regulations would have required a reduction of discards, discards of rock sole and yellowfin sole have been a relatively small proportion of overall discards by the sector.

Table 9. Percent of Groundfish Discarded by the HT-CP Sector by Target Fishery

	1995	1996	1997	1998	1999	2000	2001
Target Fishery	Percent of Groundfish Discarded by Fishery						
Atka Mackerel	24.0	21.6	15.7	14.9	17.4	13.8	16.3
Pacific Cod	52.3	55.2	55.5	42.9	42.5	36.2	30.3
Other Flatfish	52.2	56.6	50.3	44.1	45.6	36.9	32.8
Rockfish	18.2	19.7	12.1	8.9	8.4	5.4	12.8
Rock Sole	53.8	54.7	53.4	39.4	47.0	47.1	30.5
Yellowfin Sole	47.2	45.6	35.0	29.5	36.2	31.6	26.9
All Fisheries	41.2	38.4	36.4	29.6	33.2	30.8	24.9

Source: NMFS Blend Data, synthesized by Northern Economics for use in the Programmatic SEIS for Groundfish.

Table 10. IR/IU Flatfish Discards as a Percent of Groundfish by Targets Fisheries, 1995-2001

	1995	1996	1997	1998	1999	2000	2001
Target Fishery	IRIU Flatfish Discards as Percent of Total Groundfish in BSAI-wide Fisheries						
Flathead Sole	10.6	13.8	10.6	14.9	11.6	7.4	3.6
Other Flatfish	19.8	14.0	7.8	13.0	4.4	4.8	0.3
Non-AFA Trawl CP Pacific Cod	11.8	9.5	13.2	9.7	12.4	15.9	9.7
Rock Sole	26.4	20.6	25.2	25.6	30.0	32.3	13.7
Yellowfin Sole	15.0	16.1	15.2	14.7	15.4	11.5	7.5

Source: NMFS Blend Data, synthesized by Northern Economics for use in the Programmatic SEIS for Groundfish.
Note: Data include minimal amounts of catch and discards by sectors other than HT-CPs

The HT-CP fleet consists of a relatively wide variety of vessels that ranges from 103 feet to 295 feet in length. In recent years the 23-24 vessels from the fleet have fished in the BSAI with approximately 33 percent less than 125 feet and 67 percent greater than 125'. As would be expected the smaller vessels are relativley less productive than the larger vessels. From 1995-2001 the smaller vessels have generated approximately 12 percent of both catch and product value. By contrast the smaller vessels have accounted for roughly 18 percent of the total discards for the sector from 1995-2001. Vessels less than 125' have discarded 48 percent of their catch of the seven year period, while vessels > 125' have discarded 38 percent. Industry sources indicate that the smaller vessels are not able to keep as many fish as larger vessels because of limitations in hold size and processing space.

Table 11.Distribution of Activity between HT-CPs <125' and HT-CPs> 125'

Length Class	1995	1996	1997	1998	1999	2000	2001
				Number of Vessels			
< 125'	9	8	11	8	9	8	4
> 125'	23	20	17	15	15	15	15
				Product Value ($ Millions)			
< 125'	8.1	17.2	18.3	16.4	18.8	23.4	11.4
> 125'	141.3	153.6	127.1	88.2	96.6	103.3	122.0
				Product Value as a Percent of HT-CP Value			
< 125'	5.5	10.1	12.6	15.7	16.3	18.5	8.5
> 125'	94.5	89.9	87.4	84.3	83.7	81.5	91.5
				Total Catch (1,000 mt)			
< 125'	20.5	40.0	55.6	41.8	38.3	45.7	20.9
> 125'	282.8	287.4	298.1	229.3	230.0	248.3	244.5
				Percent of HT-CP Total Catch			
< 125'	6.7	12.2	15.7	15.4	14.3	15.6	7.9
> 125'	93.3	87.8	84.3	84.6	85.7	84.4	92.1
				Discards as a Percent of Total Catch of Length Class			
< 125'	58.7	57.5	53.5	46.3	40.6	38.5	41.1
> 125'	40.0	35.7	33.2	26.6	32.0	29.4	27.9
				Discards as a Percent of HT-CP Total Discards			
< 125'	9.6	18.3	23.1	24.1	17.4	19.4	13.8
> 125'	90.4	81.7	76.9	75.9	82.6	80.6	86.2

3.2.2 Description of Alternatives

The following alternatives are under consideration for initial review.

Alternative 1: (Status Quo/No Action) Allow the existing IR/IU regulations for flatfish in the BSAI to be implemented beginning June 1, 2004. The improved retention regulations would require that all rock sole and yellowfin sole in the BSAI be retained and that processors create products that yield at least 15 percent from each fish harvested.

Alternative 2: Add a minimum Groundfish Retention Standard (GRS) for all groundfish fisheries (excluding the pollock target fisheries) to the Goals and Objectives section of the BSAI Groundfish FMP. The GRS would apply in principle to all vessels harvesting groundfish in the BSAI. The GRS would be set at a point within the range of 65 percent to 90 percent of the total amount of groundfish caught. The specific GRS percentage will be determined by the Council in it final decision. The GRS would not supercede the 100 percent retention standards already set for pollock and Pacific cod under existing IR/IU regulations. In addition to meeting the GRS, all groundfish retained would have to be processed into primary products that comprise 15 percent or more of the round weight of each fish retained.

In additional to changes in the FMP Goals and Objectives, regulations would be promulgated and enforced on certain vessels and sectors in the fleet based on the guidance from NMFS that certified scales and 100 percent observer coverage will be required to enforce GRS regulations. The following decision points will determine the scope of the content of the GRS regulations.

Decision Point 1 At what percentage of total groundfish caught should the GRS be set?

1.1 65 percent of all groundfish caught must be retained

1.2 70 percent of all groundfish caught must be retained

1.3 75 percent of all groundfish caught must be retained

1.4 80 percent of all groundfish caught must be retained

1.5 85 percent of all groundfish caught must be retained

1.6 90 percent of all groundfish caught must be retained

The GRS would be written into the Goals and Objectives section of the FMP and all vessels would be expected to retain groundfish a at a level that meets or exceeds the GRS. The GRS would not necessarily be enforced by regulation on all vessels–regulations would be promulgated and imposed only on those vessels in Decision Point 2.

Decision Point 2 To which sectors should the GRS enforceable regulations apply.

2.1 All Catcher Processors

2.2 All Catcher Processors > 125'

2.3 All Trawl Catcher Processors including AFA trawl catcher processors participating in non-pollock target fisheries

2.4 All Trawl Catcher Processors > 125' including AFA trawl catcher processors participating in non-pollock target fisheries

2.5 Non-AFA Trawl Catcher Processors > 125'

2.6 Non-AFA Trawl Catcher Processors (Head and Gut Trawl Catcher Processors) with exemptions and production limits for vessels < 125'.

What are maximum production levels for exempt (< 125') non-AFA trawl CPs?

2.6.1 Total catch in any week shall not exceed 600 mt.

2.6.2 Total catch in any week shall not exceed 700 mt.

2.6.3 Total catch for the year shall not exceed 13,000 mt

2.6.4 Total catch for the year shall not exceed 17,000 mt

The decision to include a specific sector under regulation implies that certified scales and 100 percent observer coverage will be required.

Decision Point 3 At what level of the fleet would the GRS be enforced?

3.1 Enforcement of standard across vessel pools.

3.2 Enforcement of standard by individual vessels.

Decision Point 4 Will there be a single GRS or multiple GRS for different seasons?

4.1 Establish a single standard for all fishing activity.

4.2 Establish different standards for the "A" Season and the "B" Season.

Decision Point 5 Over what period will attainment of the GRS for the vessel be calculated?

5.1 At the end of each week for each area and gear fished

5.2 At the end of each week over all areas and gears fished

5.3 At the end of fishing trip as defined by the offloading of fish

5.4 At the end of each month

5.5 At the end of each quarter

5.6 At the end of each fishing season

5.7 At the end of each year

Decision Point 6 Should the maximum retainable bycatch percentage (MRB) for pollock and Pacific cod be adjusted?

6.1 No, MRBs will remain at 20 percent

6.2 Yes, increase MRBs to reduce uncecessary discards of while discouraging topping off.

6.2.1 Increase to 25 percent

6.2.2 Increase to 30 percent

6.2.3 Increase to 35 percent

3.3 Economic and Social Effects of the Alternatives

NMFS guidance for preparation of RIRs provides that, *"At a minimum, the RIR... should include a good qualitative discussion of the economic effects of the selected alternatives. Quantification of the effects is desirable, but the analyst needs to weigh such quantification against the significance of the issue and available studies and resources"* (NMFS 2000).

Research results and data on many key topics pertaining to the proposed action are limited. Almost no empirical data are available, for example, concerning the cost and operating structure of the sectors of the groundfish fishing industry that would be affected; the potential market for flatfish currently discarded; the fleet behavioral response to alternative fishing opportunities; or the determinants of demand for flatfish products. Indeed, because the status quo alternative may require the industry to retain fish with which they have little historical experience in processing and marketing, it is probable that even the industry itself cannot fully anticipate the cost, revenue and operational impacts they may incur as they adjust to the IR/IU requirements for the last half of 2004 and beyond. By necessity, therefore, much of this analysis is qualitative, although impacts have been quantified and monetized where possible.

There are two principal parts to the analysis presented here. The analysis presents potential costs and benefits attributable to or deriving from the alternative measures under consideration by the NPFMC. This part of the analysis is conducted from the point of view of all U.S. citizens (i.e., what is likely to be the "net benefit to the Nation"?). The costs and the benefits of the alternatives are, however, not homogeneously distributed across that population. Many of the costs, in particular, are highly concentrated in certain sectors of the groundfish fishing industry that operate in the Bering Sea and Aleutian Islands. Therefore, the analysis also reviews and evaluates, to the extent practicable, distributional issues and implications of the alternatives.

3.3.1 Alternative 1: Status Quo–Implement IR/IU Flatfish Regulations in June 2004

Alternative 1 maintains the status quo, in which IR/IU regulations for flatfish will be implemented in the BSAI beginning June 1, 2004. The regulations were originally scheduled to be in place in January 2003, but implementation was delayed by Council action in October 2002 (Amendment 75). In delaying the action the Council cited findings that implementation of IR/IU in flatfish could lead to significant negative consequences for the head and gut trawl catcher processor sector, and could also pose hardships for other sectors without generating commensurate benefits to the Nation. The assessment of the status quo that follows is adapted from the assessment of Amendment 75.

3.3.1.1 Head and Gut Trawl Catcher Processors

Alternative 1 (status quo) has the potential to cause significant negative economic impacts on all of the vessels in the head and gut trawl catcher processor (HT-CP) sector. These vessels primarily produce headed and gutted products from flatfish, Atka mackerel and rockfish caught in the BSAI and GOA fisheries. In 2000, there were 24 vessels in this sector. As shown in Table 12, the flatfish discard rates of HT-CPs are significant in five fisheries that target flatfish (BSAI RSOL, YSOL and OFLT fisheries and GOA SFLT fishery) and three fisheries in which flatfish are caught incidentally (BSAI PCOD and PLCK fisheries and GOA PCOD fishery). In 2000, these fisheries accounted for about 67 percent of the gross revenues of this sector. The fisheries listed that occur in the BSAI are especially important, accounting for around 65 percent of the gross revenues. Participants in this sector report that the flatfish discarded have little or no market value because they are either too small, of low quality, or, in the case of RSOL, are males without roe.

The status quo would have a negative effect on the HT-CP sector by decreasing gross revenues and/or increasing operating costs. The magnitude of the negative effect on gross revenues depends on 1) how

much the additional flatfish retained would decrease the vessel hold space available for more valuable product and 2) whether there will be any revenue earned from product derived from the additional flatfish retained. If vessel catch is constrained by hold space during a trip, the amount of product from higher-valued species that would potentially be displaced by retained flatfish under the status quo is substantial in a number of fisheries. In the BSAI rock sole fishery, for example, it is estimated that the amount of flatfish discarded in 2000 represented 125 percent of the product weight of flatfish retained for that year (see Table 12).

The amount of more valuable fish displaced depends on how the additional flatfish retained are processed. Under the status quo processors will be required to create products that yield at least 15 percent from each fish harvested. Processing the additional flatfish retained at this minimum level would reduce the amount of higher-valued fish displaced, but would increase operating costs and be more time consuming. If there is 100 percent utilization of the additional flatfish (e.g., the fish are processed as round frozen product) operating costs associated with handling (e.g., sorting) and processing would be reduced. However, the displacement of more valuable fish would increase. If vessel hold space is limited, the "discard % of product weight" (DPP) figures in Table 58 represent the amount of displacement that would occur. These figures can be interpreted as the percentage of revenue tonnage displaced. The table shows that the DPP for HT-CP vessels is highest in the rock sole target fishery, where it is more than 120 percent

Retention of flatfish in a fishery that is targeting non-flatfish, such as the PCOD fishery, presents added problems, as it requires a conversion of processing lines and can reduce the quality of target species harvested. When targeting Pacific cod, the processing line on catcher processors is configured for processing round fish. Switching to processing flatfish requires a time-consuming line conversion. The time lost represents an opportunity cost, as it would otherwise be spent catching and processing higher-value fish. If the amount of flatfish retained is relatively small a catcher processor may prefer to hold the flatfish until enough has been caught to justify a processing run.

Operators in the HT-CP fleet report that they are attempting to find markets for all flatfish harvested. They indicate some success in finding new markets for BSAI yellowfin sole and GOA shallow-water flatfish. However, the market for BSAI rock sole is still limited primarily to females with roe. Processing the additional flatfish into fish meal is not possible for most HT-CP vessels, as they are not equipped with fish meal processing capability, and loadline requirements, class restrictions and space constraints make the addition of onboard meal plants infeasible. An alternative that has been suggested is donation of IR/IU flatfish to a food bank or charity food distribution entity. However, food banks generally want an IQF fillet or similar product. Most of the IR/IU flatfish discarded are too small to be processed into this product form.

To the extent that the "race for fish" allows it, HT-CP vessels may offset to some extent the lost revenues or additional costs experienced under the status quo by taking additional fishing trips. However, the number of profitable trips vessels can make may be limited by seasonal decreases in fish quality and/or roe content that lower ex-vessel prices.

Smaller HT-CP vessels may be disproportionately affected by the status quo, as they are more likely constrained by hold space during a fishing trip, their processing capacity is more limited, and their slower speed restricts their ability to increase revenue by taking additional trips.

The effects of IR/IU rules are also a function of the annual round of fisheries in which vessel operate. For instance, a vessel that is more dependent on the rock sole fishery will suffer greater negative economic impacts than one that relies primarily on Atka mackerel or rockfish fisheries. To some extent, the vessels most affected may be able to offset income losses by switching to other fisheries. However, this shift in fishing effort could indirectly create economic hardship in the form of reduced profitability for the fishermen already engaged in these other fisheries. Catch per unit effort and individual harvest for existing fishermen could decline substantially due to crowding and intensified fishing pressure on

stocks. The burden of IR/IU rules could result in an overall decrease in the number of active HT-CP vessels through bankruptcy or other forms of economic dislocation.

Table 12. Summary of Impacts of Full Retention Requirement on the HT-CP Sector, 2000

	BSAI				
	OFLT	PLCK	PCOD	RSOL	YSOL
No. of Participants	24	9	22	23	23
% of Sector Total Gross Revenues	15.42	0.70	13.92	14.06	21.00
IR/IU Flatfish Discard % of IR/IU Flatfish Catch	34.56	50.00	63.07	48.51	19.24
IR/IU Flatfish Discard % of Product Weight	19.63	0.87	49.52	125.06	35.99

Source: NPFMC Sector Profiles Database, 2001

3.3.1.2 Processing Sectors Other than the HT-CP Sector

Alternative 1 (status quo) could also have a negative economic effect on a portion of the surimi and fillet trawl catcher processor (ST&FT-CP) fleet and some Bering Sea pollock (BSP-SP), Alaska Peninsula and Aleutian Islands (APAI-SP).[2]

Surimi trawl catcher processors have the necessary processing equipment to produce surimi from groundfish, while fillet trawl catcher processors have the processing equipment to produce fillets from groundfish. The fishing effort of both of these vessel classes is concentrated in the BSAI pollock fishery. However, some ST&FT-CP vessels fish Pacific cod or yellowfin sole after pollock seasons.

Participation by surimi and fillet trawler catcher processors in fisheries in which flatfish are targeted (BSAI YSOL fishery) or caught incidentally (BSAI PCOD fishery) is lower in comparison to the HT-CP sector. In 2000, only four of the 15 active surimi and fillet trawler catcher processors participated in the BSAI PCOD and YSOL fisheries (Table 13). The gross revenues earned by the ST&FT-CP fleet in these fisheries was less than two percent of the sector's total earnings. The discard rate for rock sole in the BSAI Pacific cod fishery is high, but these discards represent less than 15 percent of product weight.

Table 13. Summary of Impacts of Full Retention Requirement on Processing Sectors other than the HT-CP Sector, 2000

	BSAI			
	ST&FT-CP PCOD	BSP-SP PCOD	APAI-SP PCOD	ST&FT-CP YSOL
No. of Participants	4	5	8	4
% of Sector Total Gross Revenues	0.94	12.36	18.40	0.61
IR/IU Flatfish Discard % of IR/IU Flatfish Catch	86.95	99.71	87.88	0.98
IR/IU Flatfish Discard % of Product Weight	14.70	8.63	4.76	4.14

Source: NPFMC Sector Profiles Database, 2001

As with HT-CP vessels, the ST&FT-CP vessels affected will experience displacement of higher-value species under the status quo if they normally fill their holds to capacity. This displacement will lower per trip revenue. The amount of gross revenues foregone could be decreased by reducing the utilization rate to the 15 percent minimum required under the status quo, but the additional processing required would increase operating costs. Most ST&FT-CP vessels have fish meal plants on board. However, the four ST&FT-CP vessels that participated in the BSAI PCOD and YSOL fisheries in 2000 are not equipped with fish meal processing capability, and vessel size makes the addition of onboard meal plants impractical.

[2]The negative consequenses of IR/IU flatfish requirements on other sectors may be eliminated if the NPFMC chooses to approve an exemption from the regulations for fisheries with discards less than 5 percent of total catch (Amendment 76 to the BSAI FMP). A final decision on this exemption is scheduled at the April 2003 Council meeting. If the Council approves the exemption then much of this sub-section will be revised.

Shore-based processing plants that will be required to retain additional flatfish landed by catcher vessels will also experience some cost impacts. Bering Sea pollock shore plants and Alaska Peninsula and Aleutian Islands shore plants do not operate in the flatfish target fisheries, but they are significant participants in the PCOD trawl fisheries, which generate considerable amounts of flatfish discards. Bering Sea pollock shore plants and Alaska Peninsula and Aleutian Islands shore plants respectively earned more than 12 and 18 percent of their total wholesale value from the PCOD fishery (Table 13).

Shore-based processing plants that will be required to accept additional flatfish from catcher vessels will also experience several cost impacts. These will likely include the cost of labor to offload IR/IU flatfish from vessels, storage costs and meal processing costs. If current meal processing capacity is being fully utilized, shore plants would have to expand their facilities, thereby incurring increased capital costs. Other costs that could affect shore plants are increased costs associated with applying for additional discharge capacity under the NPDES program. In addition, the value of soft-fleshed Pacific cod may be reduced because of damage that can occur when transported in the same hold as rough-scaled flatfish. The ability of shore plants to recover these costs will depend on how much revenue they can earn from processing and selling the additional flatfish. Industry representatives report that shore-based meal operations currently tend to just break-even. If the plants cannot market the additional flatfish as fish meal or other products they may face delivery costs for shipment to a disposal site. Alternatively, floating meal barges may accept the additional flatfish landed. The operators of these barges have expressed interest in processing the additional flatfish into fish meal, although the economic viability of such an arrangement has not been rigorously tested in the BSAI fishery arena.

3.3.2 Alternative 2: Set Groundfish Retention Standards

Under this alternative a Groundfish Retention Standard (GRS) for all groundfish fisheries (excluding the pollock target fisheries) would be added to the Goals and Objectives section of the BSAI Groundfish FMP. The GRS would apply in principle to all vessels harvesting groundfish in the BSAI. The GRS would be set at a point within the range of 65 percent to 90 percent of the total amount of groundfish caught. The specific GRS percentage will be determined by the Council in it final decision. The GRS would not supercede the 100 percent retention standards already set for pollock and Pacific cod under existing IR/IU regulations. In addition to meeting the GRS, all groundfish retained would have to be processed into primary products that comprise 15 percent or more of the round weight of each fish retained.

Groundfish Retention Standards (GRS) were proposed as an alternative to more complex bycatch standards that had been analyzed under previous iterations of IR/IU for flatfish. Under this alternative, all vessels would be expected to retain a certain percent of their total catch regardless of the species composition of the catch. For example, if the GRS was set at 65 percent, then for each 100 mt of groundfish harvested, the vessel must produce a quantity of products equal to 65 mt in round-weight equivalents. The vessel would be free to choose which suite of species and products to retain in order to meet the minimum retention standard.

The minimum groundfish retention standard, which would be monitored by comparing total catch to total production, would create the following incentives in the groundfish fisheries off Alaska, all of which are consistent with the Council's objectives for the IR/IU program:

- Increased selectivity in fishing practices. Vessel operators would have a powerful incentive to avoid catching unwanted groundfish species because they would be held accountable for retaining a percentage of their total catch.
- Increased utilization of target and non-target species. A general retention standard would encourage vessel operators to find uses for all groundfish species that are currently discarded. In contrast to the existing 100 percent retention requirement for rock sole and yellowfin sole, which creates no incentive to retain and utilize any other groundfish species, a general retention

standard would provide an incentive for vessel operators to retain all of the groundfish species that are practicable for them to retain.

- Increased productivity and recovery rates. If the minimum retention standard is enforced using NMFS standard product recovery rates (PRRs), then vessel operators would have an incentive to refine production techniques in an attempt to achieve higher recovery rates than the published standard. Vessels that achieve higher actual PRRs would have higher apparent retention rates than vessels with lower actual PRRs.
- Increased incentive to avoid prohibited species. If the minimum retention standard is based on a comparison of total catch to retained products then vessel operators would have increased incentive to avoid prohibited species catch (PSC). This is because the total weight of PSC in the catch would be counted as part of the total catch weight and a vessel with a high percentage of PSC in the catch would need to retain a higher percentage of groundfish to meet the standard than a vessel that catches little or no PSC.

The remainder of this section will examine the issues embedded in the decision points for the options regarding the GRS. The issues and contents of each section are summarized in the following sections.

3.3.2.1 Decision Point 1: At what percentage of total groundfish caught should the GRS be set?

1.1 65 percent of all groundfish caught must be retained

1.2 70 percent of all groundfish caught must be retained

1.3 75 percent of all groundfish caught must be retained

1.4 80 percent of all groundfish caught must be retained

1.5 85 percent of all groundfish caught must be retained

1.6 90 percent of all groundfish caught must be retained

3.3.2.1.1 Effectiveness of Various Rates in Increasing Retention

The effectiveness of the various rates will depend on the distribution of retention rates among the various vessels–the more vessels that have historically retained less than the standard, the greater the improvement. Table 14 provides insights into the distribution of retention among the various catcher processor sectors in different fisheries and the additional tons that would need to be retained in order to meet the standard based on catches in 2001. If for example the GRS is set at 70 percent then 11 HT-CPs would need to improve their retention to comply with the standard, but none of the CPs in other sectors would be affected. At 70 percent approximately 6,500 mt more groundfish would have been retained and overall, the HT-CP retention rate would have improved from 75.1 pecent (see Table 5) to 77.6 percent.

If the GRS is set at 80 percent then vessels in sectors other than the HT-CP sector would be affected. The actual effectiveness of increasing retention will depend on whether regulation will be imposed on all CPs or just HT-CPs. If the GRS regulations are imposed on all CPs then based on 2001 results, 14 HT-CPs, 2 P-CPs and 8 L-CPs would be required to improve their groundfish retention rates, and an additional 17,000 mt would be retained, 16,400 by HT-CPs, less than 50 mt by P-CPs and 600 mt by L-CPs. Overall an 80 pecent GRS would have increased the HT-CPs retention rate in 2001 from 75.1 percent to 81.3 percent.

Table 14. Catcher Processors Below Specified Standards in 2001 and Additional Tons that Would Have to be Retained to Meet the Standard

Standard	65 Percent	70 Percent	75 Percent	80 Percent	85 Percent	90 Percent
Sector	Number of Vessels Below Retention Standard					
ST/FT-CP	0	0	0	0	0	0
HT-CP	9	11	11	14	19	22
P-CP	0	0	0	2	2	2
L-CP	0	0	1	8	22	36
All CPs	9	11	12	24	43	60
	Additional Tons (1,000s) That Would Need to be Retained to Meet Standard					
ST/FT-CP	0.0	0.0	0.0	0.0	0.0	0.0
HT-CP	2.9	6.5	10.7	16.4	26.8	39.5
P-CP	0.0	0.0	0.0	0.0	0.0	0.1
L-CP	0.0	0.0	0.0	0.6	2.5	7.1
All CPs	2.9	6.5	10.7	17.0	29.4	46.8

Source: NPFMC Sector Profiles Database, 2001

Within the HT-CP fleet there is considerable variation between larger and smaller vessels. (see Table 11), and it has been proposed that the GRS regulation exempt vessels < 125'. Table 15 shows how the various retention standards would affect vessels by size class. As is demonstrated in the table, all of the HT-CPs < 125' retained less than 65 percent of their groundfish catch in 2001, while only 3 of the 15 vessels > 125 retained less than 65 percent. If vessels < 125' are exempt then the effectiveness of the GRS is diminished, but the ability of small HT-CPs to remain economically viable will continue.

Table 15. HT-CPs by Length Below Specified Standards in 2001 and Additional Tons that Would Have to be Retained to Meet the Standard

Standard	65 Percent	70 Percent	75 Percent	80 Percent	85 Percent	90 Percent	95 Percent
HT-CP by Length	Number of Vessels Below Retention Standard						
< 125'	6	6	6	6	6	7	7
> 125'	3	5	5	8	13	15	15
	Additional Tons (1,000s) That Would Need to be Retained to Meet Standard						
< 125	2.1	3.4	4.7	6.0	7.3	8.9	10.6
> 125'	0.9	3.1	6.0	10.5	19.5	30.6	42.2

Source: NPFMC Sector Profiles Database, 2001

3.3.2.1.2 Comparison of Discard Savings between Alternatives

Under the status quo (Alternative 1), 100 of rock sole and yellowfin sole would have to be retained beginning in June 2004, but all other groundfish species with the exception of pollock and Pacific cod could be discarded. It is instructive to note the overall retention rates that would be implied under the status quo and compare those to rates proposed under Alternative 2. Table 16 shows the hypothetical situation assuming all rock sole and yellowfin sole (IR/IU Flatfish) were retained by all sectors from 1995-2001. As seen in the table, the HT-CP sector had 41.5 mt of IR/IU Flatfish discards in 1995. Those discards accounted for 13.7 percent of the sectors total catch. If the HT-CP had retained all of the IR/IU Flatfish, the sector's overall retention rate would have increased to 72.4 percent. This table then provides an additional perspective regarding the GRS. For example setting the GRS at 80 percent would be nearly equivalent to requiring 100 percent retention of IR/IU Flatfish. Additionally it can be inferred that the economic impacts of an 80 percent GRS would be approximately equilvalent to imposing 100

percent retention of IR/IU flatfish. Setting the GRS at less than 80 percent would provide some relief for the HT-CPs relative to IR/IU regulations slated to be imposed in June, 2004.

Table 16. Relationship to 100 Percent Retention of IR/IU Flatfish to the GRS

Target Fishery And Sector	1995	1996	1997	1998	1999	2000	2001
Surimi & Fillet Trawl Catcher Processors							
RSOL &YSOL Discards (1,000 mt)	12.1	13.9	16.4	6.0	1.8	2.6	0.7
Percent of Total Groundfish	1.4	1.8	2.3	0.9	0.4	0.5	0.1
Retention Percent if Retained	91.8	94.1	93.4	97.8	98.7	98.5	99.2
Head & Gut Trawl Catcher Processors							
RSOL &YSOL Discards (1,000 mt)	41.5	34.1	47.6	32.9	31.3	36.3	15.0
Percent of Total Groundfish	13.7	10.4	13.5	12.1	11.7	12.3	5.6
Retention Percent if Retained	72.4	72.0	77.0	82.5	78.4	81.5	80.8
Pot Catcher Processors							
RSOL &YSOL Discards (1,000 mt)	0.0	0.1	0.0	0.1	0.0	0.1	0.0
Percent of Total Groundfish	0.2	0.8	0.7	2.0	0.9	2.0	0.6
Retention Percent if Retained	96.6	96.6	99.2	99.1	96.9	97.9	94.1
Longline Catcher Processors							
RSOL &YSOL Discards (1,000 mt)	0.1	0.2	0.2	0.3	0.2	0.3	0.7
Percent of Total Groundfish	0.1	0.2	0.2	0.2	0.2	0.2	0.5
Retention Percent if Retained	84.2	85.6	85.1	84.5	86.2	84.1	85.9
All Shore Plants, Floaters, and Motherships							
RSOL &YSOL Discards (1,000 mt)	7.5	7.2	7.7	2.6	4.8	2.2	1.0
Percent of Total Groundfish	1.2	1.1	1.3	0.5	0.8	0.3	0.1
Retention Percent if Retained	93.9	94.5	93.7	98.7	97.5	98.3	99.3
All Sectors and Fisheries							
RSOL &YSOL Discards (1,000 mt)	61.2	55.5	72.0	41.9	38.1	41.4	17.4
Percent of Total Groundfish	3.2	3.0	3.9	2.6	2.7	2.6	1.0
Retention Percent if Retained	89.0	89.8	89.7	94.5	93.4	94.2	95.5

Source: NPFMC Sector Profiles Database, 2001

3.3.2.2 Decision Point 2: To which sectors should the GRS enforceable regulations apply.

2.1 All Catcher Processors

2.2 All Catcher Processors > 125'

2.3 All Trawl Catcher Processors including AFA trawl catcher processors participating in non-pollock target fisheries

2.4 All Trawl Catcher Processors > 125' including AFA trawl catcher processors participating in non-pollock target fisheries

2.5 Non-AFA Trawl Catcher Processors > 125'

2.6 Non-AFA Trawl Catcher Processors (Head and Gut Trawl Catcher Processors) with exemptions and production limits for vessels < 125'.

What are maximum production levels for exempt (< 125') non-AFA trawl CPs?

2.6.1 Total catch in any week shall not exceed 600 mt.

2.6.2 Total catch in any week shall not exceed 700 mt.

2.6.3 Total catch for the year shall not exceed 13,000 mt

2.6.4 Total catch for the year shall not exceed 17,000 mt

NMFS has determined that in order to enforce GRS, regulated vessels must have certified motion compensated flow scales and 100 percent observer coverage. This conclusion was reached because of the lack of precision in catch

estimates based on other methods and the necessity to have data of high enough quality that it can be used in enforcement cases.

NMFS's position is that any program that is reliant on individual vessel compliance with a regulation must be developed to allow NMFS to effectively monitor and enforce that vessel's activity relative to the regulatory standard. For the reasons discussed below, this means NMFS must be able to verify total catch weight in a manner that could be upheld under court challenge. NMFS does not believe that volumetric catch measurements of the mixed species fisheries, particularly the flatfish fisheries, would meet enforcement needs without better information on accuracy of these measurements. The protocol for volumetric measurements implemented for the pollock fishery were based on scientific studies and standards that were developed to ensure accurate measurements that could withstand judicial challenge. Similar studies have not been conducted for the non pollock fisheries and questions exist whether accurate volumetric measurements could be reliably attained for individual vessel accountability in these fisheries given the mixed species nature of the catch.

A review of previous studies on bin volumentrics is contained in Appendix A-1. A discussion of other sampling issues and the statistical axiom, "the rule of large numbers" is contained in Appendix A-2.

3.3.2.2.1 Option 1: Apply the GRS to All Catcher Processors

If this option were chosen all CPs would be required to install scale systems that weigh all fish and to carry observers adequate to monitor compliance. Currently this means that 2 observers would be on board every vessel.

As indicated above vessels in the ST&FT-CP sector and 10 vessels in the HT-CP sector currently have the capability to weigh all fish that come on board. Under this option 13 HT-CP-CPs–6 > 125' and 7 < 125' would need to acquire and install certified flow scales. At an average cost of 75,000 per scale (see Section 3.3.2.2.6 for additional details), the HT-CP fleet would need to incur one-time costs of approximately $975,000. In addition the vessels > 125' would have to double their observer coverage at an approximate cost of $3,000 per day, while vessels < 125' would need to increase observer coverage by 170 percent or $5,100 per day. If it is assumed that vessels in the HT-CP-CP fleet are on the grounds for an average of 150 days per year, the additional observer costs would be approximately $450,000 annually for vessels > 125' and $775,000 for vessels < 125'. In total the HT-CP fleet would incur additional annual compliance costs of approximately $12.2 million, $5.4 million for vessels < 125' and $6.8 million for vessels > 125'. For the smaller vessels these compliance costs would represent slightly less than 50 percent of their total revenue. For the larger vessels compliance cost would be approximatley 5% of total revenue. It should be noted that the requirement for 200 percent observer coverage drives these additional operating cost. For the GRS program, NMFS has indicated it may be possible to use alternative means, tamper proof video cameras for example, to monitor compliance for regulations requiring that all fish are weighed.

According to NFMS enforcement personnel, the precision of total catch estimates on longline catcher processors (L-CPs) and on pot catcher processors (P-CPs) is not significantly better than on trawl catcher processor without scales. (Alan Kinsolving, personal communication, March 2003). Therefore similar measures would be required for these vessels–in particular that all fish brought on board are weighed on certified scales and that there is a system that assures compliance (currently this implies 200 percent observer coverage). Because the flow of fish coming on board P-CPs and L-CPs is much smaller and more sporadic than on trawl vessels fixed gear CPs would be required to have certified motion compensated hopper scales rather than flow scales. They would also be requried to have certified platform scales and observer stations. An order of magnitude estimate of acquisition and installion cost would be $30,000 for each CP. For the 42 vessels in the L-CP fleet this would mean a total one time expense of $1.3 Million, and $210,000 for the seven P-CPs. In addition each CP would have to carry at least one extra observer at a cost of $3,000 per day unless an alternative means of assuring compliance were developed. Additional details on the cost of installing scales are found in Section 3.3.2.2.6.

Overall it appears that imposing GRS regulations on all CPs would be extremely costly and unless the GRS was set at levels above 80 percent there would be very little reduction in discards.

3.3.2.2.2 Option 2: Apply the GRS to All Catcher Processors > 125 feet

If this option were chosen all CPs > 125' would be required to install scale systems that weigh all fish and to carry observers adequate to monitor compliance. Currently NMFS requires 2 observers be on board every vessel in situation where total weight measurement is required. Table 17 shows the distribution of vessels, product value, catch and retention across length classes for HT-CPs, P-CPs, and L-CPs for the 2001. Over the three classes, 20 vessels would be exempt from the GRS regulations. As with the previous option, unless the GRS is set at a value that exceeds 80 percent, the requirement to impose costs of scales and extra observers on non-trawl CPs will cause considerable cost with very little improvement in retention. The pro's and con's of exempting small HT-CPs from the GRS regulations will be discussed in detail in Section 3.3.2.2.6

Table 17. Distribution of Vessels, Value, Catch and Retention across Length Class by Sector in 2001

Sector	Length Class	Vessels	Wholesale Value ($Millions)	Percent of Sector Value	Total Catch (1,000 mt)	Percent of Secor Catch	Retention Percent
HT-CP	< 125'	7	11.4	8.5	20.9	7.9	58.9
	> 125'	16	122.0	91.5	244.5	92.1	72.1
P-CP	< 125'	2	1.5	22.5	1.3	22.0	86.7
	> 125'	7	5.0	77.5	4.5	78.0	97.8
L-CP	< 125'	14	27.0	21.1	24.9	18.3	89.1
	> 125'	31	101.1	78.9	111.4	81.7	85.3

Source: NPFMC Sector Profiles Database, 2001

3.3.2.2.3 Option 3: Apply the GRS to All Trawl Catcher Processors

This option would impose GRS regulations on all trawl CPs including AFA CPs (ST&FT-CPs). For the ST&FT-CPs, the GRS would only apply to non-pollock target fisheries. This section will focus on the application of the GRS on AFA Trawl CP in their non-pollock fisheries. Impacts on non-AFA trawl CPs are discussed in Sections 3.3.2.2.1 and 3.3.2.2.6.

Table 18 shows value, catch, and retention in pollock and non-pollock fisheries of AFA Trawl CPs (ST&FT-CPs). The tables shows that even though this sector has some participation in non-pollock fisheries, their overall retention rates are still very high relative to other catcher processsors. Unless the GRS was set at a lever over 90 percent it is unlikley that the GRS would have impact other than as a monitoring and enforcement burden for NMFS.

Table 18. Pollock and Non-Pollock Fisheries of AFA Trawl CPs

Target Fishery	1995	1996	1997	1998	1999	2000	2001
				Wholesale Product Value by Fishery ($Millions)			
Pollock	435.4	348.6	343.2	312.2	334.5	395.2	407.1
Non-Pollock Fisheries	39.1	28.8	34.5	21.1	11.9	6.8	3.2
All Fisheries	474.5	377.4	377.8	333.3	346.4	402.0	410.3
				Total Catch by Fishery (1,000 mt)			
Pollock	748.0	659.0	612.3	607.1	416.0	491.5	611.8
Non-Pollock Fisheries	107.	102.4	106.6	62.6	28.5	15.9	7.4
All Fisheries	855.9	761.4	718.9	669.7	444.5	507.4	619.2
				Discards of Groundfish by Fishery			
Pollock	48.9	30.4	31.8	9.6	4.6	8.7	5.0
All Non-Pollock Fisheries	33.6	28.4	31.7	10.8	2.8	1.3	0.6
All Fisheries	82.5	58.8	63.5	20.4	7.4	10.0	5.6
				Retention Percent of Groundfish by Fishery			
Pollock	93.5	95.4	94.8	98.4	98.9	98.2	99.2
All Non-Pollock Fisheries	68.8	72.3	70.3	82.8	90.3	91.9	92.4
All Fisheries	90.4	92.3	91.2	96.9	98.3	98.0	99.1

Source: NPFMC Sector Profiles Database, 2001

3.3.2.2.4 Option 4: Apply the GRS to All Trawl Catcher Processors > 125'

Impacts of this option on AFA CPs are identical to those in the previous section because, there are no AFA CPs < 125' that would be exempt. Impacts on non-AFA trawl CPs are identical to those discussed in Section 3.3.2.2.6

3.3.2.2.5 Option 5: Apply the GRS to All non-AFA Trawl Catcher Processors

This option would apply the GRS regulations only to the non-AFATrawl CPs (HT-CP-CP-CPs). Under this option 13 HT-CP-CPs–6 > 125' and 7 < 125' would need to acquire and install certified flow scales. At an average cost of 75,000 per scale (see Section 3.3.2.2.6 for additional details), the HT-CP fleet would need to incur one-time costs of approximately $975,000. In addition the vessels > 125' would have to double their observer coverage at an approximate cost of $3,000 per day, while vessels < 125' would need to increase observer coverage by 170 percent or $5,100 per day. If it is assumed that vessels in the HT-CP-CP fleet are on the grounds for an average of 150 days per year, the additional observer costs would be approximately $450,000 annually for vessels > 125' and $775,000 for vessels < 125'. In total the HT-CP fleet would incur additional annual compliance costs of approximately $12.2 million, $5.4 million for vessels < 125' and $6.8 million for vessels > 125'. For the smaller vessels these compliance costs would represent slightly less than 50 percent of their total revenue. For the larger vessels compliance cost would be approximatley 5% of total revenue. It should be noted that the requirement for 200 percent observer coverage drives these additional operating cost. For the GRS program, NMFS has indicated it may be possible to use alternative means, tamper proof video cameras for example, to monitor compliance for regulations requiring that all fish are weighed.

3.3.2.2.6 Option 6: Apply the GRS to All Non-AFA Trawl Catcher Processors > 125'

This option would exempt small HT-CPs from the GRS. Table 15 in Section 3.3.2.1.1 shows the distribution of activity in the HT-CP fleet by length class. A total of 7 vessels are < 125' and 15 were greater than 125'. In general the smaller vessels have higher discard rates than larger vessels–6 of the 7 smaller vessels retain less than 65 percent of their total groundfish, while the 7th retains somewhere between 85 and 95 percent. Some of the larger vessels also have relatively low retention rates–3 of the 15 vessels > 125' would need to improve their retention in order to comply with a 65 percent standard. Two additional vessels would be affected if the standard were set at 70 or 75 percent. A total of 8 of the 15 vessels > 125' would have to improve their overall retention if the GRS is set at 80 percent. If the GRS is set above 80 percent the HT-CP fleet would probably be better off under IR/IU regulations (see Table 16).

If this option is chosen, then the Council has indicated the need for limits on the catch of exempt vessels. A more complete discussion of this issue can be found in Section 3.3.2.2.6.2. The following section provides additional details on the cost of flow scales necessary to implement the GRS.

3.3.2.2.6.1 Detailed Discussion of the Costs of Flow Scales Necessary to Enforce the GRS

Enforcement issues will require that vessels regulated under the GRS program have certified motion compensated flow scales on board. The scale requirement for total catch weight measurements would require the purchase of both a flow scale for installation in a processor's sorting belt and a motion compensated platform scale. It is estimated that total cost of purchasing and installing necessary equipment will be in the range of $50,000 up to $145,000 if the entire vessel needs reconfiguration with an average of approximately $75,000.

A platform scale is used for daily measurements of test weight material (fish) used to verify the accuracy of the total catch weight flow scale. Other program requirements necessary to support scale weight measurements of total catch include:

- Daily testing of the platform scale which necessitates having certified test weights aboard; and

- 100% observer coverage. Without this level of observer coverage, vessels have no incentive to weigh catch and no reason to test the scale daily. Further, each haul should be observed to provide the agency confidence that all catch in all hauls was actually weighed. This approach could require two observers unless a vessel is willing to reduce the number of hauls to a level that a single observer could monitor. Other technological means may exist to provide assurance that all catch is weighted without having each haul observed. Additional analysis would be required to assess this option.

According to NOAA Fisheries (Alan Kinsolving, NMFS, personal communication, January 2003), the following numbers summarize the status of certified scales on the HT-CP fleet at the end of 2002.

23 active HT-CP vessels

16 HT-CP vessels are > 125'

10 HT-CP vessels > 125' currently have certified scales

6 HT-CP vessels > 125' do not have certified scales

7 HT-CP vessels are < 125'

0 HT-CP vessels < 125' currently have certified scales

3 HT-CP vessels < 125' had certified scale installed at one time

Because of the fact that none of the vessels < 125' have scales and 63 percent of the vessels over 125 feet already have scales, the council indicated that it would consider requiring certified scales on HT-CPs vessels > 125' and exempting vessels < 125 from the scale requirement.

If all 6 of the of vessels > 125' that do not currently have scales have scales installed at an average cost of $75,000 per vessel then total initial cost of compliance is estimated at $450,000.

Alternative accommodation could be considered for vessels less than 125 ft that still would not significantly undermine the objective for a groundfish discard standard. For example, these vessels could be exempt from scale requirements if their production is maintained at low levels. Setting a limit based on production also would allow NMFS to project with some certainty the total volume of catch that is accounted for with scales and observers.

Vessels exempt from scale requirements would not be subject to effective prosecution if they exceed the groundfish discard standard for the reasons discussed above. Therefore, a question exists whether these vessels should even be included in the program at all. The same question exists for the current IR/IU program, which is not enforceable when no observers are onboard.

Cost to Purchase Certified Flow Scales

At this time, Marel and Skanvaegt International produce scales that have been approved by NOAA Fisheries for weighing total catch aboard AFA-eligible catcher processors and catcher processors participating in the CDQ fisheries. According to NOAA Fisheries (Alan Kinsolving, NMFS, personal communication, January 2003), nearly all of the new scales installed on catcher processors over the last couple years have been manufactured by Marel.

The distributor of Marel marine scales in Seattle is Gunnar Electronics. A representative of Gunnar Electronics estimated the current price of the scale that has been installed on catcher processors to be around $45,000. This figure is consistence with the estimate reported by NOAA Fisheries. He noted that there is a connection charge of about $1,500, and a recommended spare parts package costs an additional $7,500.

Cost of Installation

As noted previously by NOAA Fisheries, the installation cost is the largest variable. This cost depends largely on the configuration of the vessel. A representative of Fishing Company of Alaska guesses that it will cost about $25,000 per vessel to have a scale installed on the firm's boats. The configuration of two of FCA's vessels (former tuna seiners) may present problems that raise the per boat cost by $10,000. While it is important to note that FCA has not yet developed a formal cost estimate, these "best guesses" are in accord with the statement by NOAA Fisheries that installation costs will be around $30,000 in most cases.

To further investigate installation costs , a representative of Carnitech U.S., Inc. was contacted. This firm has installed all of the Marel scales aboard catcher processors. The representative affirmed that it is very difficult to generalize about installation costs due to difference among boats. He noted that a relatively easy installation would cost about $5,000, whereas an installation requiring considerable reconfiguration of the vessel could cost upwards to $100,000. On average, costs have been in the range of $20,000 to $30,000. The representative further noted that vessel size is not necessarily an important factor in determining costs – the cost of installing scales on smaller vessels can be less than those for larger vessels, as less equipment may have to be moved.

Cost of Maintenance

The representative of Gunnar Electronics confirmed the observation by NOAA Fisheries that the estimated annual cost of maintenance for the scales currently installed on catcher processors has been approximately $1,500 to $2,000. He noted that costs could increase if vessels increase their level of fishing activity.

With respect to the question of whether maintenance costs depend on the type of fish weighed, the Gunnar Electronics representative indicated that maintenance may be higher when "bottom-feeders" (e.g., flatfish) are weighed, as sand and other substrate shed from the fish may foul certain parts of the scale. For example, the conveyor belt may have to be replaced more frequently when such fish are weighed. This statement is in accordance with information provided by NOAA Fisheries.

The Gunnar Electronics representative noted that few of the catcher processors that have purchased scales from his firm have lost fishing time because of a scale malfunction. NOAA Fisheries reported that there has been an average of one scale failure per year in the pollock fleet that resulted in lost fishing days. When a malfunction occurs Gunnar Electronics sends a representative to Dutch Harbor to undertake the repairs.

Reliability

Flow scales are fairly reliable. In the pollock fleet, the frequency of scale problems have resulted in an average of one failure per year that results in lost fishing days. It's true that flatfish enter the factory with much more sand and grit on them and that this causes mechanical problems, which have reduced the reliability of flow scales on H&G boats. Most of the problems occurred during 1998 and 1999 when Marel scales were equipped with delrin sprockets that wore down quickly. Since then, the sprockets have been replaced with stainless sprockets. Scanvaegt scales tended to have problem with wear on the weighing platform when grit got between the belt and the platform. Most of those scales have been retrofitted with wear strips. NMFS staff involved with the at-sea scale program believe that no inherent reason exists why the environment on an H&G boat would be harder on the other parts of scales (e.g., electronics, load cells) than a pollock boat; if so, scale reliability should not be a problem. As a further note, much of the H&G fleet is equipped with other scale equipment in the factory that is at least as complicated, uses many of the same parts and require factory technicians who are knowledgeable in their maintenance.

3.3.2.2.6.2 What are Maximum Production Levesl for Exempt non-AFA Trawl CPs?

Four options are proposed to limit overall production of exempt non-AFA Trawl CPs-two option would limit weekly catch and two options would limit annual catch.

2.6.1 Total catch in any week shall not exceed 600 mt.

2.6.2 Total catch in any week shall not exceed 700 mt.

2.6.3 Total catch for the year shall not exceed 13,000 mt

2.6.4 Total catch for the year shall not exceed 17,000 mt

Figure 3 shows weekly catch totals for all vessels in the HT-CP sector for the years 2000-2002. Catches are sorted by vessel length and week-ending date. As seen in the figure, weekly catches of vessels < 125' rarely exceed 600 mt, and are even less likely to exceed 700 mt. A similar figure of annual total is would

indicate that less that small vessels occaisionally exceed 13,000 mt in a year but are very unlikely to exceed 17,000 mt in a year.

Figure 3. Weekly Catch Totals by Vessel, 2000-2002

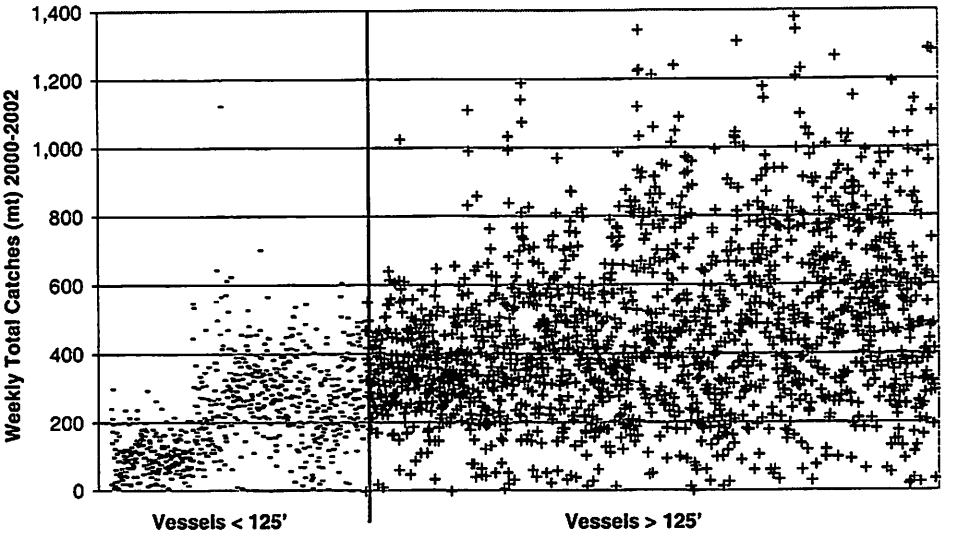
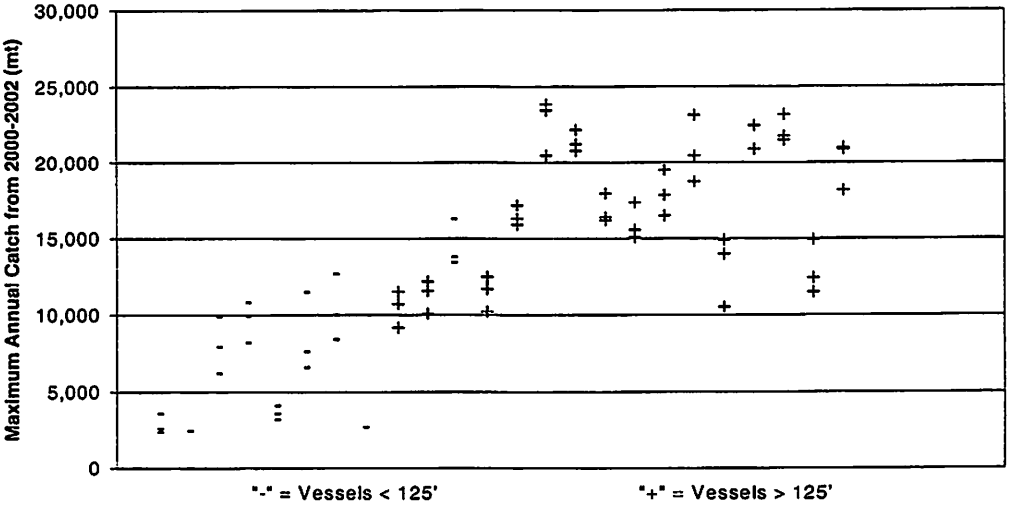


Figure 4. Annual Catch Totals by Vessel, 2000-2002



No more of the EA/RIR/IRFA has been completed to date. The following appendices were referenced earlier.

Appendix A-1 Review of Previous Studies on Bin Volumetrics

To enumerate the proportion of retained groundfish catch in the flatfish head and gut fleet, it is necessary to achieve a precise estimates of two different weights: 1) the weight of total catch of groundfish species in the hauls from the flat fish fleet, and 2) the weight of fish retained. This discussion focuses on the first point. A separate discussion of problems in the estimatioin of the second point is included later in the document.

Current catch accounting techniques for the at-sea catcher processor fleet provide an estimate of the groundfish species proportion of the hauls through observer sampling. This note provides (1) a brief documentation of some of the previous work on the use of bin volumetrics in the pollock fishery, (2) some experimental design considerations that would be required to further explore the use of this method in a mixed species fishery, and (3) some of issues that NMFS has highlighted in considering further consideration of volumetric bin measurement of trawl landings.

Bin volumetric measurements for estimating weights of fish have been used in numerous fisheries, and in the North Pacific it preceded the use of scales, particularly the more recent use of flow scales. Flow scales have been installed on most of the BSAI Pollock vessels and have significant advantages over previous weighing techniques in that they can continue to record without the continuous attention of an observer, are designed for a relatively unstable platform, and have a high level of precision. To date, the only empirical studies of bin volumetrics for estimation of total catch of groundfish in the North Pacific have been in the BSAI pollock fisheries, an application with very low bycatch. It has been found to be a technique with low accuracy and precision[3] (compared with flow scales) even under the relatively pristine and controlled conditions of the studies. NMFS is concerned that the error in an estimated retention rate that would result from this measurement technique would be too large for enforcement agents to successfully prosecute suspected violations of groundfish retention standards.

Existing Studies and References on bin volumetrics:

Two bin volumetric studies have been carried out in the North Pacific. In addition, methods for applied use of bin volumetric measurement techniques for pollock are described in the North Pacific Groundfish Observer Manual. In Dorn, Gaichas, Fitzgerald and Bibb, 1999 [4] as well as in Dorn, Fitzgerald, Guttormsen and Loefflad 1995 [5] the objectives of these two research efforts were to (1) determine the accuracy of a flow scale and evaluate test procedures for monitoring flow scale performance in production fisheries, (2) evaluate the accuracy of volume-based methods of catch weight determination using observer cod end and bin volume measurements by comparing estimates obtained from these procedures with weight estimates obtained from a flow scale, (3) evaluate the use of ultrasonic bin sensors for determining fish volumes in holding bins, (4) obtain accurate density factors to use in volume-to-weight conversions for walleye pollock catches, and (5) evaluate current and alternative methods used by observers to determine density.

Also, applied procedures for observer use of bin volume estimates for total catch aboard at sea catcher-processing vessels is included in NOAA 2003[6]. Finally, regulations for the use of certified bins for volumetric estimates of catch weight are at 50 CFR 679.28 (e) Certified bins for volumetric estimates

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[3]Precision refers to the variance around a series of observations or an estimate, while accuracy refers to the deviation from the "true" value that is being determined.

[4]Dorn, M., S. Gaichas, S. Fitzgerald and S. Bibb. 1999. Measuring total catch at sea: use of a motion-compensated flow scale to evaluate observer volumetric methods. North American Journal of Fisheries Management 17: 9999-1016.

[5]Dorn, M., S. Fitzgerald, M. Guttormsen, and M Loefflad, 1995. An evaluation of North Pacific groundfish observer program methods of haul weight estimation. NOAA Technical Memorandum NMFS-AFSF-56

[6] Alaska Fisheries Science Center. 2003. North Pacific Groundfish Observer Manual. North Pacific Groundfish Observer Program. AFSC, 7600 Sand Point Way N.E., Seattle, Washington, 98155.

of catch weight on general use of volumetric measurement. These regulations are infrequently used, as flow scales have virtually supplanted the use of volumetric estimates for BSAI pollock.

Summary of Existing Issues from previous research.

Some of the findings of these studies raise important issues regarding the further consideration of Bin Volumetric methods for estimating haul weights in non- pollock fisheries

Variance on estimates of density factors

Perhaps the most significant source of uncertainty in transferring the findings of previous pollock based studies on the use of bin volumetric estimation of trawl hauls is in establishing density factors for a mixed species application. The density is the relationship between the weight and volume of a material, and it is this weight volume relationship that would be used to convert observations of bin volumes to a weight of groundfish. Several factors in mixed species application of a density factor are anticipated to be much more serious problems given the diversity found in the mixed species catches of the head and gut trawl fleet. Some of these issues include uncertainty and variability in internal void space of both the basket samples and the loaded bins of multiple species of different sizes and shapes. Little is known about how highly heterogenous morphology of the numerous species of flatfish, cod, pelagic species, shellfish, and other miscellaneous species will stack, flow, and stratify in large and small bins, and how well the basket sampling process will reproduce useful information about how multi-species fish will compress in a much larger container. Some fin fish species have swim bladders adding to this uncertainty of how the material will compress. As the application to at sea flat fish trawl operations would involve smaller vessels, generally less resistant to maintaining a stable deck and with deck space itself likely to be more limiting than pollock CPs, we anticipate these conditions in the field would call for many more replicates, and thus, a greater number of samples.

Considering these sampling issues, it is entirely probable that field test results may be unable to achieve a reasonable level of precision and accuracy to generate a simple density factor table that can be applied to a wide variety of operations. There is a significant probability that routine basket sampling may need to occur during the transfer of each haul to bins, to provide a sufficient level of precision and accuracy for bin volumetrics to be an acceptable option in the at sea head and gut trawl fishery. Dorn et.al, 1999 (p 1014 under general conclusions) note that the conclusions regarding pollock may not be transferrable to other species because they are looking at a single species application , with an experienced crew on large vessels. The primary purpose was to estimate total weights, but not the further computation of bycatch. They also note that applications to other fisheries are dependent on the use of routine basket weight sampling.

Additional potential sources of error or bias in measurement of total catches and retained catch.

Aside from the sources of error in the use of basket sampling for determination of haul densities, there would be additional variability associated with differences between observer and crew observations between vessels, container size and shape, the elapsed time within the bin for settling and stratification of fish, and variability due to the dewatered state of fish in bins. Finally, there could be strategic or systematic bias in sampling if vessel employees instead of trained observers are taking samples.

Observer requirements/auditing of bin volumetric measurements of hauls

If retention standards are to represent any more than a voluntary guideline, observers will need to cover basket sampling and bin-volumetric measures in the Head and Gut fleet over a 24 hour period, or for the duration of daily hauls. Since a single observer cannot be available for this duration, NMFS anticipates that this sampling method would necessitate the existence of 2 full time observers on each of these vessel. We realize that this is highly impractical and costly, yet without this verification there will be no way to audit or produce reliable running totals of total catches. In contrast, the use of flow scales may be operated without 2 observers, as continuous recording of weight observations, scale calibrations, and cumulative running total results in an effective audit of information. There are even potential options for video monitoring of these operations given sufficient controls.

Establishing a target for level of precision required in Bin Volume estimates of trawl hauls

A key starting point for any quantitative assessment of a measurement technique is to define the target in terms of the parameters being estimated, as well as the level of precision desired. While the goal appears to be the estimation of some proportion of retained catch to compare with a target established in regulation, there are a few questions that need to be addressed. Among them are the time interval of the enforcement of the retained catch amounts. It could be daily, by offload, or annually. A second question is how far the target may deviate from the estimate before a citation can be successfully prosecuted. To estimate the proportion of retained catch, the NMFS enforcement section does not currently have an estimate of the target level of precision required to enforce retention standards for the head and gut fleet. Some additional effort to determine if this is possible to define would be desirable before embarking on further applied studies of bin volumetric estimation of total catch in the flat fish fishery.

Accessibility issues

The use of bin volumetric measurement has been raised as a potential alternative for vessels under 125' as most of the vessels above this size class currently have flow scales. A concern in the use of flow scales on small vessels is in the direct costs, space requirements, and constraints on crew and product movement on deck. However, on many smaller vessels, on-deck bins are often located in cramped spaces, with insufficient lighting, and visual access, potentially exacerbating efforts to obtain a representative sample of the surface height. The relative industry costs of upgrading these containers to meet some form of standard may be comparable with the present and future flow scale technology.

Time horizons for investigation of Bin Volumetrics from NMFS studies

After conducting the study on a trawl vessel, Dorn, et..al. and Bibb 1999 concluded that Bin Sampling, in fact was "Another alternative is to construct density samplers (for bin volumetric measurements) and deploy them with observers in many different trawl fisheries. The data collected could allow NMFS or another management agency to produce a table of densities to be used for volumetric catch estimates in any trawl fishery. However this **could take several years or longer** during which time observers will continue to use inaccurate basket density estimates to obtain catch weights."

Some conceptual experimental design considerations for establishing bin volumetric methods.

Before any further consideration of the use of Bin - volumetrics were to be applied to the estimation of total catch/bycatch in any BSAI fisheries, NMFS recommends that the Council consider a field research program that includes at least the following elements. We acknowledge that this effort may take several years.

1. Determine the target level of precision required to meet Council derived retention standard goals, through collaboration with enforcement and managers.
2. Expand fieldwork on bin-volumetrics and flow scale performance on vessels beyond pollock and whiting fisheries to:
    a. Determine sampling characteristics and variables that may effect densities of mixed species hauls in the field
    b. Determine optimal density sampling container for mixed species applications
    c. Determine if a density table can be developed that accounts for species mix, composition and other factors or routine use of density sampling on a vessel to achieve sufficient precision and accuracy.
3. Conduct field work on bin volumetric-based haul weights, with chartered vessels applying many of the same sampling approaches used in the previous analyses, or,
4. Assess experimental design options for deploying density samplers to a sample of vessels throughout the target fleets to evaluate the feasibility of density sampling, and number of platforms involved to generate samples, duration of study, cost of study.
5. Evaluate logistics and costs of volumetric-based haul weight estimates through field tests.
6. Determine the enforcement implications of using bin volumetrics and tradeoffs to use of flow scales.

Apendix A-2: A Discussion of Sampling Errors and the Rule of Large Numbers

Originally GRS were proposed as simple alternatives to more complex bycatch reduction measures. However, enforcing GRS on a vessel by vessel basis is complicated by the fact that precise estimates of total catch are required, as are precise estimates of the weight of fish used for products. The key term in the previous sentence is "precise". To enforce GRS on individual vessels estimates of both total catch and total retained weight must be relatively precise. For example if the GRS is set at 85 percent but the precision of individual vessel estimates of retention is +/- 15 percent, then only vessels that retain less than 70 percent will face a significant risk of enforcement action in the short-run. The following discussion provides an indication of the source of the lack of precision and why NMFS is satisified with its estimations of total annual catch amounts in spite of these errors.

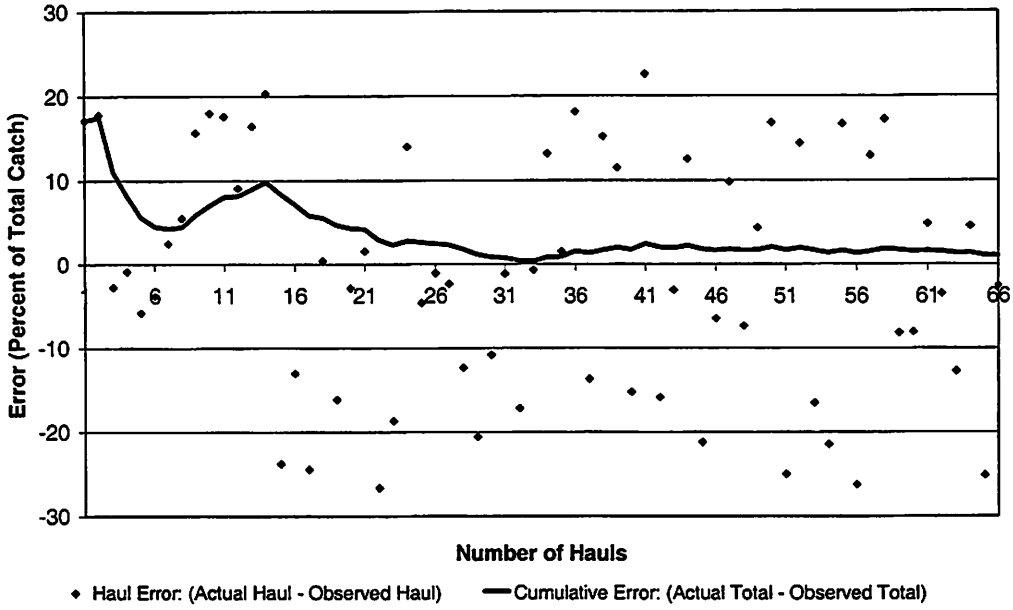
Currently, estimates of the total weight of catch are calculated with the use of observer estimates and estimates supplied by vessel operators. In most cases the estimates are based on calculation using the approximate volume of fish brought on board multiplied by a density factor. For example, the observer may estimate that a net (codend) of yellowfin sole brought on board has a volume of 20,000 m^3. By applying a standard density factor[7] for yellowfin sole of 0.889mt/m^3, the observer estimates the total catch in the net to be 17.78 mt. While the estimate is the best the observer can do, the estimate lacks the precision that could be attained if the fish were weighed on an approved scale. The lack of precision comes from the estimate of volume and from the density factor used. For example assume that the true volume of the codend was 3 percent greater than the observer thought (20,600 mt), and that the actual density of the fish in the net was .925 because of a larger than expected proportion of pollock (which are more dense than yellowfin sole). Using the true values, the actual weight of the catch is 19.06 mt, and the observer's estimate is in error by a factor of – 7.0 percent. If the error random then, there over subsequent hauls there is a high likelihood that similar offsetting errors will be made and over a period of time the estimate of total catch will be reasonably close to the true weight.

NMFS relies on the statistical axiom known as the "rule of large numbers" to be confident its estimates of total fleet-wide catches are accurate. The rule refers to the sample size used in the estimate and can be paraphrased to state that the greater the number of observations in the sample, the more accurate the estimate. However, when it comes using a single observer's estimates over a short period of time (a week for example) the rule of large numbers does not apply and the precision necessary to prosecute cases does not exist.

Figure 5 provides an hypothetical example of way the "rule of large numbers" works. In the first two hauls the actual catch amount is nearly 20% higher than the observers estimate, but for the next several hauls the observers estimates are lower higher than actual catches. This brings the cumulative error down signficantly. However in the next several haul (through haul 15) the actual catches are higher than observered and the cummulative errror climbs back up to nearly 10 percent. Even though the pattern of haul-wise errors does not change or dramatically improve the cumulative error continues to mover toward zero. If the errors are random and enough haul are sampled with unbiased estimates then the rule of large numbers will dictates that the cummulative error will be close to zero.

[7]This density factor is hypothetical and should not be taken as the correct factor.

Figure 5. Example Demonstrating the "Rule of Large Numbers"



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