

## DRAFT FOR PUBLIC REVIEW

### Environmental Assessment/Regulatory Impact Review/ Initial Regulatory Flexibility Analysis for a Regulatory Amendment to Implement Guideline Harvest Level Measures in the Halibut Charter Fisheries in IPHC Regulatory Areas 2C

**Date:** May 4, 2007

**Lead Agency:** NOAA Fisheries Service  
P. O. Box 21668  
Juneau, Alaska 99802

**Responsible Official:** Doug Mecum, Acting Alaska Regional Administrator

**Abstract:** This analysis examines a change to the management of Pacific halibut guided sport (charter) fisheries in International Pacific Halibut Commission Regulatory Area 2C in the Gulf of Alaska. The Council is considering two alternatives. In addition to the no action alternative, the Council is considering the following 13 options under Alternative 2 to reduce halibut harvests to the GHL of 1.432 Mlb: (1) No more than one trip per vessel per day; (2) No harvest by skipper and crew and a limit on the number of lines to not exceed the number of paying clients; (3) Annual limits of four fish, five fish, or six fish per angler; (4) Reduced bag limits of one fish per day in May, June, July, August, September or for the entire season; (5) Requiring one of two fish in a daily bag to be larger than 45 inches or 50 inches; (6) Requiring one of two fish in a daily bag to measure 32 inches or less; (7) A reverse slot limit requiring one of two fish in a daily bag limit to measure 32 inches or less or longer than either 45 inches or 50 inches; (8) A combination of Options 1, 2, and 5; (9) A combination of Options 1, 2, and 6; (10) A combination of Options 1, 2, and 7; (11) A combination of Options 1, 2, 3, and 5; (12) A combination of Options 1, 2, 3, and 6; and (13) A combination of Options 1, 2, 3, and 7.

None of the proposed actions are expected to have the potential to result in a “significant action,” as defined in Executive Order 12866, or result in adverse impacts on directly regulated small entities, as defined in the Regulatory Flexibility Act. A final regulatory flexibility analysis focusing on the preferred alternative will be included in the final regulatory package submitted for Secretarial review.

**Comments Due:** Comments may be submitted prior to final action, which is scheduled for June 2007. A formal public comment period will be announced by the Secretary of Commerce upon publication of the proposed rule.

**For Further Information Contact:** Jane DiCosimo  
North Pacific Fishery Management Council  
605 West 4<sup>th</sup> Avenue, Suite 306  
Anchorage, Alaska 99501-2252  
(907) 271-2809



# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>viii</b>
Environmental Assessment .....	ix
Regulatory Impact Review.....	x
Expected Effect of Alternative 1 .....	x
Expected Effect of Alternative 2 .....	xi
Option 1 – Effect of No More than One Trip per Day .....	xi
Option 2 – Effect of No Harvest by Skipper and Crew and Line Limits .....	xi
Option 3 – Effect of an Annual Limit .....	xii
Option 4 – Effect of Lower Bag Limits.....	xii
Option 5 – Effect of Size Limits for Second Fish .....	xiv
Option 6 – Effect of One Fish 32” or Less.....	xiv
Option 7 – Effect of One Fish of Any Size with a Reverse Slot Limit for the Second Fish ...	xv
Option 8 – Effect of Combination of Options 1, 2, & 5 .....	xv
Option 9 – Effect of Combination of Options 1, 2, & 6.....	xvi
Option 10 – Effect of Combination of Options 1, 2, & 7.....	xvi
Option 11 – Effect of Combination of Options 1, 2, 3, & 5 .....	xvii
Option 12 – Effect of Combination of Options 1, 2, 3, & 6.....	xviii
Option 13 – Effect of Combination of Options 1, 2, 3, & 7.....	xix
Summary Effects.....	xx
Overall and Long-Term Efficacy of the Options and Management Options .....	xxiv
<b>1.0 ENVIRONMENTAL ASSESSMENT .....</b>	<b>1</b>
1.1 Background .....	1
1.2 Purpose and Need.....	4
1.3 Problem Statement .....	4
1.4 Description of the Alternatives.....	5
1.4.1 Alternative 1.....	6
1.4.2 Alternative 2.....	7
1.5 Action Area .....	7
1.6 Relationship of this action to Federal law .....	8
1.7 Related NEPA Documents .....	8
1.8 Affected Environment .....	8
1.9 Potential Environmental Impacts .....	9
1.10 Potential Impacts on Resource Components .....	11
1.10.1 The Pacific Halibut Stock.....	11
1.10.2 Groundfish.....	20
1.10.3 Endangered or Threatened Species .....	22
1.10.4 Seabirds .....	23
1.10.5 Marine Mammals .....	24
1.10.6 Biodiversity and the Ecosystem .....	24
1.10.7 Social and Economic Environment .....	25
1.11 Cumulative Effects .....	25
<b>2.0 REGULATORY IMPACT REVIEW .....</b>	<b>27</b>
2.1 Introduction .....	27
2.2 Purpose of the Regulatory Impact Review.....	27
2.3 Description of the Fishery .....	28
2.4 Statement of the Problem .....	28
2.5 Baseline Analytical Data .....	30
2.6 Analysis.....	33
2.6.1 Option 1 – No More than One Trip per Vessel per Day .....	34

2.6.2	Option 2 – No Harvest by Skipper and Crew and Line Limits .....	35
2.6.3	Option 3 – Effect of an Annual Limit .....	37
2.6.4	Option 4 – Effect of 1-Fish Bag Limit .....	38
2.6.4.1	Secondary Effects Discussion.....	40
2.6.4.1.1	Changes in Angler Behavior during Trips .....	40
2.6.4.1.2	Changing Demand for Charter Trips .....	41
2.6.4.1.3	Changes in Discard Mortality .....	43
2.6.4.2	Bag Limit Reduction Analytical Results .....	44
2.6.5	Option 5 – Size Limits for Second Fish .....	46
2.6.6	Option 6 – One Fish 32 inches or less .....	48
2.6.7	Option 7 – One Fish of Any Size with a Reverse Slot Limit for the Second Fish .....	49
2.6.8	Option 8 – Combination of Options 1, 2, & 5 .....	50
2.6.9	Option 9 – Combination of Options 1, 2, & 6 .....	50
2.6.10	Option 10 – Combination of Options 1, 2, & 7 .....	51
2.6.11	Option 11 – Combination of Options 1, 2, 3, & 5 .....	52
2.6.12	Option 12 – Combination of Options 1, 2, 3, & 6 .....	54
2.6.13	Option 13 – Combination of Options 1, 2, 3, & 7 .....	55
2.7	Economic and Socioeconomic Impacts of Alternatives .....	56
2.7.1	Expected Effect of Alternative 1. No Action .....	56
2.7.2	Expected Effect of Each Option within Alternative 2 .....	57
2.7.2.1	Option 1 – No More than One Trip per Day .....	57
2.7.2.2	Option 2 – No Harvest by Skipper and Crew and Line Limits .....	57
2.7.2.3	Option 3 – An Annual Limit .....	57
2.7.2.4	Option 4 – 1 Fish Bag Limit .....	57
2.7.2.5	Option 5 – Size Limits for Second Fish .....	58
2.7.2.6	Option 6 – One Fish of Any Size with a Maximum Length of 32 inches or less for the Second Fish .....	59
2.7.2.7	Option 7 – One Fish of Any Size with a Reverse Slot Limit for the Second Fish .....	59
2.7.2.8	Option 8 – Combination of Options 1, 2, & 5 .....	59
2.7.2.9	Option 9 – Combination of Options 1, 2, & 6 .....	60
2.7.2.10	Option 10 – Combination of Options 1, 2, & 7 .....	60
2.7.2.11	Option 11 – Combination of Options 1, 2, 3, & 5 .....	60
2.7.2.12	Option 12 – Combination of Options 1, 2, 3, & 6 .....	61
2.7.2.13	Option 13 – Combination of Options 1, 2, 3, & 7 .....	61
2.7.3	Economic Effects on Industry and Communities .....	62
2.7.3.1	Effect of Alternative 1. No Action .....	62
2.7.3.2	Effect of Alternative 2 .....	63
2.7.3.2.1	Option 1 – One Trip per Day .....	63
2.7.3.2.2	Option 2 – No Harvest by Skipper and Crew and Line Limit .....	64
2.7.3.2.3	Option 3 – Annual Harvest Limit .....	65
2.7.3.2.4	Option 4 – One-fish bag limit .....	66
2.7.3.2.5	Option 5 – One-fish bag limit with an Option to Harvest a Second Fish above a Minimum Size .....	66
2.7.3.2.6	Option 6 – One Fish of Any Size with a Maximum Length of 32 inches or less for the Second Fish .....	67
2.7.3.2.7	Option 7 – One Fish of Any Size with a Reverse Slot Limit for the Second Fish .....	68
2.7.3.2.8	Option 8 – Combination of Options 1, 2, & 5 .....	68
2.7.3.2.9	Option 9 – Combination of Options 1, 2, & 6 .....	68
2.7.3.2.10	Option 10 – Combination of Options 1, 2, & 7 .....	69
2.7.3.2.11	Option 11 – Combination of Options 1, 2, 3, & 5 .....	69
2.7.3.2.12	Option 12 – Combination of Options 1, 2, 3, & 6 .....	70
2.7.3.2.13	Option 13 – Combination of Options 1, 2, 3, & 7 .....	71
2.7.4	Enforcement Issues and Recordkeeping and Reporting Requirements .....	72

2.7.4.1	Use of state recordkeeping and reporting tools.....	73
2.7.4.2	Trip limit (Option 1) .....	74
2.7.4.3	Prohibition of retention by skipper or crew (Option 2) .....	74
2.7.4.4	Annual limit (Option 3) .....	75
2.7.4.4.1	Type of information required by NOAA OLE.....	76
2.7.4.4.2	Cost estimate for using State reporting tools .....	77
2.7.4.5	Size limits (Options 5, 6, and 7) .....	78
2.7.4.6	Charter operator responsibilities .....	79
2.7.4.7	Enforcement costs.....	79
2.7.5	Effects on Net Benefits to the Nation.....	80
2.7.5.1	Alternative 1. No Action/Status Quo.....	81
2.7.6	Summary and Conclusions.....	82
<b>3.0</b>	<b>REGULATORY FLEXIBILITY ACT.....</b>	<b>83</b>
3.1	Introduction .....	83
3.2	Reasons for Considering the Proposed Action.....	83
3.3	Objectives and Legal Basis of the Proposed Actions .....	83
3.4	Description and Number of Small Entities to which the proposed actions will apply .....	84
3.4.1	Definition of a Small Entity .....	84
3.4.2	Description of Small Entities to Which the Proposed actions will apply.....	84
3.4.3	Estimate of the Number of Small Entities to Which the Proposed actions will apply .....	84
3.5	Description of the Projected Reporting, Record Keeping and Other Compliance Requirements of the Analyzed Options.....	85
3.5.1	Description of Compliance Requirements of the Analyzed Options .....	85
3.5.2	Description of Compliance Costs Associated with the Proposed Actions .....	85
3.5.3	Estimate of the Regulatory Burden and Distributional Effects .....	86
3.5.4	Description of Potential Benefits of the Proposed Actions to Small Entities .....	87
3.6	Identification of Relevant Federal Rules that may Duplicate, Overlap or Conflict with the Proposed Actions.....	87
3.7	Conclusion.....	87
<b>4.0</b>	<b>CONSISTENCY WITH OTHER APPLICABLE LAWS.....</b>	<b>87</b>
4.1	Introduction .....	87
4.2	Section 303(a) (9) – Fisheries Impact Statement .....	88
4.3	Section 303(b)(6) – Limited Entry Requirements .....	88
<b>5.0</b>	<b>REFERENCES.....</b>	<b>88</b>
<b>6.0</b>	<b>LIST OF PREPARERS .....</b>	<b>91</b>
<b>7.0</b>	<b>INDIVIDUALS CONSULTED.....</b>	<b>91</b>
	<b>APPENDIX I. Development of the Council’s GH L policy by year of Council action .....</b>	<b>93</b>
	<b>APPENDIX II. Choice of a Hook and Release Mortality Rate for the Area 2C Charter Halibut Fishery, 2006.....</b>	<b>97</b>
	<b>APPENDIX III. IPHC Set Line Survey Biomass Frequencies .....</b>	<b>103</b>

## LIST OF TABLES

Table 1	Summary Effect of No More than One Trip per Day .....	xi
Table 2	Summary Effect of a No Harvest by Skipper and Crew.....	xii
Table 3	Summary Effect of an Annual Limit .....	xii
Table 4	Summary Effect of Lower Bag Limits .....	xiii
Table 5	Summary Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish.....	xiv
Table 6	Summary Effect of a Two-Fish Bag Limit with One Fish of Any Size and One Fish 32 inches or less in Length .....	xv
Table 7	Summary Effect of a Reverse Slot Limit.....	xv
Table 8	Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and a Minimum Size Limit on the Second Fish.....	xvi
Table 9	Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and the Second Fish 32 inches or less .....	xvi
Table 10	Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and the Reverse Slot Limit.....	xvii
Table 11	Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits, and a Minimum Size Limit on the Second Fish.....	xviii
Table 12	Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits, and the Second Fish 32 inches or less .....	xix
Table 13	Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits and the Reverse Slot Limit.....	xx
Table 14	Summary Effect of Options of Charter Industry Halibut Harvest (2006) in Area 2C.....	xxi
Table 15	Summary Effect of Options Ordered by Lower End Estimate of Reduction in the GHL .....	xxii
Table 16	Qualitative Summary of Effects by Option for Area 2C .....	xxiii
Table 17	Area 2C sport catch of Pacific halibut. Values shown for 2006 are projections based on the ADF&G Statewide harvest survey, logbook, and reflect the prohibition on skipper/crew fish in 2006. All lb are net weight (headed and gutted).....	3
Table 18	Resource components potentially affected by the proposed alternatives .....	10
Table 19	Five year summary of removals by category for IPHC Area 2C. ....	15
Table 20.	Charter halibut participation, effort, and harvest during 1995-2005 .....	17
Table 21	Estimated rockfish and lingcod harvest (number of fish) by charter anglers by area and year. ....	21
Table 22	ESA listed and candidate species that range into the BSAI and GOA groundfish management areas. ....	23
Table 23	Effort in the Area 2C charter halibut fishery, 1998-2006.....	29
Table 24	Charter Halibut Harvest, 1995-2006 .....	30
Table 25	Logbook Estimates of Second Trips per Day for Halibut in Area 2C, 1998-2006.....	31
Table 26	Proportion of Harvest Occurring in Vessel Trips Beyond 1 trip per day .....	31
Table 27	Charter Harvest Level Estimates per Angler in Area 2C, 1996-2004 .....	32
Table 28	“Second” Fish as Portion of Area 2C Charter Angler Harvests, 2006 .....	32
Table 29	Expected Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish, No Demand Effects .....	33
Table 30	Logbook Estimates of Second Trips per Day for Halibut .....	34
Table 31	Estimated Harvest Savings from Limiting Vessels to One Trip per Day, 2006.....	34
Table 32	Effort Statistics for Area 2C, 1998-2006.....	35

Table 33	Crew Harvest, 1999-2001.....	36
Table 34	Effect of an Annual Limit on Charter Industry Halibut Harvest in Area 2C.....	37
Table 35	Prior-Year Estimate of Annual Limit Effects, 1996-2004.....	38
Table 36	“Second” Fish as Portion of Area 2C Charter Angler Harvests, 2006 .....	40
Table 37	Estimated Changes in Demand Relative to Changes in Price of a Trip from Criddle et al. (2003).....	41
Table 38	Estimated Changes in Demand from Changing Catch Rates .....	42
Table 39	King Salmon Tags Sold in Southeast Alaska, 1999-2001 .....	42
Table 40	Effect of 5 Percent Discard Mortality on Harvest Reductions without Reduced participation, 1-Fish Bag Limit for the Entire Season .....	44
Table 41	Effect of a One-Fish Bag Limit Accounting for the Reduced Participation.....	45
Table 42	Season Long One-Fish Bag Limit with Reduced Participation, Current Status Quo .....	46
Table 43	Month One-Fish Bag Limit Accounting for Reduced participation .....	46
Table 44	Expected Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish.....	47
Table 45	Expected Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish with Demand Effects .....	47
Table 46	Expected Effect of a Two-Fish Bag Limit with One Fish of Any Size and One Fish 32 inches or less in Length .....	48
Table 47	Expected Effect of a Reverse Slot Limit .....	49
Table 48	Expected Effect of a One Trip per Day, No Harvest by Skipper and Crew, and a Minimum Size Limit on the Second Fish.....	50
Table 49	Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and the Second Fish 32 inches or less .....	51
Table 50	Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and the Reverse Slot Limit.....	52
Table 51	Expected Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits, and a Minimum Size Limit on the Second Fish .....	53
Table 52	Expected Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits, and the Second Fish 32 inches or less .....	54
Table 53	Expected Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits and the Reverse Slot Limit.....	55
Table 54	Long-Term Commercial Losses in Ex-Vessel Value based on Estimated Commercial CEY Reductions and Guided Sport Catch-Area 2C .....	63
Table 55	Area 2C Vessels Affected by the limiting Vessels to One Trip per Day .....	64
Table 56	Long-Term Commercial Losses in Ex-Vessel Value based on Estimated Commercial CEY Reductions and Guided Sport Catch-Area 2C .....	81

## LIST OF FIGURES

Figure 1	IPHC regulatory areas in the northern Pacific Ocean and Bering Sea .....	7
Figure 2	The IPHC’s stock assessment and catch limit setting process for Area 2C .....	12
Figure 3	Coastwide CEY projection through 2012 (IPHC 2007).....	13
Figure 4	Five year project for coastwide spawning biomass (A) and exploitable biomass (B), and Area 2C spawning biomass (C) and Area 2C exploitable biomass (D) using a closed area assessment. Projection assumes a 0.20 harvest rate. ....	14
Figure 5	Five year average (2002–2006) proportion halibut removed by category in Area 2C. ....	15
Figure 6	Charter Fleet Halibut Harvests Year .....	28
Figure 7	Charter Fleet and Effort Growth, 1998-2006 .....	29
Figure 8	Distribution of Area 2C Harvest Halibut by Number of Fish, 2006 .....	39

## **ABBREVIATIONS**

ADF&G	Alaska Department of Fish and Game
CEY	Constant Exploitation Yield
E.O.	Presidential Executive Order
GHL	Guideline Harvest Level
IPHC	International Pacific Halibut Commission
IRFA	initial regulatory flexibility analysis
ISER	University of Alaska, Anchorage Institute for Social and Economic Research
lb	Pounds
Mlb	Million lb
NPFMC	North Pacific Fishery Management Council
OMB	Office of Management and Budget
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
SBA	U.S. Small Business Administration
SWHS	Statewide Harvest Survey

## EXECUTIVE SUMMARY

This analysis assesses the potential biological, social, and economic impacts of implementing regulations to control harvests in the charter halibut fisheries in International Pacific Halibut Commission (IPHC) Area 2C. The proposed action was initiated in October 2005, when the Council first reviewed Alaska Department of Fish and Game (ADF&G) data that indicated that the 2004 guideline harvest level (GHL) had been exceeded. In response, the Council developed an analysis of alternatives for implementing management options to reduce harvests to below the GHL. The Council selected a five-fish annual limit as its preferred alternative in April 2006. The Council subsequently rescinded its preferred alternative, upon request by NMFS due to its high implementation and enforcement costs. At the same meeting, the ADF&G estimate for 2005 and post-season projection for 2006 indicated that the GHL also had been exceeded in those two years. The Council added several management options to Alternative 2 during its initial review of this analysis in April 2007, which resulted in this revised analysis.

In January 2007, the IPHC recommended a reduction in the charter fishing bag limit for halibut in Area 2C from two fish to one fish between June 15 and July 30, 2007. The IPHC's action was a response to increasing harvests from the charter sector has experienced a substantial increase in capacity and catch during the last 10 years. Moreover, the IPHC believed it needed to take action because alternatives under consideration by the Council in this analysis would not be in place prior to 2008. The IPHC traditionally decreased the commercial harvest to account for non-commercial removals, including the charter harvest.

In March 2007, the Secretary of State in consultation with the Secretary of Commerce rejected the IPHC's recommendation for a bag limit reduction. The Secretaries cited concerns about the potential economic impact to the charter fishery and wanted NMFS to analyze a suite of alternatives that would reduce harvest to level comparable to the IPHC's action while minimizing the economic impacts on the charter sector. On April 6, 2007, NMFS proposed regulations (72 FR 17072) that would restrict the harvest of halibut by persons fishing on a guided sport charter vessel in Area 2C. The current sport fishing catch or bag limit of two halibut per day is proposed to be changed for a person sport fishing on a charter vessel in Area 2C to require that at least one of the two fish taken in a day be no more than 32 inches in length. This proposed regulatory change is necessary to reduce the halibut harvest in the charter vessel sector while minimizing negative impacts on this sector, its sport fishing clients, and the coastal communities that serve as home ports for the fishery. Upon implementation, the NMFS preferred alternative would become the new status quo.

The analysis employs the best information available. The goal of any restrictive measures would be to reduce sport fishing mortality of halibut in the charter fishery sector in Area 2C to its GHL in a manner that minimizes adverse impacts on the charter fishery, its sport fishing clients, the coastal communities that serve as home port for this fishery, and on fisheries for other species. In addition to the no action alternative, the Council is considering 13 options to reduce halibut harvests to the GHL of 1.432 Milb in Area 2C. At the request of the Council, the analysis also compares these options relative to a reduced Area 2C GHL, which may be triggered in 2008 as a result of a potentially reduced constant exploitation yield (CEY). At final action, the Council may select a preferred alternative to achieve a harvest up to the current GHL and a different preferred alternative under a reduced GHL. The proposed rule would notice the public of these two CEY scenarios, and the final rule would implement the measures associated with the Area 2C 2008 CEY set by the IPHC at its January 2008 meeting.

The Council developed the following suite of alternatives to reduce harvest for anglers fishing from a charter vessel in regulatory Area 2C:

Alternative 1. No action

Alternative 2. Implement one or more measures to restrict charter halibut harvest to the Area 2C GHLL

- Option 1. No more than one trip per vessel per day
- Option 2. No harvest by skipper and crew and line limits
- Option 3. Annual limits of four, five, or six fish per angler
- Option 4. Reduced bag limits of one fish per day in May, June, July, August, September or for the entire season
- Option 5. A one-fish bag limit with the option to harvest a second fish larger than 45 inches or 50 inches
- Option 6. A two-fish bag limit with one fish of any size and one fish 32 inches or less in length
- Option 7. A two-fish bag limit with one fish of any size and one fish 32 inches or less in length or larger than 45 inches or 50 inches
- Option 8. Combination of Options 1, 2, and 5
- Option 9. Combination of Options 1, 2, and 6
- Option 10. Combination of Options 1, 2, and 7
- Option 11. Combination of Options 1, 2, 3, and 5
- Option 12. Combination of Options 1, 2, 3, and 6
- Option 13. Combination of Options 1, 2, 3, and 7

## Environmental Assessment

The potential effects of the alternatives on the resources would be caused by increased harvest of groundfish species, incidental catch of groundfish species, and an increase in halibut mortality. Negative impacts on salmon stocks are not expected, because current ADF&G management under the Pacific Salmon Treaty closely monitors stock health and sets escapements accordingly. The socioeconomic environment may be affected through changes in angler demand for charter halibut trips which may decrease total revenue, both over the short and long run. The socioeconomic environment for the charter and commercial sector may also be affected by allocation conflicts over fully utilized species such as halibut, rockfish, and salmon.

The environmental analysis concluded that none of the alternatives would affect the health of the halibut stock. Regardless of the amount of halibut biomass taken by a sector, no adverse impacts to the halibut resource would be expected because the IPHC factors in most resource removals in the halibut stock assessment when setting annual catch limits. Additionally release mortality for the sport fishery is not expected to substantially increase above status quo under any of the alternatives.

The analysis also looked at groundfish species that may be targeted or incidentally caught in the charter halibut fisheries. Demersal shelf rockfish (DSR, e.g., yelloweye rockfish) and lingcod are two species commonly harvested in the sport fishery. Commercial and sport catch limits are set for these species and none of the catches for these species exceeded their respective ABC or OFL in 2006. DSR harvest in 2006 was well under the OFL, ABC, TAC for the commercial and sport fisheries combined. Harvest levels for lingcod in recent years have remained constant under strict sport fishery slot limits and season regulations, and commercial catch limits. A small increase in lingcod harvest would likely not significantly impact the stock because of ADF&G regulations for the sport and commercial sectors. Moreover, the magnitude of the harvest increase from the preferred alternative would likely be small

given the strict sport harvest measures currently in place for lingcod. For these reasons, the impact of the alternatives on these species is expected to be insignificant.

Cumulative effects are linked to incremental policy changes that individually may have small outcomes, but that in the aggregate and in combination with other factors can result in major resource trends. This action would not interact synergistically with other actions or with natural trends to significantly affect the halibut resource of the Gulf of Alaska. The proposed alternatives will not have any effect on the halibut resource. No reasonably foreseeable future actions would have impacts that would cause significant cumulative effects when combined with the effects from this action.

Possible future actions currently under consideration by the Council include annual changes to the guideline harvest level (GHL) policy, limited entry, setting an allocation (rather than a GHL) to the charter sector, and the development of a share-based allocation program to individual charter operators or to the charter sector. ADF&G has received authority to limit the number of lines being fished on a charter vessel to the number of paying clients (already in effect in Southeast Alaska) and prohibit retention of halibut by the skipper and crew, while charter fishing. ADF&G has exercised this authority in Area 2C in 2006 and 2007 to prohibit retention of crew caught fish and to limit the lines to the number of paying passengers, but not to exceed six lines. The State Legislature is considering a bill to allow the State to share otherwise confidential charter boat fishery data with Federal managers, which would facilitate implementation of the limited entry (moratorium) program and GHL management measures. A delegation of authority to the State to manage halibut is being sought by the State of Alaska.

## **Regulatory Impact Review**

### ***Expected Effect of Alternative 1***

Alternative 1 (No Action) would result in no changes to Federal regulations to reduce charter halibut harvests to the Area 2C GHL. Taking no action could leave current regulations on the 2-fish bag limit unchanged. However, the No Action alternative includes pending action by NMFS for implementation in 2007. The NMFS preferred alternative would require that at least one of the two halibut in a Federal bag limit could be no longer than 32 inches with the head on (72 FR 17071). The NMFS analysis (NMFS 2007) predicts that its preferred alternative would reduce harvest by 0.516 Mlb, or 25.4 percent, under 2006 conditions. A reduction of this magnitude would have reduced harvest to 106.1 percent of the 1.432 Mlb GHL.

Because the NMFS preferred alternative is expected to be implemented prior to final action in June 2007, the “status quo” may be different between the release of this draft to the public in May 2007 and final action scheduled to be taken by the Council in June 2007. The effect of “taking no action” depends on the status of the federal regulations. If the Secretary implements its preferred alternative prior to Council action, then the Council could take no action and those regulations would remain in effect. Under that scenario, Action 1 is the same as Alternative 2, Option 6.

The status quo also includes actions taken by the State of Alaska to limit charter halibut harvests. Emergency orders were issued by ADF&G in 2006 and 2007 to prohibit a sport fishing guide and sport fishing crew member on a charter vessel in Southeast Alaska from retaining fish while clients are onboard the vessel from May 1, 2007, through December 31, 2007 (E.O. 1-R-02-07). State regulations for Southeast Alaska also limit the number of lines in the water to the number of paying clients. These two measures (prohibition on skipper and crew halibut and line limits) are also included under Alternative 2, Option 2, but would be implemented under Federal regulations.

## **Expected Effect of Alternative 2**

Instead of taking no action, the Council could recommend that a different management measure or measures be implemented for 2008 and beyond, since the goals of the NMFS and Council actions are not the same (selection of Alternative 2, Option 6 is the same as taking no action.) The problem statement in this analysis is focused on reducing halibut harvest in Area 2C to the GHL rather than a harvest reduction of a comparable level to the IPHC’s recommendation. The NMFS analysis reported that IPHC’s action was expected to reduce charter halibut harvest by about 397,000 to 432,000 lb in Area 2C. However, revised ADF&G data now projects that the NMFS preferred alternative will reduce harvests by 516,000 Mlb.

This analysis estimates that while the management options under Alternative 2 would result in reduced charter industry halibut harvest, the amount of the reduction varies widely between the options. The sections below briefly summarize the estimated effect of each option compared to the current GHL and the GHL that would exist if step-down provisions are triggered by falling CEY estimates. More detailed discussions of each option are included in Section 2.6.

### **Option 1 – Effect of No More than One Trip per Day**

Option 1, a limit on vessels of no more than one trip per day, would have reduced harvest in 2006 between 0.038 and 0.049 Mlb (between 1.8 and 2.4 percent). With this option, the GHL overage would have been between 138.7 percent and 139.5 percent of the GHL, instead of 142.1 percent (Table 1). The analysis showed that “second trips” of the day for halibut are increasing as a percentage of overall trips, but still represent a relatively small portion of overall effort (Section 2.6). Key informant interviews indicated that a very small portion of the charter fleet in Area 2C relies on this business model. More interviewees viewed this option as the least painful for the industry.

**Table 1 Summary Effect of No More than One Trip per Day**

Estimate Level	Effects of 1 Trip per Day		Alt. 1. 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
	Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
Lower	0.038	1.8%	1.997	139.5%	164.1%	1.481	103.42%	121.7%
Upper	0.049	2.4%	1.986	138.7%	163.2%	1.470	102.63%	120.8%

Source: Northern Economics, Inc. estimates based ADF&G Logbook and Statewide Harvest Survey Data.

### **Option 2 – Effect of No Harvest by Skipper and Crew and Line Limits**

Effective May 26, 2006, ADF&G banned harvest by skipper and crew while paying clients are on a charter vessel by emergency order. This order was enacted again on May 1, 2007. Data from previous years’ logbooks indicate that the prohibition saved between 3.8 and 4.2 percent of the harvest (Table 2). (NPFMC 2006). The analysis expects that continuation of the prohibition, either under an EO or as a change in federal regulation, would extend this benefit into the future. This estimate is included in the modeled effects under the no action alternative. Combination options (i.e., Options 8, 9, 10, 11, 12, and 13) which include this option do not derive additional benefit beyond that already included under the status quo.

Line limits were implemented in State regulations at 5 AAC 47.030(b) and (g) since about 1997. Charter vessels have a 6-line limit and the number of lines fished cannot exceed the number of paying clients (except when jigging for herring or smelt for bait). There would be no expected halibut harvest reduction from line limits because it is part of the status quo.

**Table 2 Summary Effect of a No Harvest by Skipper and Crew**

Estimate Level	Effects of No Crew Harvest		Alt. 1. 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
	Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
Lower	0.078	3.8%	1.957	136.7%	160.8%	1.441	100.60%	118.4%
Upper	0.086	4.2%	1.949	136.1%	160.1%	1.433	100.04%	117.7%

Source: Northern Economics, Inc. estimates based ADF&G Logbook and Statewide Harvest Survey Data.

### **Option 3 – Effect of an Annual Limit**

Option 3, an annual limit of either four or five fish, would have reduced harvest in 2006 by 0.088 Mlb (six-fish limit), 0.190 Mlb (five-fish limit) or 0.335 Mlb (four-fish limit). These amounts are equal to between 4.3 percent, 9.3 percent and 16.3 percent of the 2006 harvest, respectively. With these options, the GHL overage would have stood at between 118.7 and 135.9 percent instead of the estimated 142.1 percent (Table 3). While key informant interviewees reported that this option would disproportionately affect operators of lodges and multi-day packages, lodge operators indicated that this option is preferable to other options. The four-fish limit is the only option, aside from a change in the bag limit, that results in a more than a 20 percent decline in the GHL overage. NMFS has expressed concerns about the enforcement costs of this option. However, the analysis notes that the 2006 logbooks have lowered enforcement costs because they track angler harvest by sport fishing license number.

**Table 3 Summary Effect of an Annual Limit**

Sub-Option	Effect of Annual Catch Limit		Alt. 1. 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
	Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
Four Fish	0.335	16.4%	1.700	118.7%	139.7%	1.519	106.05%	124.8%
Five Fish	0.190	9.3%	1.845	128.8%	151.6%	1.519	106.05%	124.8%
Six Fish	0.088	4.3%	1.947	135.9%	160.0%	1.519	106.05%	124.8%

Source: Northern Economics, Inc. estimates based Alaska Department of Fish & Game Logbook Data, 2005.

### **Option 4 – Effect of Lower Bag Limits**

Option 4 would lower the daily bag limit from two halibut to one halibut in June, July, August, or for the entire season. This option could reduce demand for charter halibut trips. Key informant interviews and a review of the peer-review literature indicate that the expected demand reduction could be as high as 30 percent. Two estimates are presented for each sub-option (Table 4). These address: (1) the effect of the option without any demand reduction, and (2) the effect of the option with a 30 percent demand reduction. For the full season bag limit reduction, the demand reduction is likely to be within these two points. The month-long bag limit reductions are more complicated, as anglers can transfer effort to other months. Data are not available to help predict the magnitude of these transfers. However, key informant interviews suggest that the demand reduction and demand transfers may cancel each other out, and that the base estimate of no demand decline may stand as the best estimate of the option's overall effect.

The analysis estimates that:

- A reduction in bag limit in May 2006 would have reduced total season harvest between 0.037 and 0.059 Mlb, which is equivalent to between 2.6 percent and 3.7 percent of the total 2006 harvest.
- A reduction in bag limit in June 2006 would have reduced total season harvest between 0.204 and 0.297 Mlb, which is equivalent to between 10.0 percent and 14.6 percent of the total 2006 harvest.
- A reduction in bag limit in July 2006 would have reduced total season harvest between 0.295 and 0.430 Mlb, which is equivalent to between 14.5 percent and 21.1 percent of the total 2006 harvest.
- A reduction in bag limit in August 2006 would have reduced total season harvest between 0.244 and 0.356 Mlb, which is equivalent to between 12.0 percent and 17.5 percent of the total 2006 harvest.
- A reduction in bag limit in September 2006 would have reduced total season harvest between 0.028 and 0.042 Mlb, which is equivalent to between 2.0 percent and 2.9 percent of the total 2006 harvest.
- The full-season bag limit reduction would have reduced total season harvest between 0.808 and 1.178 Mlb, which is equivalent to between a 39.7 and 57.9 percent reduction in the harvest. This level of reduction would have reduced the GHL overage from 142.1 percent of the GHL to between 59.9 and 85.7 percent of the GHL.

These results do not include changes in discard mortality, because discard mortality is not currently estimated, is not included as part of the charter fleet removals, and is not deducted from the overall CEY when setting the commercial catch limit. However, the full discussion of this analysis in Section 2.6 discusses this effect on these estimates. Additionally, these estimates do not include a shift towards higher average weight. As discussed in Section 2.6, there is not enough information about angler behavior to make reliable estimates of this type of shift.

Key informant interviewees indicated that a May, June, August, or September bag limit reduction would be preferable to a July or full-season reduction because many operators depend on halibut between the king and coho salmon seasons. Operators indicated a full-season reduction would be highly detrimental to their businesses and rated this option toward the bottom of the eight considered here. Conversely, a full season bag limit reduction has the highest benefit for the commercial fleet.

**Table 4 Summary Effect of Lower Bag Limits**

Sub-Option	Demand Reduction	Effect of Reduced Bag Limit		Alt. 1. 2-fish Bag Limit			Alt 2. Option 6 2-fish Bag Limit w/1-fish < 32		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
May	None	0.037	2.6%	1.998	139.6%	164.2%	1.519	106.05%	124.8%
	30 Percent	0.053	3.7%	1.982	138.4%	162.8%	1.519	106.05%	124.8%
June	None	0.204	14.2%	1.832	127.9%	150.5%	1.519	106.05%	124.8%
	30 Percent	0.297	20.7%	1.738	121.4%	142.8%	1.519	106.05%	124.8%
July	None	0.295	20.6%	1.740	121.5%	143.0%	1.519	106.05%	124.8%
	30 Percent	0.430	30.0%	1.605	112.1%	131.9%	1.519	106.05%	124.8%
August	None	0.244	17.1%	1.791	125.1%	147.1%	1.519	106.05%	124.8%
	30 Percent	0.356	24.9%	1.679	117.2%	138.0%	1.519	106.05%	124.8%
September	None	0.028	2.0%	2.007	140.1%	164.9%	1.519	106.05%	124.8%
	30 Percent	0.042	2.9%	1.993	139.2%	163.8%	1.519	106.05%	124.8%
Entire Season	None	0.808	56.4%	1.227	85.7%	100.8%	1.519	106.05%	124.8%
	30 Percent	1.178	82.2%	0.857	59.9%	70.4%	1.519	106.05%	124.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

### Option 5 – Effect of Size Limits for Second Fish

Option 5 would establish a one-fish bag limit, with an option to harvest one of two fish above a minimum length. It includes two sub-options of establishing a 45 inch or 50 inch minimum length for one of their two fish bag limit. As with Option 4, it may reduce angler demand for charter trips. However, key informant interviewees indicated that this option would likely lead to a much smaller reduction in demand than a full-season bag limit reduction. They estimated demand reductions could be about 10 percent. This summary presents the no demand decline and 10-percent demand decline scenarios as low and high estimates of the potential effects of these options. The analysis estimates that:

- A 45 inch minimum length on one of two fish would have reduced 2006 harvest in Area 2C between 0.391 and 0.559 Mlb. These amounts are equivalent to between a 19.2 and 27.4 percent decline in 2006 harvest. The GHL overage would have declined from 142.1 percent of the GHL to between 103.1 percent and 114.8 percent of the GHL.
- A 50 inch minimum length on one of two fish would have reduced 2006 harvest in Area 2C between 0.478 and 0.637 Mlb. These amounts are equivalent to between a 23.5 and 31.3 percent decline in 2006 harvest. The GHL overage would have declined from 142.1 percent of the GHL to between 97.7 percent and 108.7 percent of the GHL.

As with Option 4, these results do not include changes in discard mortality. However, the full discussion of this analysis in Section 2.6 discusses the effect of discard mortality on these estimates.

**Table 5 Summary Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish**

Sub-Option	Demand Reduction	Effect of 2 <sup>nd</sup> Fish Size Min.		Alt. 1. Current 2-fish Bag Limit			Alt 2. Option 6 2-fish Bag Limit w/1-fish < 32		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
45"	None	0.391	19.2%	1.644	114.8%	135.1%	1.519	106.05%	124.8%
	10 Percent	0.559	27.4%	1.476	103.1%	121.3%	1.519	106.05%	124.8%
50"	None	0.478	23.5%	1.557	108.7%	127.9%	1.519	106.05%	124.8%
	10 Percent	0.637	31.3%	1.398	97.7%	114.9%	1.519	106.05%	124.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

### Option 6 – Effect of One Fish 32” or Less

Option 6 duplicates the current NMFS preferred alternative for 2007, which allows one fish of any size and requires one of two fish be equal to or smaller than 32 inches. The analysis predicts that this measure would reduce harvest by 0.516 Mlb or 25.4 percent under 2006 conditions. A reduction of this magnitude would have reduced harvest to 106.1 percent of the 1.432 Mlb GHL. A demand reduction is not expected with this option given that 48 percent of the current harvest measures 32 inches or less, but it is a possibility amongst anglers who target larger halibut specifically. A 10 percent demand reduction combined with the option itself would result in harvest reductions of 0.737 Mlb.

**Table 6 Summary Effect of a Two-Fish Bag Limit with One Fish of Any Size and One Fish 32 inches or less in Length**

Demand Reduction	Effect of 2-fish Bag Limit w/1-fish < 32				
	Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
None	0.516	25.4%	1.519	106.05%	124.8%
10 Percent	0.737	36.2%	1.298	90.63%	106.6%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

**Option 7 – Effect of One Fish of Any Size with a Reverse Slot Limit for the Second Fish**

Option 7 would allow one fish of any size while establishing a reverse slot limit for allowing the retention of a second fish if the fish is below 32 inches or above 45 or 55 inches. The analysis estimates that the 45 inch reverse slot limit has the potential to actually increase harvest weight as some fish between 32 and 45 inches will be replaced with fish above 45 inches. The analysis estimates that the particular combination of 32/45-inch reverse slot limit would result in an increase of average harvest weight to 20.39 lb from the 2006 average harvest weight of 18.98 lb. The 32/50-inch reverse slot is more effective, resulting in a slight harvest saving of 5,000 lb. However, the analysis is unable to conclude that a reverse slot limit at these lengths would result in any harvest savings areawide. The potential for increased harvest weight was also an issue for the minimum size option rejected by the Council in April 2007. The same dynamics that drove the potential for increased harvest weight in that option also drive the potential for increased harvest weight in this option.

**Table 7 Summary Effect of a Reverse Slot Limit**

Sub-Option	Demand Reduction	Effects of No Crew Harvest		Alt. 1. 2-fish Bag Limit			NMFS Preferred Alternative for 2007*		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
45"	None	-0.060	19.2%	2.095	146.3%	172.2%	1.519	106.05%	124.8%
	10 Percent	0.153	27.4%	1.882	131.4%	154.7%	1.519	106.05%	124.8%
50"	None	0.005	23.5%	2.030	141.8%	166.8%	1.519	106.05%	124.8%
	10 Percent	0.211	31.3%	1.824	127.3%	149.8%	1.519	106.05%	124.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

There is no a priori expectation with this option of significant demand changes. However, the potential for demand reductions should not be ignored as the option effectively eliminates half of the opportunity the charter clients have to harvest fish in the 15 to 40 lb range. Anglers often consider fish in this size range to be the superior eating halibut. As noted in prior options, operators have noted the potential for difficulty in measuring fish and increased mortality for fish that unexpectedly do not meet length requirements.

**Option 8 – Effect of Combination of Options 1, 2, & 5**

Option 8 would limit vessels to one trip per day, ban harvest by skipper and crew, and establish a minimum size limit of 45 inches or 50 inches on one of two fish in an angler’s bag limit. The analysis estimates that the 45-inch minimum size limit would have reduced harvest in 2006 between 0.429 and 0.608 Mlb, a reduction which would have reduced harvest to between 99.7 and 112.2 percent of the

GHL.<sup>1</sup> This range bounds the estimated effect of the NMFS preferred alternative for 2007. A 50-inch minimum size limit sub-option would have reduced harvest between 0.516 and 0.686 Mlb and lowered the harvest to between 110.9 and 124.8 percent of the GHL. Both the lower and upper estimates for this sub-option exceed the harvest reductions associated with the NMFS preferred alternative for 2007.

**Table 8 Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and a Minimum Size Limit on the Second Fish**

Sub-Option	Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
45"	Lower	0.429	21.1%	1.606	112.2%	132.0%	1.519	106.05%	124.8%
	Upper	0.608	29.9%	1.427	99.7%	117.3%	1.519	106.05%	124.8%
50"	Lower	0.516	25.3%	1.519	106.1%	124.8%	1.519	106.05%	124.8%
	Upper	0.686	33.7%	1.349	94.2%	110.9%	1.519	106.05%	124.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

**Option 9 – Effect of Combination of Options 1, 2, & 6**

Option 9 limits vessels to one trip per day, bans harvest by skipper and crew, and places a length limit on one of two fish in an angler’s daily bag of 32 inches or less. The analysis estimates that this option would have reduced harvest in 2006 between 0.554 and 0.565 Mlb, a reduction which would have reduced harvest to between 102.6 and 103.4 percent of the GHL. Both the lower and upper estimates for this sub-option exceed the harvest reductions associated with the NMFS preferred alternative for 2007.

**Table 9 Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and the Second Fish 32 inches or less**

Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
	Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
Lower	0.554	27.2%	1.481	103.4%	121.7%	1.481	103.42%	121.7%
Upper	0.565	27.8%	1.470	102.6%	120.8%	1.470	102.63%	120.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

**Option 10 – Effect of Combination of Options 1, 2, & 7**

Option 10 limits vessels to one trip per day, bans harvest by skipper and crew, and establishes a reverse slot limit between 32 inches and 45 or 50 inches on one of two fish in an angler’s bag limit. The analysis estimates that the 45-inch sub-option could result in a slight increase in harvest or a reduction of up to 0.202 Mlb.. A 50-inch minimum size limit sub-option would have reduced harvest between 0.042 and

<sup>1</sup> For Option 8-13 lower estimates include the lowest estimate from each individual option and no estimated reduction in demand while upper estimates include the highest estimate from each individual option including expected demand reductions if applicable.

0.260 Mlb and lowered the harvest to between 123.9 and 139.1 percent of the GHL. The authors note that the large differences between the lower and upper estimates for both sub-options are driven entirely by the inclusion of a 10 percent reduction in demand for the upper estimates. Given that there is currently no expectation for the demand reduction to be that high, the authors believe that the lower estimate is a better predictor of the potential effects of these sub-options.

**Table 10 Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and the Reverse Slot Limit**

Sub-Option	Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
45"	Lower	-0.023	-1.1%	2.058	143.7%	169.1%	1.934	135.07%	158.9%
	Upper	0.202	9.9%	1.833	128.0%	150.6%	1.938	135.31%	159.2%
50"	Lower	0.042	2.1%	1.993	139.1%	163.7%	1.999	139.62%	164.3%
	Upper	0.260	12.8%	1.775	123.9%	145.8%	2.003	139.86%	164.6%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

**Option 11 – Effect of Combination of Options 1, 2, 3, & 5**

Option 11 limits vessels to one trip per day, bans harvest by skipper and crew, establishes an annual limit of four fish, five fish, or six fish, and places a minimum size limit of 45 inches or 50 inches on an angler’s second fish in their daily bag. These combinations result in six different sub-options; all but one of which would result in more harvest savings than the NMFS preferred alternative for 2007. Additionally, all but one of the sub-options would have reduced 2006 harvest to a level slightly greater or lower than the GHL. The sub-option with the smallest effect is the 45 inch minimum size on one of two fish combined with a six fish annual limit. This sub-option would reduce harvest between 0.498 and 0.502 Mlb and have resulted in a harvest between 1.533 and 1.542 Mlb. These levels are above the GHL and equivalent to 107.0 percent to 107.7 percent of the GHL. The remaining sub-options would reduce harvest below the GHL. The most effective sub-option is the 50 inch minimum size on one of two fish combined with a four fish annual limit. This sub-option would have reduced harvest between 0.815 and 0.843 Mlb, a harvest equivalent to 83.2 to 85.2 percent of the GHL. The effects of the remaining sub-options are:

- The 45 inch minimum with a 4 fish annual limit would have reduced harvest between 0.692 and 0.701 Mlb, a harvest equivalent to 93.1 to 93.8 percent of the GHL.
- The 45 inch minimum with a 5 fish annual limit would have reduced harvest between 0.575 and 0.584 Mlb, a harvest equivalent to 101.3 to 101.9 percent of the GHL.
- The 50 inch minimum with a 5 fish annual limit would have reduced harvest between 0.704 and 0.733 Mlb, a harvest equivalent to 90.9 to 93.0 percent of the GHL.
- The 50 inch minimum with a 6 fish annual limit would have reduced harvest between 0.626 and 0.655 Mlb, a harvest equivalent to 96.4 to 98.4 percent of the GHL.

**Table 11 Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits, and a Minimum Size Limit on the Second Fish**

Sub-Option	Estimate	Base Effect of Combined Options		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
45" & 4 Fish	Lower	0.692	34.0%	1.343	93.8%	110.4%	1.635	114.18%	134.4%
	Upper	0.701	34.5%	1.334	93.1%	109.6%	1.402	97.94%	115.2%
45" & 5 Fish	Lower	0.575	28.3%	1.460	101.9%	120.0%	1.784	124.59%	146.6%
	Upper	0.584	28.7%	1.451	101.3%	119.2%	1.551	108.34%	127.5%
45" & 6 Fish	Lower	0.493	24.2%	1.542	107.7%	126.7%	1.889	131.90%	155.2%
	Upper	0.502	24.7%	1.533	107.0%	126.0%	1.656	115.66%	136.1%
50" & 4 Fish	Lower	0.843	41.4%	1.192	83.2%	97.9%	1.581	110.38%	129.9%
	Upper	0.815	40.0%	1.220	85.2%	100.3%	1.568	109.46%	128.8%
50" & 5 Fish	Lower	0.733	36.0%	1.302	90.9%	107.0%	1.725	120.47%	141.7%
	Upper	0.704	34.6%	1.331	93.0%	109.4%	1.634	114.11%	134.3%
50" & 6 Fish	Lower	0.626	30.8%	1.409	98.4%	115.8%	1.736	121.20%	142.6%
	Upper	0.655	32.2%	1.380	96.4%	113.4%	1.827	127.55%	150.1%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

**Option 12 – Effect of Combination of Options 1, 2, 3, & 6**

Option 12 limits vessels to one trip per day, bans harvest by skipper and crew, establishes an annual limit of four, five, or six fish, and places a maximum size limit of 32 inches on an angler’s second fish in their daily bag. All sub-options except the six fish sub-option are more effective at reducing harvest than the NMFS preferred alternative for 2007. They have the following results:

- The four-fish annual limit would reduce annual harvests .574 to .794 Mlb, resulting in a harvest of 86.6 to 102.0 percent of the current GHL.
- The five-fish annual limit would reduce annual harvests .551 to .603 Mlb, resulting in a harvest of 100.0 to 103.7 percent of the current GHL.
- The six-fish annual limit would reduce annual harvests .449 to .502 Mlb, resulting in a harvest of 107.1 to 110.8 percent of the current GHL.

**Table 12 Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits, and the Second Fish 32 inches or less**

Sub-Option	Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)
Four Fish	Lower	0.574	28.2%	1.461	102.0%	120.0%	1.461	102.02%	120.0%
	Upper	0.794	39.0%	1.241	86.6%	102.0%	1.241	86.65%	102.0%
Five Fish	Lower	0.551	27.1%	1.484	103.7%	122.0%	1.484	103.66%	122.0%
	Upper	0.603	29.7%	1.432	100.0%	117.6%	1.432	99.97%	117.6%
Six Fish	Lower	0.449	22.1%	1.586	110.8%	130.3%	1.586	110.77%	130.3%
	Upper	0.502	24.7%	1.533	107.1%	126.0%	1.533	107.08%	126.0%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

**Option 13 – Effect of Combination of Options 1, 2, 3, & 7**

Option 13 limits vessels to one trip per day, bans harvest by skipper and crew, establishes an annual limit of four, five, or six fish, and places a reverse slot limit between 32 and 45 or 50 inches on an angler’s second fish in their daily bag. These combinations result in six different sub-options. The sub-option with the smallest effect is the 45 inch minimum size on one of two fish combined with a six fish annual limit. This sub-option would reduce harvest between 0.069 and 0.294 Mlb and have resulted in a harvest between 1.741 and 1.966 Mlb. These levels are well above the GHl and equivalent to 121.6 to 137.3 percent of the GHl. The most effective sub-option is the 50 inch minimum size on one of two fish combined with a four fish annual limit. This sub-option would have reduced harvest between 0.376 and 0.467 Mlb, a harvest equivalent to 109.5 percent to 115.8 percent of the GHl. The effects of the remaining sub-options are:

- The 45 inch minimum with a 4 fish annual limit would have reduced harvest between 0.323 and 0.548 Mlb, a harvest equivalent to 103.8 to 119.6 percent of the GHl.
- The 45 inch minimum with a 5 fish annual limit would have reduced harvest between 0.174 and 0.399 Mlb, a harvest equivalent to 114.2 to 130.0 percent of the GHl.
- The 50 inch minimum with a 5 fish annual limit would have reduced harvest between 0.232 and 0.401 Mlb, a harvest equivalent to 114.1 to 125.9 percent of the GHl.
- The 50 inch minimum with a 6 fish annual limit would have reduced harvest between 0.130 and 0.299 Mlb, a harvest equivalent to 121.2 to 133.0 percent of the GHl.

**Table 13 Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits and the Reverse Slot Limit**

Sub-Option	Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
45" & 4 Fish	Lower	0.323	15.9%	1.712	119.6%	140.7%	1.712	119.55%	140.7%
	Upper	0.548	26.9%	1.487	103.8%	122.2%	1.487	103.84%	122.2%
45" & 5 Fish	Lower	0.174	8.5%	1.861	130.0%	152.9%	1.861	129.96%	152.9%
	Upper	0.399	19.6%	1.636	114.2%	134.4%	1.636	114.25%	134.4%
45" & 6 Fish	Lower	0.069	3.4%	1.966	137.3%	161.5%	1.966	137.27%	161.5%
	Upper	0.294	14.5%	1.741	121.6%	143.0%	1.741	121.56%	143.0%
50" & 4 Fish	Lower	0.376	18.5%	1.659	115.8%	136.3%	1.659	115.84%	136.3%
	Upper	0.467	23.0%	1.568	109.5%	128.8%	1.568	109.46%	128.8%
50" & 5 Fish	Lower	0.232	11.4%	1.803	125.9%	148.2%	1.803	125.92%	148.2%
	Upper	0.401	19.7%	1.634	114.1%	134.3%	1.634	114.11%	134.3%
50" & 6 Fish	Lower	0.130	6.4%	1.905	133.0%	156.5%	1.905	133.01%	156.5%
	Upper	0.299	14.7%	1.736	121.2%	142.6%	1.736	121.20%	142.6%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

### Summary Effects

For quick reference, Table 14 shows the estimated affect all of the options as if they had been in place in 2006.

**Table 14 Summary Effect of Options of Charter Industry Halibut Harvest (2006) in Area 2C**

Management Option	Sub-Option	Expected Reduction (Mlb)		Expected Reduction (% of Current Harvest)		Expected Post-Option Harvest as a Portion of the GHL (%)	
		Lower	Upper	Lower	Upper	Lower	Upper
Option 1. One Trip per Day	None	0.038	0.049	1.8%	2.4%	139.5%	138.7%
Option 2. No Harvest by Skipper & Crew and Line Limits	None	0.078	0.086	3.8%	4.2%	136.7%	136.1%
Option 3. Annual Limit	4 Fish	0.335	0.335	16.4%	16.4%	118.7%	118.7%
	5 Fish	0.190	0.190	9.3%	9.3%	128.8%	128.8%
	6 Fish	0.088	0.088	4.3%	4.3%	135.9%	135.9%
Option 4. One Fish Bag Limit	May	0.037	0.053	1.8%	2.6%	139.6%	138.4%
	June	0.204	0.297	10.0%	14.6%	127.9%	121.4%
	July	0.295	0.430	14.5%	21.1%	121.5%	112.1%
	August	0.244	0.356	12.0%	17.5%	125.1%	117.2%
	September	0.028	0.042	1.4%	2.0%	140.1%	139.2%
Option 5. Minimum Size on the Second Fish	45"	0.391	0.559	19.2%	27.4%	114.8%	103.1%
	50"	0.478	0.637	23.5%	31.3%	108.7%	97.7%
Option 6. Second Fish Below 32"	None	0.516	0.737	25.4%	36.2%	106.0%	90.6%
Option 7. Reverse Slot Limit	32"/45"	-0.060	0.153	-3.0%	7.5%	146.3%	131.4%
	32"/50"	0.005	0.211	0.2%	10.4%	141.8%	127.3%
Option 8. Combine Options 1, 2, and 5.	45"	0.429	0.608	21.1%	29.9%	112.2%	99.7%
	50"	0.516	0.686	25.3%	33.7%	106.1%	94.2%
Option 9. Combine Options 1, 2, and 6.	None	0.554	0.565	27.2%	27.8%	103.4%	102.6%
Option 10. Combine Options 1, 2, and 7.	32"/45"	-0.023	0.202	-1.1%	9.9%	143.7%	128.0%
	32"/50"	0.042	0.260	2.1%	12.8%	139.1%	123.9%
Option 11. Combine Options 1, 2, 3, and 5.	45" & 4 Fish	0.692	0.701	34.0%	34.5%	93.8%	93.1%
	45" & 5 Fish	0.575	0.584	28.3%	28.7%	101.9%	101.3%
	45" & 6 Fish	0.493	0.502	24.2%	24.7%	107.7%	107.0%
	50" & 4 Fish	0.843	0.815	41.4%	40.0%	83.2%	85.2%
	50" & 5 Fish	0.733	0.704	36.0%	34.6%	90.9%	93.0%
Option 12. Combine Options 1, 2, 3, and 6.	4 Fish	0.574	0.794	28.2%	39.0%	102.0%	86.6%
	5 Fish	0.551	0.603	27.1%	29.7%	103.7%	100.0%
	6 Fish	0.449	0.502	22.1%	24.7%	110.8%	107.1%
Option 13. Combine Options 1, 2, 3, and 7.	32"/45" & 4 Fish	0.323	0.548	15.9%	26.9%	119.6%	103.8%
	32"/45" & 5 Fish	0.174	0.399	8.5%	19.6%	130.0%	114.2%
	32"/45" & 6 Fish	0.069	0.294	3.4%	14.5%	137.3%	121.6%
	32"/50" & 4 Fish	0.376	0.467	18.5%	23.0%	115.8%	109.5%
	32"/50" & 5 Fish	0.232	0.401	11.4%	19.7%	125.9%	114.1%
	32"/50" & 6 Fish	0.130	0.299	6.4%	14.7%	133.0%	121.2%

Source: Northern Economics, Inc. estimates based ADF&G Logbook and Statewide Harvest Survey Data.

Table 15 shows all of the sub-options ordered by their lower-end estimated effect on the GHL. The table orders results by lower estimates because there is greater confidence in these estimates as they do not include the highly variable demand reductions. However, the table shows both lower and upper estimates. The most effective options are Option 11 and Option 4 while the least effective are those involving the 32/45" reverse slot limit.

**Table 15 Summary Effect of Options Ordered by Lower End Estimate of Reduction in the GHL**

Management Option	Sub-Option	Expected Reduction (Mlb)		Expected Post-Option Harvest as a Portion of the GHL (%)	
		Lower	Upper	Lower	Upper
Option 11. Combine Options 1, 2, 3, and 5.	50" & 4 Fish	0.843	0.815	41.4%	40.0%
Option 4. One Fish Bag Limit	Full Season	0.808	1.178	39.7%	57.9%
Option 11. Combine Options 1, 2, 3, and 5.	50" & 5 Fish	0.733	0.704	36.0%	34.6%
Option 11. Combine Options 1, 2, 3, and 5.	45" & 4 Fish	0.692	0.701	34.0%	34.5%
Option 11. Combine Options 1, 2, 3, and 5.	50" & 6 Fish	0.655	0.626	32.2%	30.8%
Option 11. Combine Options 1, 2, 3, and 5.	45" & 5 Fish	0.575	0.584	28.3%	28.7%
Option 12. Combine Options 1, 2, 3, and 6.	4 Fish	0.574	0.794	28.2%	39.0%
Option 9. Combine Options 1, 2, and 6.	None	0.554	0.565	27.2%	27.8%
Option 12. Combine Options 1, 2, 3, and 6.	5 Fish	0.551	0.603	27.1%	29.7%
Option 6. Second Fish Below 32"	None	0.516	0.737	25.4%	36.2%
Option 8. Combine Options 1, 2, and 5.	50"	0.516	0.686	25.3%	33.7%
Option 11. Combine Options 1, 2, 3, and 5.	45" & 6 Fish	0.493	0.502	24.2%	24.7%
Option 5. Minimum Size on the Second Fish	50"	0.478	0.637	23.5%	31.3%
Option 12. Combine Options 1, 2, 3, and 6.	6 Fish	0.449	0.502	22.1%	24.7%
Option 8. Combine Options 1, 2, and 5.	45"	0.429	0.608	21.1%	29.9%
Option 5. Minimum Size on the Second Fish	45"	0.391	0.559	19.2%	27.4%
Option 13. Combine Options 1, 2, 3, and 7.	32"/50" & 4 Fish	0.376	0.467	18.5%	23.0%
Option 3. Annual Limit	4 Fish	0.335	0.335	16.4%	16.4%
Option 13. Combine Options 1, 2, 3, and 7.	32"/45" & 4 Fish	0.323	0.548	15.9%	26.9%
Option 4. One Fish Bag Limit	July	0.295	0.430	14.5%	21.1%
Option 4. One Fish Bag Limit	August	0.244	0.356	12.0%	17.5%
Option 13. Combine Options 1, 2, 3, and 7.	32"/50" & 5 Fish	0.232	0.401	11.4%	19.7%
Option 4. One Fish Bag Limit	June	0.204	0.297	10.0%	14.6%
Option 3. Annual Limit	5 Fish	0.190	0.190	9.3%	9.3%
Option 13. Combine Options 1, 2, 3, and 7.	32"/45" & 5 Fish	0.174	0.399	8.5%	19.6%
Option 13. Combine Options 1, 2, 3, and 7.	32"/50" & 6 Fish	0.130	0.299	6.4%	14.7%
Option 3. Annual Limit	6 Fish	0.088	0.088	4.3%	4.3%
Option 2. No Harvest by Skipper & Crew and Line Limits	None	0.078	0.086	3.8%	4.2%
Option 13. Combine Options 1, 2, 3, and 7.	32"/45" & 6 Fish	0.069	0.294	3.4%	14.5%
Option 10. Combine Options 1, 2, and 7.	32"/50"	0.042	0.260	2.1%	12.8%
Option 1. One Trip per Day	None	0.038	0.049	1.8%	2.4%
Option 4. One Fish Bag Limit	May	0.037	0.053	1.8%	2.6%
Option 4. One Fish Bag Limit	September	0.028	0.042	1.4%	2.0%
Option 7. Reverse Slot Limit	32"/50"	0.005	0.211	0.2%	10.4%
Option 10. Combine Options 1, 2, and 7.	32"/45"	-0.023	0.202	-1.1%	9.9%
Option 7. Reverse Slot Limit	32"/45"	-0.060	0.153	-3.0%	7.5%

Source: Northern Economics, Inc. estimates based ADF&G Logbook and Statewide Harvest Survey Data.

Table 16 provides a qualitative summary of the effects by option, including charter industry preference based on key informant interviews and qualitative estimates on the benefits of each option to the commercial sector. Generally, charter operators preferred options that provided the least disruption of current business models, while commercial benefits are directly tied to the magnitude and durability of the harvest reductions that the options provide. Key informant interviews indicated that charter operators may prefer no retention by skipper and crew, second fish of a specified minimum size, and annual limit options. Interviewees rate the one-fish bag limit as the most disruptive option. From a commercial perspective, the best options are Option 11 and the one-fish bag limit.

**Table 16 Qualitative Summary of Effects by Option for Area 2C**

Option	Expected Size and Durability of Reductions	Effects on Industry	Effect on State Managed Fisheries
1. One Trip per Vessel per Day	1.8 to 2.4% reduction in harvest. Anglers will likely adapt rapidly.	Relatively minor effects on the charter industry excepting those businesses that focus on multiple trips per day. Minor benefits for the commercial industry.	State managers expect a concurrent minor reduction in the harvest of some associated species.
2. No Retention by Skipper and Crew and Line Limits	3.8 to 4.2% reduction. Skipper and crew demand shifts to non-guided recreational sector	Most preferred option for the charter industry with modest benefits for the commercial industry.	State managers expect a concurrent minor reduction in the harvest of some associated species.
3. Annual Limit	4.3 to 16.4% reduction depending on the annual limit. Reductions are likely durable.	Generally, the second most preferred option by the charter industry. Commercial industry would receive sizable benefits.	State managers expect a modest to significant increase in the charter harvest of available salmon species, lingcod, and rockfish.
4. One-fish bag limit	Reductions between 1.4 % and 58% depending on the temporal length of the bag limit reduction. Reductions are likely more durable.	Highest economic effect on the charter industry with the highest benefits for the commercial fleet. Least preferred option for the charter industry.	State managers expect a significant increase in the charter harvest of available salmon species, lingcod, and rockfish.
5. Option for a Second Fish with a Minimum Length	Reductions between 19.2% percent and 31.3% percent depending on the minimum length for one of two fish in the bag limit. Reductions are likely more durable.	Minor demand reductions expected, but a generally acceptable option for much of the charter fleet particularly at the lower minimum lengths. Modest to high benefits for the commercial fleet.	Charter harvest of state managed species would likely increase by modest amounts.
6. Second Fish Below 32"	25.4% to 36.2% reduction in harvest. Reductions are likely durable.	Large demand reductions are unlikely given that many fish below 32" already represent 48% of harvest. Repeat anglers targeting larger fish may be turned off or may take more trips to equalize their halibut take. Modest to high benefits for the commercial fleet.	Charter harvest of state managed species could increase by modest amounts.
7. Reverse Slot Limit	3.0% increase in harvest to 10.4% decline depending on the slot size and the size of effects	Large demand reductions are unlikely as are large benefits to the commercial fleet.	Charter harvest of state managed species could increase by modest amounts. However, such an increase is not certain.
8. Combine 1, 2 & 5	21.1% to 33.7% harvest reductions depending on the minimum size on one of two fish in the bag limit. Reductions are likely more durable.	Minor demand reductions expected, but a generally acceptable option for much of the charter fleet particularly at the lower minimum lengths. Moderate to high benefits for the commercial fleet.	Individual options have confounding effects on the harvest of state managed species. Overall effects are unclear.
9. Combine 1, 2 & 6	27.2% to 27.8% harvest reductions. Reductions are likely durable.	Large demand reductions are unlikely given that many fish below 32" already represent 48% of harvest. Modest to high benefits for the commercial fleet.	Individual options have confounding effects on the harvest of state managed species. Overall effects are unclear.
10. Combine 1, 2 & 7	1.1 percent increase to 12.8% harvest reduction depending on the slot size and the size of demand effects.	Large demand reductions are unlikely as are large benefits to the commercial fleet.	Individual options have confounding effects on the harvest of state managed species. Overall effects are unclear.
11. Combine 1, 2, 3 & 5	24.2% to 41.4% harvest reductions depending on the annual limit and minimum size on one of two fish. Reductions are likely more durable than some other options.	Demand reductions expected from anglers sensitive annual catch limits. Moderate to high benefits for the commercial fleet.	Individual options have confounding effects on the harvest of state managed species. Overall effects are unclear.

Option	Expected Size and Durability of Reductions	Effects on Industry	Effect on State Managed Fisheries
12. Combine 1, 2, 3 & 6	22.1% to 39.0% harvest reductions depending on the annual limit. Selected.	Demand reductions expected from anglers sensitive annual catch limits. Moderate to high benefits for the commercial fleet. Moderate to high benefits for the commercial fleet.	Individual options have confounding effects on the harvest of state managed species. Overall effects are unclear.
13. Combine 1, 2, 3 & 7	3.4% to 26.9% harvest reduction depending on the slot size and the size of demand effects.	Demand reductions expected from anglers sensitive annual catch limits. Likely minor to modest benefits to the commercial fleet.	Individual options have confounding effects on the harvest of state managed species. Overall effects are unclear.

## Overall and Long-Term Efficacy of the Options and Management Options

The analysis notes that the long-term efficacy of each of the options is likely to be limited by strategic responses to the proposed management options. For example, lowering bag limits during one portion of the season will shift demand to other times of the year. Similarly, season closure dates and closure of specific days of the week will also shift effort. Thus, the estimates for these options should be seen as short-term maximum effects rather than long-term estimates. The efficacy of annual limits is likely to be limited by the substitution of bare-boat charters and other self-guided activities because charter-based trips could become less attractive with the annual limit. Again, the harvest resulting from this behavior would not count against the GHL, but would be counted in the IPHC's deductions for total sport catch from Total CEY. Finally, it should be anticipated that a response to restrictive bag limits in Area 2C may be a shift in pressure to Area 3A where no bag limit is currently being discussed.

## 1.0 ENVIRONMENTAL ASSESSMENT

This Environmental Assessment (EA) assesses the potential biological, social, and economic impacts of alternatives for implementing regulations to restrict charter harvest in Area 2C to its Guideline Harvest Level (GHL) of 1.432 Milb. The National Environmental Policy Act (NEPA) requires a description of the purpose and need for the proposed action, as well as a description of alternative actions that may address the problem.

- The purpose and need is addressed in Section 1.2.
- Section 1.4 describes the alternatives considered for analysis.
- Section 1.8 describes the affected environment.
- Section 1.9 discusses the potential environmental impacts of the alternatives as required by NEPA, as well as impacts on endangered species and marine mammals.
- Section 2.0, the regulatory impact review (RIR), describes potential economic impacts from the alternatives.
- Section 1.0 presents the initial regulatory flexibility analysis (IRFA), which evaluates the impacts on directly regulated small entities.

### 1.1 Background

*The IPHC promulgates regulations governing the Pacific halibut (*Hippoglossus stenolepis*) fishery in compliance with the terms of the Convention between the United States and Canada for the Preservation of the halibut fishery of the North Pacific Ocean and Bering Sea, signed at Washington D.C., on March 29, 1979. The IPHC promulgates regulations on an annual basis that are approved by the Secretary of State of the United States under Section 4 of the Northern Pacific Halibut Act (Halibut Act, 16.U.S.C. 773 – 773k). Pursuant to regulations at 50 CFR 300.62, the approved IPHC regulations are published in the Federal Register to inform persons subject to the regulation.*

Additional management regulations that are not in conflict with those adopted by the IPHC are implemented by the Secretary of Commerce and may be developed by the Regional Fishery Management Council to allocate harvest privileges among U.S. fishermen. The halibut fishery in waters off Alaska (0-200 miles) is under the jurisdiction of the Secretary of Commerce, represented by the National Marine Fisheries Service (NMFS), and advised by the North Pacific Fishery Management Council (Council). These waters comprise IPHC regulatory Areas 2C (Southeast Alaska), 3 (Southcentral Alaska), and 4 (Bering Sea/Aleutian Islands).

Each year, using a combination of harvest data from the commercial, recreational, and subsistence fisheries and information collected during scientific surveys, the IPHC determines the abundance of halibut in each area (exploitable biomass). The biological target level for total removals in a regulatory area is the product of a fixed harvest rate and the estimate of exploitable biomass. This is called the “total constant exploitation yield” (Total CEY) and is the target level for total removals (in net lb) for an area in the coming year. In Area 2C, the IPHC subtracts from the Total CEY estimates of the total “non-commercial” removals for the up coming year. These removals include harvest from recreational anglers, subsistence users, wastage, and bycatch mortalities. The portion of the Total CEY remaining after the removals are subtracted is the CEY available for the commercial longline fishery, the “Fishery CEY.”<sup>2</sup> The actual fishery harvest limit is set with reference to this Fishery CEY.

---

<sup>2</sup> The IPHC does not currently account for mortality resulting from the release of fish in the sport fishery.

With the exception of the charter fishery, and a small increase in subsistence harvest, it is believed that other removals have remained stable. However, the increase in growth for the charter fishery has resulted in an increase in harvest. As the charter fishery removals increase, its harvests reduce the lb available for the commercial halibut fishery. The fishery catch limit is allocated between quota share holders in Area 2C. Each quota share holder receives a percentage of the total poundage available for commercial harvest within a year. This poundage comprises an individual fishing quota.

In 1995, the Council adopted a problem statement recognizing that the increasing amount of harvest in the charter fishery may change the stability, economic viability, and diversity of the halibut industry, the quality of the recreational experience, access for subsistence users, and the socioeconomic well-being of the coastal communities dependent on the halibut resource. This policy statement led to the development of a guideline harvest level (GHL) policy to address the allocative issues between the commercial and the charter sectors.

### *The Guideline Harvest Level*

Since 1993, the Council has discussed the expansion of the charter halibut sector. The issue gained prominence in 1993 when some small Alaskan communities, such as Sitka, expressed concerns about local depletion of the halibut resource and the potential reallocation of greater percentage of the Total CEY from the IFQ fishery to the charter fishery. In response to these concerns, the Council developed a GHL policy to control halibut harvested in the charter sector. In September 2007, the Council took final action on two management actions affecting the halibut fishery: (1) approved recordkeeping and reporting requirements for the charter fishery which was subsequently implemented by ADF&G; and (2) recommended GHLs for Areas 2C and 3A.

On January 28, 2002, the National Marine Fisheries Service (NMFS) published a proposed rule (67 FR 3867) in the *Federal Register* that specified GHLs and a system of harvest reduction measures that would be used to maintain the charter halibut harvest in IPHC Areas 2C and 3A at or below the GHLs. The GHLs established an estimated amount of halibut harvest that may be taken annually in the charter fishery for Areas 2C and 3A.

The proposed rule also described management measures that would be implemented by NMFS to take effect the year following an overage of a GHL. However, the harvest measures as described in the proposed rule could not be implemented. On April 2, 2002, NMFS informed the Council through a letter that the management measures could not be implemented in the year following a GHL overage because of the time lag associated with receiving recreational harvest data from State of Alaska Department of Fish and Game (ADF&G), and a notice and comment period under the Administrative Procedures Act (APA), including an Environmental Analysis, Regulatory Impact Review, and Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) of the harvest control measure would be required.

The final rule implementing the GHL was promulgated by NMFS on August 8, 2003 (68 FR 47256). The rule removed the “problematic” harvest control measures described in the proposed rule because of the timeline associated with meeting the legal requirements of the APA. The final rule established the GHLs as a level of acceptable annual harvests for the charter halibut fishery in IPHC Areas 2C and 3A. The GHLs equal 1.432 Milb net weight in Area 2C, and 3.65 Milb net weight in Area 3A. Since its implementation in 2004, the charter harvest has exceeded the Area 2C GHL by increasing amounts. Post-season harvest projections for the 2006 charter fishing season indicate the GHL were exceeded by 47 percent (680,000 lb).

Charter halibut harvest is effectively unrestricted, because the GHL is not a “hard” cap. The commercial allocation is a hard cap calculated after deducting estimates of other harvests, including charter harvest.

Therefore, as the charter fishery expands, its harvests reduce the allocation to the commercial halibut fishery, and the amount of IFQ available for harvest is reduced.

While commercial quotas fluctuate directly with stock abundance, the fixed GHLS for Areas 2C and 3A are established annually in lb and only respond to a decline in stock abundance. Regulations at 50 CFR 300.65 define GHLS levels in relation to halibut stock abundance (total CEY). The GHLS are reduced if the area-specific total CEY declines by at least 15 percent below the average 1999-2000 total CEY, as determined by the IPHC. For example, if the total CEY in Area 2C were to fall between 15 and 24 percent below its 1999-2000 average, then the GHLS would be reduced to 1.217 Milb. If the total CEY declined by 25 to 34 percent, then the GHLS would be reduced to 1.095 Milb. If the total CEY continued to decline by at least 10 percent, the GHLS would be reduced by an additional 10 percent until it reached a baseline level of 708,000 lb. The GHLS would be increased by commensurate incremental percentage points to its initial level of 125 percent of the average 1995-1999 charter harvest estimates.

The GHLS formula allowed for a 25 percent increase above past charter harvests. The charter sector requested that a fixed allocation be provided to enhance predictability for bookings for the next summer's fishing season. The overall intent was to maintain a stable charter fishing season of historic length, using area-specific measures to control harvests to the GHLS. The GHLS have never been reduced; however, charter halibut harvest in Area 2C has continued to grow, exceeding the GHLS for the first time in 2004 (Table 17).

**Table 17 Area 2C sport catch of Pacific halibut. Values shown for 2006 are projections based on the ADF&G Statewide harvest survey, logbook, and reflect the prohibition on skipper/crew fish in 2006. All lb are net weight (headed and gutted)**

Year	Guided (million lb)	Guided as a percent of GHLS	Unguided (million lb)	Total <sup>d</sup> (million lb)
1995	0.986	67	0.765	1.751
1996	1.187	83	0.943	2.129
1997	1.034	72	1.139	2.172
1998	1.584	110	0.917	2.501
1999	0.938	66	0.904	1.843
2000	1.132	79	1.126	2.258
2001	1.202	84	0.723	1.925
2002	1.275	89	0.814	2.090
2003	1.412	99	0.846	2.258
2004 <sup>a</sup>	1.750	122	1.187	2.937
2005	1.952	136	0.845	2.798
2006 <sup>b</sup>	2.028	142	1.004	3.032
2006 <sup>c</sup>	2.035	142	1.004	3.039

<sup>a</sup> First full charter season under the GHLS harvest policy (final rule published August 3, 2003).

<sup>b</sup> Projection based on traditional linear regression method to estimate harvest based on historical trends in SWHS. Estimate includes skipper and crew fish which accounted for approximately 0.0845 Milb.

<sup>c</sup> Projection based on extrapolated logbook harvest for 2006. Logbook data for 2006 is unverified. For this reason, the IPHC was provided harvest amounts as calculated from the SWHS.

<sup>d</sup> Discrepancies in the total value are from rounding error.

The proposed action was initiated in October 2005, when the Council reviewed 2004 ADF&G data that indicated that the Area 2C GHLS had been exceeded. Implementing management measures to reduce harvests below the GHLS is the next management step as outlined in the Council's GHLS policy. The

Council selected a 5-fish annual limit as its preferred alternative for Area 2C in April 2006 (NPFMC 2006). The Council rescinded its preferred alternative for Area 2C in October 2006, upon request of NMFS because of high implementation and enforcement costs. At that same time, ADF&G data for 2005 and 2006 indicated that the GHL had been exceeded by increasing levels in those two years. The Council added several management options to Alternative 2, which resulted in this revised analysis. If approved, the Council's preferred alternative would be implemented in 2008 at the earliest.

## 1.2 Purpose and Need

The purpose of the proposed action is to reduce charter halibut harvests in Area 2C to the GHL of 1,432 Mlb, which was implemented in 2004. The GHL is intended to stop the reallocation from the commercial to charter sector. Charter halibut harvests in Area 2C have grown an annualized growth rate of 6.8 percent over the past 11 years. The number of active vessels, the total number of active vessels, the total number of clients, the average number of clients per trip, and the average numbers of trips per vessel are all at their highest level in the recorded data period of 1998 through 2006. One of the best measures of upward pressure on demand, the number of clients per trip, has increased steadily in recent years. This increase indicates that the number of clients is rising faster than the number of trips and is likely an indicator of healthy demand for the services provided by the charter fleet. The GHL has been exceeded every year since its implementation.

## 1.3 Problem Statement

The recent expansion of the halibut charter industry may make achievement of Magnuson-Stevens Act National Standards more difficult. Of concern is the Council's ability to maintain the stability, economic viability, and diversity of the halibut industry, the quality of the recreational experience, the access of subsistence users, and the socioeconomic well-being of the coastal communities dependent on the halibut resource. Specifically, the Council notes the following areas of concern with respect to the recent growth of halibut charter operations:

(1) Pressure by charter operations may be contributing to localized depletion in several areas.

(2) The recent growth of charter operations may be contributing to overcrowding of productive grounds and declining harvests for historic sport and subsistence fishermen in some areas.

(3) As there is currently no limit on the annual harvest of halibut by charter operations, an open-ended reallocation from the commercial fishery to the charter industry is occurring. This reallocation may increase if the projected growth of the charter industry occurs. The economic and social impact on the commercial fleet of this open-ended reallocation may be substantial and could be magnified by the IFQ program.

(4) In some areas, community stability may be affected as traditional sport, subsistence, and commercial fishermen are displaced by charter operators. The uncertainty associated with the present situation and the conflicts that are occurring between the various user groups may also be impacting community stability.

### **PROBLEM STATEMENT**

**Adopted February 2006**

Harvest by the guided sport halibut sector has exceeded the Guideline Harvest Level (GHL) recommended by the NPFMC and established by the Secretary of Commerce. The NPFMC adopted the GHL to address the open-ended reallocation of halibut from the commercial to the guided sport sector and to provide a measure of stability to the halibut industry and coastal communities while the NPFMC develops a long-term plan for the guided sport (GS) sector. Designing management measures to maintain stability and prevent the GS sector from exceeding the GHL during this interim period is the responsibility of the NPFMC.

- (5) Information is lacking on the socioeconomic composition of the current charter industry. Information is needed that tracks: (a) the effort and harvest of individual charter operations; and (b) changes in business patterns.
- (6) The need for reliable harvest data will increase as the magnitude of harvest expands in the charter sector.

## 1.4 Description of the Alternatives

In October 2005, the Council reviewed ADF&G Sport Fish Division data that indicated that the GHLS were exceeded in Area 2C in 2004. In conformance with its 2000 policy to implement measures to attain a certain level of harvest reduction, the Council identified alternatives to reduce charter halibut harvests. Those alternatives were based on the suite of proposed measures that were developed over the course of seven separate meetings of the GHL Committee, Advisory Panel, and Council in 2000. The Council selected its preferred alternative for a 5-fish annual limit in April 2006 and rescinded it in December 2006, based on advice from NMFS on its high implementation and enforcement costs. At the same meeting, the ADF&G estimate for 2005 and post-season projection for 2006 indicated that the GHL also had been exceeded in those two years. The Council revised the management options under Alternative 2 during its initial review of this analysis in April 2007, which resulted in this revised analysis.

The analysis employs the best information available. The goal of any restrictive measures would be to reduce sport fishing mortality of halibut in the charter fishery sector in Area 2C to its GHL in a manner that minimizes adverse impacts on the charter fishery, its sport fishing clients, the coastal communities that serve as home port for this fishery, and on fisheries for other species. In addition to the no action alternative, the Council is considering 13 options to reduce halibut harvests to the GHL of 1.432 Mlb in Area 2C. At the request of the Council, the analysis also compares these options relative to a reduced Area 2C GHL, which may be triggered in 2008 as a result of a potentially reduced CEY.

At final action, the Council could select two preferred alternatives, each based on one of two alternate GHLS: (1) current GHL of 1.432 Mlb, and (2) reduced GHL of 1.217 Mlb. The proposed rule would describe the two scenarios and notice the public of potential management measures. Only one of the two scenarios would be implemented in the final rule, based on the Area 2C 2008 CEY set by the IPHC at its January 2008 meeting and implementing regulations for determining the GHL (68 FR 47256).

Alternative 1. No action

Alternative 2. Implement one or more measures to restrict charter halibut harvest to the Area 2C GHL

- Option 1. No more than one trip per vessel per day
- Option 2. No harvest by skipper and crew and line limits
- Option 3. Annual limits of four, five, or six fish per angler
- Option 4. Reduced bag limits of one fish per day in May, June, July, August, September, or for the entire season
- Option 5. A one-fish bag limit with the option to harvest a second fish larger than 45 inches or 50 inches
- Option 6. A two-fish bag limit with one fish of any size and one fish 32 inches or less in length
- Option 7. A two-fish bag limit with one fish of any size and one fish 32 inches or less in length or larger than 45 inches or 50 inches

- Option 8. Combination of Options 1, 2, and 5
- Option 9. Combination of Options 1, 2, and 6
- Option 10. Combination of Options 1, 2, and 7
- Option 11. Combination of Options 1, 2, 3, and 5
- Option 12. Combination of Options 1, 2, 3, and 6
- Option 13. Combination of Options 1, 2, 3, and 7

#### **1.4.1 Alternative 1.**

Taking no action would result in no new measures to reduce charter halibut harvests to the Area 2C GHL. Alternative 1 includes “current” Federal and State regulations that would otherwise remain unchanged. Emergency orders were issued by ADF&G in 2006 and 2007 to prohibit a sport fishing guide and sport fishing crew member on a charter vessel in Southeast Alaska from retaining fish while clients are onboard the vessel from May 1, 2007, through December 31, 2007 (E.O. 1-R-02-07). State regulations for Southeast Alaska also limit the number of lines in the water to the number of paying clients. These two measures (prohibition on skipper and crew halibut and line limits) are also included under Alternative 2, Option 2, but would be implemented under Federal regulations.

In January 2007, the IPHC recommended a reduction in the charter fishing bag limit for halibut in Area 2C from two fish to one fish between June 15 and July 30, 2007. The IPHC’s action was a response to increasing harvests from the charter sector, which has experienced a substantial increase in capacity and catch during the last 10 years. Moreover, the IPHC believed it needed to take action because alternatives under consideration by the Council in this analysis would not be in place prior to 2008. The IPHC traditionally decreased the commercial harvest to account for non-commercial removals, including the charter harvest.

In March 2007, the Secretary of State in consultation with the Secretary of Commerce rejected the IPHC’s recommendation for a bag limit reduction. The Secretaries cited concerns about the potential economic impact to the charter fishery and wanted NMFS to analyze a suite of alternatives that would reduce harvest to level comparable to the IPHC’s action while minimizing the economic impacts on the charter sector. On April 6, 2007, NMFS proposed regulations (72 FR 17072) that would restrict the harvest of halibut by persons fishing on a charter vessel in Area 2C. The current sport fishing catch or bag limit of two halibut per day is proposed to be changed for a person sport fishing on a charter vessel in Area 2C to require that at least one of the two fish taken in a day be no more than 32 inches in length. This proposed regulatory change was deemed necessary to reduce the halibut harvest in the charter vessel sector while minimizing negative impacts on this sector, its sport fishing clients, and the coastal communities that serve as home ports for the fishery.

At the time of final action in early June 2007, it may be possible to consider proposed Secretarial action to limit charter halibut harvests in 2007 as part of the status quo because the associated regulations are expected to be implemented prior to Council action. Under that scenario, Action 1 is the same as Alternative 2, Option 6.

### 1.4.2 Alternative 2.

Alternative 2 proposes to implement one or more management measures to restrict charter halibut harvests to the Area 2C GHL of 1.432 Mlb (or a reduced GHL of 1.217 Mlb) for 2008 and beyond. Such action would supersede a proposed NMFS action to implement a regulation that would require one of two fish in a bag limit to measure 32 inches or less. Eight management measures and combinations of these measures are included under this alternative under 13 specific options. The eight measures include: (1) No more than one trip per vessel per day; (2) No harvest by skipper and crew; (3) A limit on the number of lines to not exceed the number of paying clients; (4) Annual limits of four fish, five fish, or six fish per angler; (5) Reduced bag limits of one fish per day in May, June, July, August, September or for the entire season; (6) Requiring one of two fish in a daily bag to be larger than 45 inches or 50 inches; (7) Requiring one of two fish in a daily bag to measure 32 inches or less; and (8) A reverse slot limit requiring one of two fish in a daily bag limit to measure 32 inches or less or longer than either 45 inches or 50 inches.

If the Annual Total Constant Exploitation Yield for Halibut in Area 2C is More Than:	Then the GHL for Area 2C will be:
(i) 9,027,000 lbs. (4094.5 mt)	1,432,000 lbs. .... (649.5 mt)
(ii) 7,965,000 lbs. (3612.9 mt)	1,217,000 lbs. .... (552.0 mt)
(iii) 6,903,000 lbs. (3,131.2 mt)	1,074,000 lbs. .... (486.7 mt)
(iv) 5,841,000 lbs. (2,649.4 mt)	931,000 lbs. .... (447.2 mt)
(v) 4,779,000 lbs. (2,167.7 mt)	788,000 lbs. .... (357.4 mt)

The Council may select one set of management measures as its preferred alternative for the current GHL *and* another set of (more restrictive) management measures should the GHL be reduced as a result of an IPHC action in January 2008 that might set a CEY for Area 2C that would automatically trigger a reduction in the GHL (see formula for setting the GHL in box at left). Both sets of proposed measures would be published in the proposed rule. The final rule would publish the final regulations after the IPHC sets the CEY.

### 1.5 Action Area

The action considered in the analysis would occur in IPHC regulatory Area 2C (Figure 1).

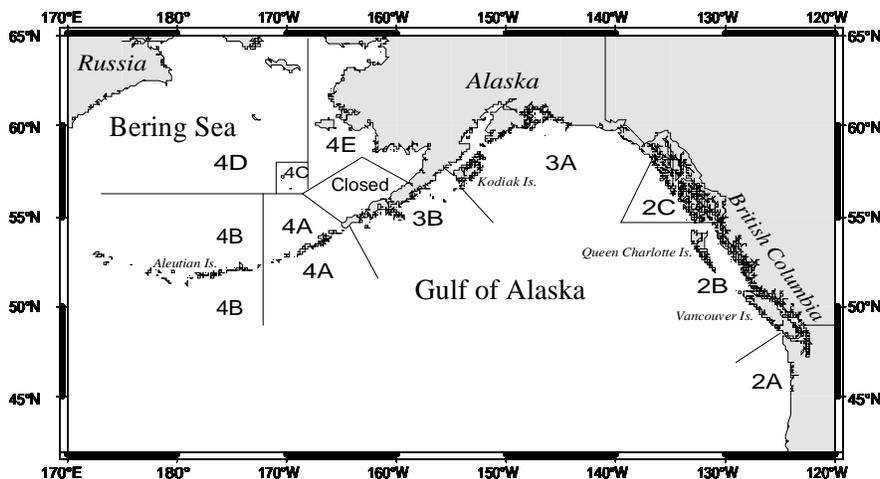


Figure 1 IPHC regulatory areas in the northern Pacific Ocean and Bering Sea

## 1.6 Relationship of this action to Federal law

While NEPA and the Regulatory Flexibility Act (RFA) are the primary laws directing the preparation of this document, a variety of other Federal laws and policies require environmental, economic, and socio-economic analysis of proposed Federal actions. This document contains the required analysis of the proposed Federal action to ensure that the action complies with these additional Federal laws and executive orders (EOs):

- Convention between the United States and Canada for the Preservation of the halibut fishery of the North Pacific Ocean and Bering Sea (Convention). Northern Pacific Halibut Act (Halibut Act, 16 U.S.C. 773-773k)
- Endangered Species Act
- Marine Mammal Protection Act
- Administrative Procedure Act
- Information Quality Act

## 1.7 Related NEPA Documents

The NEPA documents listed below have detailed information on the halibut fishery, groundfish fisheries with halibut bycatch, and on the natural resources, the economic and social activities, and communities affected by those fisheries:

- Groundfish Programmatic Supplemental Environmental Impact Statement (PSEIS) (NMFS 2004)
- Essential Fish Habitat Environmental Impact Statement (EIS) (NMFS 2005b)
- The Harvest Specifications Environmental Impact Statement (EIS)(NMFS 2007)
- Guideline Harvest Level Environmental Assessment (EA, Council 2003)
- Draft EA for measures to reduce charter harvest in Area 2C to the GHL (Council 2007b)
- EA regulatory amendment to define subsistence halibut fishing in Convention Waters (Council 2003b)

## 1.8 Affected Environment

The NEPA documents listed below contain extensive information on the fishery management areas, marine resources, ecosystem, social and economic parameters of these fisheries, and the annual harvest specifications. Rather than duplicate an affected environment description here, readers are referred to those documents. All of these public documents are readily available in printed form or over the Internet at links given in the references. Because this action is limited in area and scope, the description of the affected environment is incorporated by reference from the following documents:

Groundfish Programmatic EIS. The Alaska Groundfish Fisheries Final Programmatic Supplemental Environmental Impact Statement (PSEIS) evaluates the fishery management policies embedded in the GOA and BSAI groundfish FMPs against policy level alternatives and the setting of TACs, allowable biological catch (ABC), and overfishing level (OFL) at various levels (NMFS 2004). The PSEIS is available at <http://www.fakr.noaa.gov/sustainablefisheries/default.htm>. The following sections of this document are particularly relevant:

- Section 3.3 contains a description of the physical oceanographic environment for BSAI and GOA waters.

- Section 3.5.2 contains descriptions of prohibited species management, life history characteristics, trophic interactions, past and present effects analysis, comparative baseline and cumulative effects analysis.
- Section 3.5.3 contains descriptions of target groundfish species management, life history characteristics, trophic interactions, past and present effects analysis, comparative baseline and cumulative effects analysis.
- Section 3.9.2.4 contains socio-economic information on fishing sectors, including the hook and line sectors.

Harvest Specification EIS. The EIS analyzed the Council’s harvest strategy for the GOA fisheries (NMFS 2007). The EIS included ecosystem considerations section of the Stock Assessment and Fishery Evaluation (SAFE) reports. The EIS also contains a detailed discussion of the prohibited species catch limits, which include a discussion on the management of halibut bycatch. <http://www.fakr.noaa.gov/analyses/specs/eis/default.htm>.

Essential Fish Habitat Identification and Conservation in Alaska EIS. (NMFS 2005b) This EIS reexamines the effects of fishing on EFH in waters off Alaska, presents a wider range of alternatives, and provides a thorough analysis of potential impacts on EFH caused by the groundfish fishery. The analysis provides a description of managed groundfish species, marine mammals, and the socioeconomic environment in the Central GOA trawl fishery. The analysis indicates that there are long-term effects of fishing on benthic habitat features off Alaska and acknowledges that considerable scientific uncertainty remains regarding the consequences of such habitat changes for the sustained productivity of managed species. The EIS is found at <http://www.fakr.noaa.gov/habitat/seis/efheis.htm>.

Steller Sea Lion Protection Measures Final Supplemental Environmental Impact Statement (SEIS). (NMFS 2001) The SEIS evaluates alternatives to mitigate potential adverse effects as a result of competition for fish between Steller sea lions under a no action alternative as well as other alternatives that would substantially reconfigure the GOA and BSAI groundfish fishery. Impacts are disclosed, both significantly positive and significantly negative as required by NEPA. A biological opinion prepared according to the Endangered Species Act is included for the preferred alternative. This document also describes the life history characteristics of Steller sea lions and potential interactions with the groundfish fishery. For more information see <http://www.fakr.noaa.gov/sustainablefisheries/seis/sslpm/default.htm>.

For those groundfish stocks where information is available, none are considered overfished or approaching an overfished condition and all are managed within the annual harvest specifications. The ABC, OFL, and TAC amounts for each target species or species group for 2006 is specified in the *Federal Register* (71 FR 10870, March 3, 2006). The status of each target species category, biomass estimates, and acceptable biological catch specifications are presented both in summary and in detail in the annual SAFE reports (Council 2005b). The SAFE report also updated the economic status of the groundfish fisheries off Alaska and presented the ecosystem considerations relevant to the GOA. This EA incorporates by reference stock status information in the SAFE reports (Council 2005).

The IPHC annually publishes a summary of current management, research, and harvest recommendations for its annually meeting. This document may be found on the IPHC’s website at <http://www.iphc.washington.edu/halcom/default.htm>.

## **1.9 Potential Environmental Impacts**

The approach to reducing charter halibut harvest in Area 2C is limited in scope and will not likely affect all environmental components within that area. Table 18 shows the three potentially affected components: groundfish, halibut stocks, and the socioeconomic environment. The potential effects of the alternatives

on the resource could be caused by increased harvest of groundfish species, incidental catch of groundfish species, and an increase in halibut mortality.

**Table 18 Resource components potentially affected by the proposed alternatives**

Alternatives	Potentially Affected Component								
	Non-halibut prohibited species	Physical	Benthic Comm.	Groundfish	Marine Mammals	Seabirds	Non-specified Species	Halibut	Socio-economic
Alt 1	N	NA	NA	NA	NA	NA	NA	NA	NA
Alt 2, Opt 1	N	N	N	N	N	N	N	N	N
Alt 2, Opt 2	N	N	N	N	N	N	N	N	N
Alt 2, Opt 3	N	N	N	N	N	N	N	N	N
Alt 2, Opt 4	N	N	N	Y	N	N	N	Y	Y
Alt 2, Opt 5	N	N	N	Y	N	N	N	Y	Y
Alt 2, Opt 6	N	N	N	N	N	N	N	N	N
Alt 2, Opt 7	N	N	N	Y	N	N	N	Y	Y
Alt 2, Opt 8	N	N	N	Y	N	N	N	Y	Y
Alt 2, Opt 9	N	N	N	Y	N	N	N	Y	Y
Alt 2, Opt 10	N	N	N	Y	N	N	N	Y	Y
Alt 2, Opt 11	N	N	N	Y	N	N	N	Y	Y
Alt 2, Opt 12	N	N	N	Y	N	N	N	Y	Y
Alt 2, Opt 13	N	N	N	Y	N	N	N	Y	Y

N = no impact beyond status quo anticipated by the option on the component.

Y = an impact beyond status quo is possible if the option is implemented.

Negative impacts on non-halibut prohibited species, including salmon, are not expected because current ADF&G and Federal management closely monitors stock health, allocation, and restricts harvest from all sectors to biological management goals. The alternatives would not significantly change the amount of these species harvested, fishing methodology, areas fished, seasons fished, or fishing intensity. Salmon is the primary prohibited species other than halibut targeted in the sport fishery. Information is not available to predict small changes in harvest patterns due to the alternatives, however, given the magnitude of the charter fishery, angler preferences, specialized gear to target halibut, and current regulations to control sport harvest, any increase in salmon removals is likely to be small and would be regulated within biological limits.

The socioeconomic environment may be affected through changes in angler demand for charter halibut trips which may decrease total revenue over the short and long run. The socioeconomic environment for the charter and commercial sector may also be affected by allocation conflicts for fully utilized species such as halibut, rockfish, and salmon. A detailed discussion of potential socioeconomic impacts is provided in Section 2.0.

No effects are expected on the physical environment, benthic community, non-specified and forage species, marine mammals, and sea bird components of the environment. No effect is expected because current fishing practices (e.g., season and gear types) harvest limits, or regulations protecting habitat and important breeding areas as described in previous NEPA documents (Section 3.0) would not be changed by any of the alternatives. No effects are expected for marine mammals because existing protection measures would not be changed, nor would allowable harvest amounts for important prey species. None of the alternatives would change TAC amounts, methods, season closure dates, or areas closed to fishing.

The significance ratings are: significantly beneficial, significantly adverse, insignificant, and unknown. Where sufficient information on direct and indirect effects is available, rating criteria are quantitative in nature. In other instances, where less information is available, the discussions and rating criteria are qualitative. In instances where criteria to determine an aspect of significance (significant adverse, insignificant, or significant beneficial) do not logically exist, no criteria are noted. These situations are termed “not applicable” in the criteria tables.

Differences between direct and indirect effects are primarily linked to the time and place of impact. Direct effects are caused by the action and occur at the same time and place. Indirect effects occur later in time and/or are further removed in distance from the direct effects (40 CFR 1508.27). For example, the direct effects of an alternative which lowers the harvest level of a target fish could include a beneficial impact to the targeted stock of fish, a neutral impact on the ecosystem, and an adverse impact on net revenues to fishermen, while the indirect effects of that same alternative could include beneficial impacts on the ability of Steller sea lions to forage for prey, neutral impacts on incidental levels of PSC, and adverse impacts in the form of economic distribution effects, for example, reducing employment and tax revenues to coastal fishing communities.

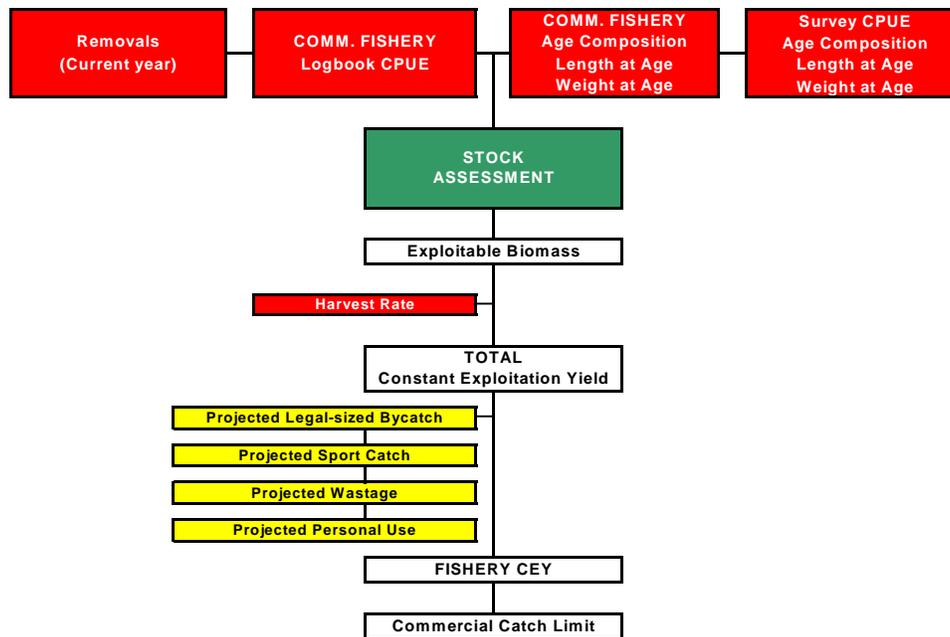
## **1.10 Potential Impacts on Resource Components**

### **1.10.1 The Pacific Halibut Stock**

The IPHC sets area catch limits for the commercial fishery in proportion to halibut abundance. This harvest philosophy protects against overharvest of what may be separate, but unknown, genetic populations, and spreads fishing effort over the entire range to prevent regional depletion. Small scale local depletion does not have a significant biological effect on the resource as a whole. The IPHC considers the halibut resource to be a single population. Egg and larval drift and subsequent counter migration by young halibut cause significant mixing within the population. Ultimately, counter migration and local movement tend to fill in areas with low halibut density, although continued high exploitation will maintain local depletion. However, estimates of local biomass and information about immigration and migration rates on a high geographical resolution are not available to manage small areas.

As described by Clark and Hare (2005), the annual exploitable biomass is estimated by fitting a stock assessment model using available data from the commercial fishery and scientific surveys in each area. Total CEY is calculated by applying a target harvest rate (22.5 percent in Area 2C in 2007) to the exploitable biomass estimate.

The Fishery CEY is calculated by subtracting estimates of all unallocated removals (which include legal-sized bycatch, legal-sized wastage, personal use, and charter and non-guided catch) from the Total CEY (Figure 2). The IPHC uses harvest estimates from the previous year for all non-commercial categories except sport harvest because removal numbers are stable between years. Because charter harvest has continued to grow over the last decade, a projection method based on historical harvest levels is used to estimate harvest for the year in which commercial quota is established.

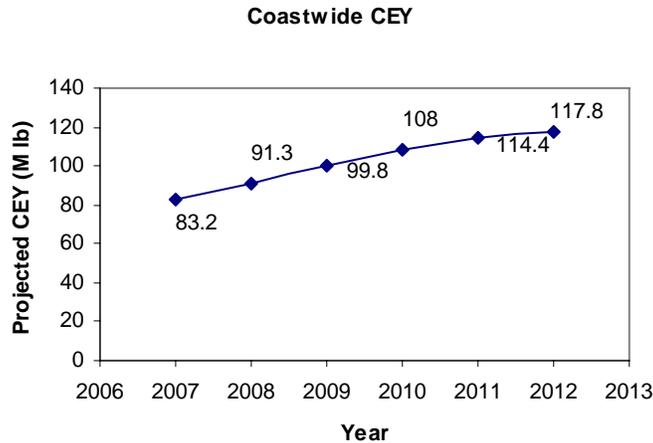


**Figure 2 The IPHC's stock assessment and catch limit setting process for Area 2C**

After the harvest deductions are made, the remainder comprises the Fishery CEY. The commercial catch limit is set based on the Fishery CEY. In setting the commercial catch limits, the IPHC considers area-specific harvest policy objectives and also applies its Slow Up/Fast Down<sup>3</sup> policy in setting the commercial halibut fishery catch limits. Thus, the commercial catch limits may be greater than or less than, and do not necessarily equal, the Fishery CEY. The commercial catch limit is currently only set for commercial fisheries for hook and line gear. The nature of this process means that changes in the charter harvest affect the commercial catch limits with a lag, and not immediately on a lb for lb basis.

Growing concerns about net migration from the western to the eastern Gulf of Alaska have led the staff to doubt the accuracy of the closed-area assessments that have been done for many years (Clark and Hare 2006). In 2006, IPHC staff changed the structure of its stock assessment model because of new scientific information that modified previous model assumptions about migration between regulatory areas. The new estimation technique considered tagging data and mortality rates which suggested that a fraction of halibut continue to migrate eastward beyond eight years of age. This discovery changed the traditional “closed-area” approach used by the IPHC. Clark and Hare (2006) reported that a comparison of total yield between the coastwide assessment with survey apportionment and a closed-area assessment produced very similar biomass estimates, but the distribution of yield among regulatory areas was much different. The coastwide assessment indicated more biomass was available in Areas 3B and 4 and less in Area 2 than the levels calculated using the closed area model. Figure 3 shows projected CEY on the basis of the 2006 coastwide stock assessment, a 20 percent coastwide target harvest rate, and the biomass distribution estimated from the 2004-2006 survey CPUE by area.

<sup>3</sup> The IPHC can recommend a Fishery CEY that are responsive to rapid changes in halibut abundance. For example, if the halibut stock is rapidly declining, the Commission may recommend a lower Fishery CEY incremented over several years to dampen the effects of the stock decline. Conversely, if the stock is in rapid increase, the Fishery CEY may be increased over number of years rather than one large increase.



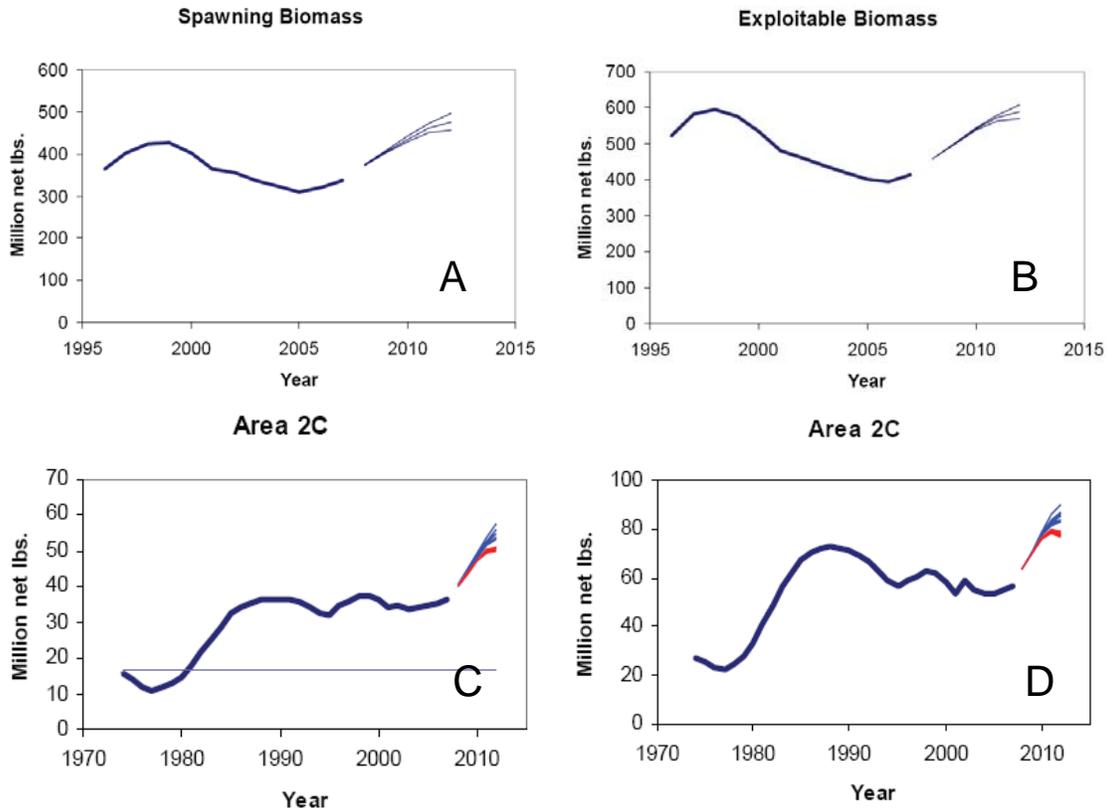
**Figure 3 Coastwide CEY projection through 2012 (IPHC 2007)**

The IPHC did not adopt staff recommendations for the 2006 projections for Area 2C and, instead, adopted a CEY of 8.3 M lb. The Commission believed that further examination of options for partitioning the coastwide biomass estimate for each area before it adopted the new approach. Thus, the IPHC relied on previous methodology of separate regulatory assessments as the basis for determining 2007 catch limits. Lower catch rates in the eastern portion of the stock prompted the IPHC to recommend more restrictive catch limits for Area 2C. A stakeholder committee will meet with staff to learn more about the coastwide model and make recommendations to the IPHC on adopting the new model for Area 2C in 2008. Using an area-wide approach, yields are projected to increase in Area 2C (after being adjusted downward as a result of the new migration model) over the next five years. While the area trends are probably accurate, the absolute biomass estimates are not (Clark, pers. commun.).

For Area 2C, the coastwide model predicted a harvest limit of 7.81 Milb whereas the closed area model predicted an allowable harvest level of 9.12 Milb. The IPHC recommended a 2007 harvest level of 8.51 Milb and discussed holding a work shop to discuss the modeling changes in 2008 and determine its application. The IPHC believed that further examination of options for partitioning the coastwide biomass estimate for each area was needed before it adopted the new modeling approach. Thus, the IPHC relied on previous methodology of separate regulatory assessments as the basis for determining 2007 catch limits.

The exploitable biomass for the coastwide projection and Area 2C projection is expected to increase during the next ten years. Note that the projections in Figure 4 assume the CEY in depicted in Figure 3 is harvested in the future and the IPHC authors report the following caution about the area-specific projection:

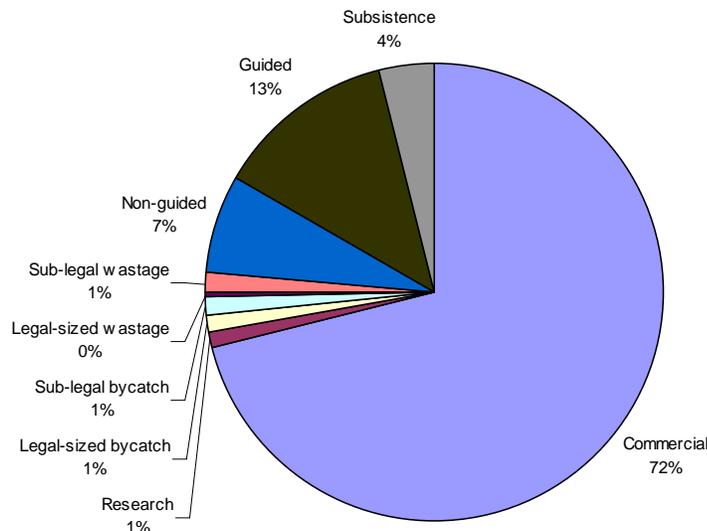
*“At this juncture it is uncertain what future harvest rates will be applied to the different regulatory areas. Further, the closed areas assessments do not portray the same biomass distribution as the coastwide assessment. We do believe, however, that the closed area assessments provide a generally accurate portrayal of past trends and future projections. What is uncertain is the vertical scale for the different areas. We have included area-specific projections from the closed area assessments for illustrative purposes.” (IPHC 2007).*



**Figure 4** Five year project for coastwide spawning biomass (A) and exploitable biomass (B), and Area 2C spawning biomass (C) and Area 2C exploitable biomass (D) using a closed area assessment. Projection assumes a 0.20 harvest rate.

Additional descriptive information on surveys, stock assessments, and research on halibut can be found in detail in the 2007 Report of Assessment and Research Activities (IPHC 2007). Further details on the management, production history, and life history of halibut are described in Section 3.7.2 of the SEIS (NMFS 1998) and the 2004 IPHC annual report.

Pacific halibut is fully utilized in Area 2C. Three major categories of use occur in Alaska for halibut: commercial, sport, and subsistence (Figure 5). Commercial harvests account for the largest portion of total use in Area 2C, comprising approximately 72 percent of the removals, not including approximately five percent of bycatch and wastage. Sport users are divided into two subcategories: guided and non-guided. Approximately 13 percent of the total removals come from the charter sector and 7 percent from the non-guided sector. Subsistence (personal use) comprises the smallest portion of cultural use at 4 percent of the total removals. Wastage removals represent the mortality of legal-sized halibut due to lost or abandoned gear, and of sublegal-sized halibut discarded in the halibut fishery. Since the implementation of the quota share fisheries in the 1990s, the total mortality of legal-sized halibut from lost gear in all areas has remained under 0.5 MIb annually. Bycatch mortality accounts for halibut that die from being caught in other fisheries. The 2006 bycatch mortality estimate of 0.16 MIb in Area 2C is the lowest since 1987 but similar to the estimates for the last several years (Table 3).



**Figure 5** Five year average (2002-2006) proportion halibut removed by category in Area 2C.

In 2006, the total for the removal categories were approximately 14.73 Mlb. The bycatch categories in Table 19 include legal and sub-legal mortalities. The legal mortality category is composed of halibut caught in the non-halibut commercial fishery that are discarded, but are of at least 32 inches in length. Sub-legal halibut are those discarded in the commercial that are less than 32 inches in length.

**Table 19** Five year summary of removals by category for IPHC Area 2C.

Year	Commercial			Research Fish (Mlb)	Bycatch mortality		Wastage		Non-charter Removals (Mlb)	Charter Removals (Mlb)	Subsistence Removals (Mlb)
	Quota (Mlb)	Removals (Mlb)	Gross ex-vessel revenues		Legal (Mlb)	Sub-legal (Mlb)	Legal (Mlb)	Sub-legal (Mlb)			
2002	8.50	8.455	\$19.09	0.145	0.18	0.16	0.03	0.11	0.81	1.28	0.170
2003	8.50	8.286	\$24.98	0.124	0.17	0.17	0.03	0.10	0.85	1.41	0.628
2004	10.50	10.114	\$31.31	0.186	0.15	0.21	0.03	0.27	1.19	1.75	0.677
2005	10.93	10.489	\$33.70	0.141	0.14	0.20	0.03	0.23	0.85	1.95	0.598
2006	10.63	10.374	\$38.95	0.096	0.14	0.20	0.02	0.28	1.00	2.03	0.598

Note: weights measured in millions of lb headed and gutted net weight.

### *Commercial removals*

The original groundfish fishery management plans for the Bering Sea/Aleutian Islands and Gulf of Alaska designated Pacific halibut as a prohibited species to any new commercial development due to its historical usage by the longline (or setline) fishery. The commercial halibut fishing fleet is diverse, using various types of longline gear and strategies. An individual fishing quota program was implemented in 1995 (50 CFR 300.60 through 300.65). The IFQ program enabled an eligible vessel to fish any time between March 5 and November 15 in 2006. Total setline CEY (at a harvest rate of 22.5 percent for Areas 2C and 3A) for Alaska waters is estimated to be high, at just under 74 Mlb, which indicates the halibut resource is very robust (IPHC 2005). In Area 2C, the fishery CEY has ranged from 8.5 Mlb to 10.93 Mlb during the last five years.

Halibut begin recruiting to longline gear at approximately 60 cm in length, but the commercial minimum size limit is 32 inches (82 cm). The fishery ranges from shallow inshore waters to as deep as 275 meters along the continental shelf. The directed catch consists of individuals chiefly from 7 kg. to 121 kg. The

average size in the commercial catch in 1996 was between 9 kg. and 20 kg depending on the area caught; the average age was 12 years (Forsberg, J., Unpub 1997).

The IFQ program has kept catches within harvest limits, reduced the amount of lost gear and wastage due to “ghost fishing,” and allowed the commercial fishery to operate during a long period which has had the ancillary affect of increasing safety. The annual amount of IFQ for the commercial hook and line fisheries is established annually by the Secretary of Commerce, based on recommendations from the IPHC.

Harvest from the commercial fishery is tracked by NMFS using a catch accounting system that deducts harvest from an IFQ holder’s account. This information is also used to enforce the total annual quota as well as individual IFQ accounts. Thus, since the IFQ program, annual harvest limits have not been exceeded by a significant margin. The IFQ program has an overage/underage provision that balances an IFQ holder’s account, year to year. This regulation results in a long-term balance of harvest at the catch limit and allows IFQ holders to move small amounts of halibut between years.

Halibut bycatch and wastage occurs in the groundfish and salmon fisheries operating in waters off Alaska. The effects of these fisheries on halibut are primarily managed by conservation measures developed and recommended by the Council over the entire history of the Federal Fishery Management Plans (FMPs) for the Bering Sea and Aleutian Island (BSAI) and Gulf of Alaska (GOA) and implemented by Federal regulation. These measures can be found at 50 CFR 679.21 and include catch limitations on a year round and seasonal basis. These management measures are discussed further in the following documents:

- Sections 3.6.1 and 3.6.2 of the GOA and BSAI FMPs (Council, 2005a and b) cover management of the bycatch of halibut in the groundfish fisheries. The FMPs are available at <http://www.fakr.noaa.gov/npfmc/default.htm>.
- Section 3.5 of the PSEIS (NMFS 2004) reviews the effects of the groundfish fishery on halibut. The PSEIS is available at <http://www.fakr.noaa.gov/sustainablefisheries.seis/intro.htm>.
- Charter 7 of the Alaska Groundfish Harvest Specification EIS (NMFS 2007) provides an overview of prohibition species catch management, including halibut bycatch.

The annual amount of halibut bycatch and wastage is treated as a hard cap in groundfish fisheries. Fisheries are often closed to directed fishing when halibut bycatch allotments are taken. As a result, fishing morality has remained relatively constant; with the total amounts depending on the type of fisheries being prosecuted and total effort. In Area 2C, bycatch and wastage have accounted for approximately 4 percent of the total removals.

The catch limit for the commercial longline fishery in Area 2C is set once all other removals are deducted from the available yield. The increase in charter removals results in a reduction of the commercial sector harvest over an extended period of time. In a given year, non-commercial removals are not necessarily deducted on a lb for lb basis. For example, harvest quota for the commercial fishery set in 2007 includes historical sport harvest from 2006, but the 2007 sport harvest is unknown. Thus, an increase of sport harvest above the level predicted in 2006 is accounted for in future commercial quotas. Over the long-term, this overage is balanced, resulting in a loss of commercial quota share. This same relationship would occur if any other non-commercial removals increased rapidly (and unpredictably) from year to year. Of the non-commercial removals accounted for by the IPHC, the charter harvest has increased at a rapid rate, whereas other removals have remained relatively constant. The relationship between the charter and commercial sectors has resulted in consideration of numerous actions to control charter halibut removals, including the proposed action.

*Sport fishing removals*

Sport fishing for halibut in Southeast Alaska is an important recreational activity for resident and non-resident anglers. Sport harvests rapidly increased in the late 1980s to mid-1990s as indicated by a continued increase in targeted effort (Tersteeg and Jaenicke 2005). A portion of the marine sport fishing effort is directed at halibut and state-managed groundfishes, including rockfishes, lingcod, and sharks. Fishing effort is mostly concentrated around Juneau, Ketchikan, Sitka, Wrangell, and Petersburg. However, substantial effort is reported near remote fishing lodges and smaller communities throughout the region, such as Craig, Gustavus, and Yakutat (Tersteeg and Jaenicke 2005). These remote communities offer charter and bareboat services. Bareboat services allow anglers to rent a vessel that is unguided. These anglers are generally provided with instruction from a lodge about good fishing locations and technique.

As reported in IPHC (2005), Alaska sport harvest estimates are derived from a statewide postal survey in conjunction with creel surveys at points of landing. Final estimates lag by one year and are derived from a combination of linear projections of halibut harvested in the previous five years, current average weights, and current in-season data. Charter halibut harvests between 1995 and 2005 nearly doubled in Area 2C (from 986,000 to 1,950,000 lb) and account for approximately 13 percent of the average halibut removals during the last five years (Table 20).

**Table 20. Charter halibut participation, effort, and harvest during 1995-2005**

2C Year	Charter							Anglers	
	Licensed businesses	Active vessels	Total trips	Charter Avg. trip/ vessel	Number harvested	Million lb harvested	Percent harvested	Sportfish licenses	Halibut Clients*
1995	na	na	na	na	49,615	0.986		90,940	na
1996	na	na	na	na	53,590	1.187	20%	94,677	na
1997	na	na	na	na	51,181	1.034	5%	98,265	na
1998	na	569	15,541	27	54,364	1.584	61%	97,079	55,922
1999	387	591	15,700	27	52,735	0.939	-5%	100,801	56,173
2000	412	634	20,241	32	57,208	1.132	15%	105,245	72,803
2001	386	627	18,965	30	66,435	1.202	22%	103,341	69,222
2002	351	567	15,085	27	64,614	1.275	29%	106,561	52,809
2003	353	590	16,948	29	73,784	1.412	43%	105,827	59,498
2004	365	624	19,111	31	84,327	1.75	77%	121,858	67,803
2005	381	654	na	na	102,206	1.95	98%	na	na

\* an increasing number of sportfish licenses are sold over the internet

Sources: (1) Charter and Clients – ADF&G (2) Commercial – NMFS RAM Division

Regulations by both Federal and State agencies affect the halibut fishery. Federal sportfishing regulations are found at 50 CFR 300.62. The 2006 annual measures for halibut fisheries were published at 71 FR 10850, Part 24. The GHL regulations are published at 50 CFR 300.65.

Federal regulations require the following:

- The daily bag limit is two halibut with 4 in possession
- The sport fishing season February 1 – December 31
- No person shall fillet, mutilate, or otherwise disfigure a halibut in any manner that prevents the determination of minimum size or the number of fish caught while onboard the catcher vessel.
- No halibut caught for sport harvest shall be offered for sale, bartered, or traded.

- No halibut caught while sport fishing shall be possessed on board a vessel when other fish or shellfish aboard the said vessel for destined for commercial use, sale, trade, or barter.
- The operator of a charter vessel shall be liable for any violations of these regulations committed by a passenger aboard said vessel.

State of Alaska fishing seasons and reporting requirements for the charter fishery are included below.

- Most anglers must have a current year's Alaska sport fishing license. There are three exceptions:
  - Resident and non-resident anglers younger than 16 do not need a sport fishing license.
  - Alaska resident anglers 60 and older must have a free ADF&G Permanent ID Card.
  - Alaska resident disabled veterans (50 percent or greater) must have a free ADF&G Disabled Veteran's Permanent ID Card.
- When a fish is landed and killed it becomes part of the bag limit of the person originally hooking it. Once you have attained your bag limit, you are not allowed to catch and keep halibut for anyone else on the vessel that same day.
- When a fish is landed and killed it becomes part of the bag limit of the person originally hooking it. Once you have attained your bag limit, you are not allowed to catch and keep halibut for anyone else on the vessel that same day.

The sport fishery has a certain level of catch-and-release mortality, which results from physiological injury, stress, or handling. In some high use fisheries such as the Madison River trout fisheries in Yellowstone National Park, the mortality rate is cumulative because fish may be released multiple times. The level of mortality depends on several factors, including the hooking location, handling time, type of gear used, environmental characteristics (e.g., warm water), and a species physiology. Meyer (2007) provides a brief discussion of release mortality as it relates to Pacific halibut. This discussion is provided in Appendix II. Meyer (2007) estimated that the release mortality rate for Pacific halibut was approximately 5 percent in Area 2C, which means approximately five percent of the halibut caught and released die soon after being caught.

For the following reasons, this analysis can provide only a qualitative discussion about the impacts of release mortality on halibut for the alternatives:

1. **Behavioral changes:** If implemented, Alternative 2, Options 4 - 7 (and in combination with other options in Options 8 -13) would likely change the selection process that anglers use when determining which fish to harvest or release. Anglers may consider trip attributes such as the length of a trip, what other party members have caught, weather and sea conditions, sea sickness, availability of alternative species, residency, and maximization of poundage when decided to release a fish. These behavioral characteristics may correspond with the ability of an angler to maximize the two fish bag limit either for poundage, numbers of fish, or both. Under a more restrictive harvest regime anglers are likely to change how they use these selection criteria to make harvest decisions. In addition, some anglers may completely drop out of the fishery under a new regulation.
2. **Data limitation:** The data currently available (creel census, logbook, SWHS) has been collected under a two fish bag limit regulation. This data does not include a size distribution for released fish or information about the size of halibut caught by an individual angler or the type of trip an angler took (e.g., cruise ship vs. lodge). The number of the halibut that die following release could be estimated from ADF&G logbook, creel, or mail survey data. However, size information is necessary to convert this estimate to poundage. The average weight of released fish is lower than the average weight of harvested fish because anglers preferentially target larger fish. Additionally, because of the angler selection process

previously described, a mortality estimate based on current data may not accurately portray conditions for the non-status quo alternatives.

The previously described limitations make it difficult to predict changes in halibut mortality. However, a qualitative discussion provides insight into the relative impact each alternative may have on the number of fish released in comparison with status quo. Alternative 2, Option 4 is likely to have a higher amount of release mortality than the other options because it provides the most restrictive measure in terms of limiting an angler to harvest one fish. Alternative 2, Option 5 is likely to have the next highest amount of release mortality as anglers would need to cycle through fish to catch one of 45 inches or greater or 50 inches or greater. The number of fish an angler cycles through may increase in concert with an increasing minimum size requirement. Alternative 2, Option 6 would likely have a similar harvest level as status quo. Alternative 2, Option 7 may have a similar or lower level of mortality to status quo because anglers would target the size of one of the fish below and above the slot of 32 and either 45 or 50 inches. Given that catch and release is a condition of the halibut fishery under status quo, an unknown number of anglers would likely continue fishing regardless of the regulation.

Note that the IPHC does not explicitly include sportfishing release mortality when determining the Fishery CEY nor is the incidental mortality in the sport fishery included as part of the GHL amount. Further, when making its recommendation, the IPHC staff did not provide a numerical estimation for sport fish mortality under its proposed one-fish bag limit (IPHC 2007). Thus, a numerical estimate of mortality from which to compare a comparable action by NMFS is not available and data limitations prevent an assessment of biases associated harvest size when compared with release size.

As previously discussed, options 5 through 13 under Alternative 2 are expected to maintain discard rates that are similar to the historical two-fish bag limit. Option 4 may result in release mortality estimates at least as high as the two fish bag limit because in a daily fishing period, anglers would be harvesting less fish while cycling through fish in an effort to maximize its size. To reduce discard mortality, IPHC staff recommended the mandatory use of circle hooks be adopted in Areas 2C and 3A. However, this recommendation was not adopted by the IPHC Commissioners because of enforcement concerns. Options 1 and 2 are expected to no effect on discard rates.

Another factor that may impact release mortality is the amount of time an angler has available to fish for halibut. Several of the major ports in Southeast Alaska are dependent on cruise ship passengers. These passengers generally take a half-day charter and are thus constrained by the amount of time available for fishing and travel to the fishing grounds. In some ports, the most productive halibut fishing areas are too far away to permit a half-day trip (e.g., Juneau). Anglers are further constrained by local catch rates which generally range from two (e.g., Sitka) to nine (e.g., Juneau and Ketchikan) rod hours per fish. Thus, during the allotted time period, anglers would be limited in their ability to optimize the size of fish kept and continue fishing after their bag limit was harvested. Multi-day anglers would have the greatest opportunity to catch and release fish. However, the ability for these anglers to “cycle” through fish would be dependent on local catch rates and how much time they spent targeting halibut rather than other species (e.g., salmon).

#### *Subsistence removals*

The distinctions between sport and subsistence are clouded by differing legal and cultural interpretations by both resource managers and users, and since rod and reel gear is legal in the subsistence fishery. The IPHC did not have a formal regulatory definition of subsistence prior to 2002; however, it did attempt to track subsistence harvest taken under a personal use category, leaving only sport harvests under the sportfishing category. In 2002, the IPHC adopted regulatory language defining subsistence (“Customary and Traditional Fishing in Alaska”), based on a recommendation by the Council. Federal regulations now

recognize and define a legal subsistence fishery for halibut in Alaska (70 FR 16742, April 1, 2005). Subsistence removals totaled 0.598 Mlb (net weight) in 2005 (Fall *et al.* 2006). Subsistence harvest is tracked by ADF&G using survey respondent methods including public outreach, mailed household surveys, and community visits. Fall *et al.* (2006) provides a detailed description of the survey methods and response rates. Subsistence/personal use harvest has remained relatively stable during the last three years (Table 3). Subsistence fishery regulations are found at 50 CFR 300.60–300.66.

**Effect of alternatives:** The proposed alternatives address resource allocation issues. They would affect harvest levels and fishing practices of individuals participating in the charter halibut fishery, but not the health of the halibut stock. Regardless of the amount of halibut biomass taken by a sector, no adverse impacts to the halibut resource would be expected because the IPHC factors most resource removals in the halibut stock assessment when setting annual catch limits. The IPHC does not currently explicitly account for release mortality in the halibut sport fishery. However, release mortality for the sport fishery is not expected to substantially increase above status quo under any of the alternatives. In addition, the impact of a different size frequency between the set-line survey and the recreational catch is relatively minor (Hare and Clark 2007 in IPHC 2007). Therefore, none of the proposed alternatives are expected to significantly impact the halibut stock.

### 1.10.2 Groundfish

In the charter fishery, anglers may switch to target species other than halibut if halibut fishing is poor. The charter operator wants to satisfy the client and may do so by landing any species (Scott Meyer, pers. comm.). Thus, a regulatory constraint on halibut may influence the amount of other groundfish species caught in the charter fishery. The harvest of State-managed groundfish observed in the ADF&G port sampling program is usually inversely related to halibut harvest, but it is unknown if anglers switch target species when halibut fishing is poor or expend more effort to target other species. No in-depth analysis of these data has been done, and it may be impossible given the lack of information. It is likely that harvest of State-managed species will increase if the halibut stock declines in abundance.

A regulatory measure to restrict halibut harvest may be analogous to a decline in abundance. For certain anglers, halibut fishing may become less desirable the more difficult it is to optimize the poundage of fish harvested or to harvest two fish. The decision process for anglers is complex and data are not available to predict removals from the groundfish fishery that may occur under the non-status quo alternatives.

The primary groundfish bycatch taken in the halibut charter fishery includes limited amounts of Pacific cod and rockfishes (primarily yelloweye and black), with lesser amounts of spiny dogfish, salmon shark, and lingcod. These species may be recorded in ADF&G data as having been caught on a halibut targeted trip, but they may become the target species during the trip because the halibut bag limit has been reached or fishing is poor. Some halibut trips may catch rockfish incidentally. State regulations require rockfish to be retained up to the bag limit; however, incidentally caught rockfish beyond an individual's bag limit must be released. Assessment of these released rockfish and associated bycatch mortality is difficult. Identification of rockfish species that are similar in appearance is difficult and calculation of a mortality rate is dependent on the depth that rockfish was caught, handling and release techniques, etc.

The 2006 SAFE (NMFS 2006) reports that in February 2006, the State of Alaska Board of Fisheries (BOF) allocated the Southeast Outside Demersal Shelf Rockfish complex (DSR) between the sport fishery and commercial fishery in the southeast Alaska. The OFL was 640 mt, and the ABC and TAC were equal to 410 mt. The BOF allocated 84 percent of the TAC to the commercial fishery and reserved the remaining 16 percent for sport fishermen. This produced a 66 mt BOF allocation for the sport fishery.

The SAFE report indicated that a directed DSR commercial fishery did not occur in 2006 because of concerns about exceeding the ABC and TAC. Commercial fishermen did have an incidental catch of 215 mt. The SAFE report indicated that in 2006 approximately 64 mt of DSR rockfish was harvested in the sport fishery, with 7 mt released. The sport fishery (guided and unguided) exceeded its BOF allocation by about 5.5 mt, while the commercial fishery took significantly less than its BOF allocation. Combined, the commercial and sport fisheries removed approximately 287 mt of DSR which was 70 percent of the 410 mt combined TAC, leaving 123 mt of the TAC unharvested. These estimates were presented as preliminary based on the best available data at the time (December 2006).

Recreational anglers also catch pelagic rockfish including dusky, yellowtail, and black rockfish. Sport fishing for these species is managed under ADF&G fishing regulations. Commercial harvest amounts for this species group is under their respective OFL and ABC in 2006. The ABC for the pelagic rockfish assemblage in the western Yakutat region and Eastern Alaska/Southeast Outside district was 736 mt in 2006 and 751 mt in 2007 (NMFS SAFE 2006). The commercial catch for the pelagic group was 174 mt in 2006, which was below the ABC which is set equal to the TAC. The OFL for the pelagic rockfish assemblage was 6,662 mt for the GOA, with 2,498 mt of commercial catch for the entire GOA. Harvest in the sport fishery is not at a level high enough to cause the pelagic rockfish group to exceed the OFL. In 2004, the total harvest of all rockfish in the sport fishery (including non-pelagic species) was 22.7 mt, which when added to the commercial catch would not have exceeded the ABC or OFL. An increase in sport harvest may constrain the commercial fishery; however, rockfish stocks would still be managed within their biological benchmarks. For the previously described reasons, the impact of the alternatives is likely to be insignificant for pelagic rockfish stocks.

The impacts of the alternatives on rockfish removals are difficult to project, because behavioral changes under a new restrictive halibut harvest policy are unknown. Small increases in rockfish removals would increase sport harvest beyond its TAC; however, given the overall joint commercial and sport harvest, it is unlikely these removals would be of a magnitude to exceed the OFL or ABC. A future directed commercial fishery would be managed under the OFL. For this reason, the impacts on rockfish from the alternatives are not expected to be significant.

Lingcod is also a commercial and sport fishery target species. Harvest levels in recent years have remained constant under strict sport fishery slot limit regulations and seasons, and commercial quota limits (Table 21); however, in 2005 total catch increased to 16,281 fish from 9,549 in 2004. A harvest increase in the sport sector resulting from the alternatives would likely be small given the existing regulatory constraints.

**Table 21** Estimated rockfish and lingcod harvest (number of fish) by charter anglers by area and year.

Year	IPHC Area 2C	
	Number of charter harvested rockfish	Number of charter-harvested lingcod
1996	14,591	10,588
1997	13,077	9,355
1998	15,516	11,690
1999	24,815	11,264
2000	26,292	11,805
2001	29,509	8,961
2002	25,346	5,749
2003	27,991	6,551
2004	45,908	9,549
2005	NA	16,281

Source: ADF&G, Statewide Harvest Survey data.

**Effect of alternatives:** Demersal shelf rockfish (DSR, e.g., yelloweye rockfish), pelagic shelf, and lingcod are species commonly harvested in the sport fishery. Commercial and sport catch limit limits are

set for these species and none of the catches of these species exceeded their respective ABC or OFL in 2006. DSR and pelagic shelf rockfish harvest in 2006 was well under the OFL, ABC, and TAC for the commercial and sport fisheries combined.

Harvest levels for lingcod in recent years have remained constant under strict sport fishery slot limit and season regulations, and commercial quota limits. A small increase in lingcod harvest would have an insignificant impact on the stock, because of ADF&G regulations for the sport and commercial sectors. For these reasons, the impact of the alternatives on these species is expected to be insignificant.

The interaction of halibut catch and harvest of other groundfish species is poorly documented and not well understood. Any discussion of impacts from the proposed alternatives will be highly speculative. Other species taken incidentally in sport charter halibut fisheries include sculpin, arrowtooth flounder and several other flatfishes, spiny dogfish, sleeper shark, salmon shark, and greenling. No sport fish harvest estimates are available for these species for Area 2C. However, the commercial catch limit is set for these species and none of the catches of these species has historically exceeded their respective OFL. The impact of the alternatives on these species is expected to be insignificant.

### **1.10.3 Endangered or Threatened Species**

The Endangered Species Act of 1973 as amended [16 U.S.C. 1531 et seq; ESA], provides for the conservation of endangered and threatened species of fish, wildlife, and plants. It is administered jointly by NMFS for most marine mammal species, marine and anadromous fish species, and marine plants species and by the U.S. Fish and Wildlife Service (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 U.S. Fish and Wildlife Service (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 must be 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.

After reviewing the current status of the listed species, designated critical habitat, and the potential effects of the halibut fisheries, NMFS Sustainable Fisheries concludes that this fishery off Alaska (which uses gear unlikely to generate bycatch of finfish, seabirds or marine mammals) will not affect ESA-listed species or designated critical habitat, pursuant to Section 7 of the Endangered Species Act. Therefore, the ESA does not require a consultation for this fishery. Halibut do not interact with any listed species and do not comprise a measurable portion of the diet of any listed species nor do any of the species comprise a measurable portion of their diet. No interactions between the charter halibut fisheries and any listed

species have been reported. Table 22 identifies the species listed as endangered and threatened under the ESA.

**Table 22 ESA listed and candidate species that range into the BSAI and GOA groundfish management areas.**

Common Name	Scientific Name	ESA Status
Blue Whale	<i>Balaenoptera musculus</i>	Endangered
Bowhead Whale	<i>Balaena mysticetus</i>	Endangered
Fin Whale	<i>Balaenoptera physalus</i>	Endangered
Humpback Whale	<i>Megaptera novaeangliae</i>	Endangered
Right Whale <sup>1</sup>	<i>Balaena glacialis</i>	Endangered
Sei Whale	<i>Balaenoptera borealis</i>	Endangered
Sperm Whale	<i>Physeter macrocephalus</i>	Endangered
Steller Sea Lion (Western Population)	<i>Eumetopias jubatus</i>	Endangered
Steller Sea Lion (Eastern Population)	<i>Eumetopias jubatus</i>	Threatened
Chinook Salmon (Lower Columbia R.)	<i>Oncorhynchus tshawytscha</i>	Threatened
Chinook Salmon (Upper Columbia R. Spring)	<i>Oncorhynchus tshawytscha</i>	Endangered
Chinook Salmon (Upper Willamette)	<i>Oncorhynchus tshawytscha</i>	Threatened
Chinook Salmon (Snake River spring/summer)	<i>Oncorhynchus tshawytscha</i>	Threatened
Chum Salmon (Hood Canal Summer run)	<i>Oncorhynchus keta</i>	Threatened
Coho Salmon (Lower Columbia R.)	<i>Oncorhynchus kisutch</i>	Threatened
Steelhead (Snake River Basin)	<i>Oncorhynchus mykiss</i>	Threatened
Steller's Eider <sup>2</sup>	<i>Polysticta stelleri</i>	Threatened
Short-tailed Albatross <sup>2</sup>	<i>Phoebastria albatrus</i>	Endangered
Spectacled Eider <sup>2</sup>	<i>Somateria fishcheri</i>	Threatened
Kittlitz's Murrelet <sup>2</sup>	<i>Brachyramphus brevirostris</i>	Candidate
Northern Sea Otter	<i>Enhydra lutris</i>	Threatened
Olive Ridley turtle	<i>Lepidochelys olivacea</i>	Threatened/Endangered
Loggerhead turtle	<i>Caretta caretta</i>	Threatened
Green turtle	<i>Chelonia mydas</i>	Threatened/Endangered
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered

<sup>1</sup>NMFS designated critical habitat for the northern right whale on July 6, 2006 (71 FR 38277).  
<sup>2</sup> The Steller's eider, short-tailed albatross, spectacled eider, and Northern sea otter are species under the jurisdiction of the USFWS. For the bird species, critical habitat has been established for the Steller's eider (66 FR 8850, February 2, 2001) and for the spectacled eider (66 FR 9146, February 6, 2001). The Kittlitz's murrelet has been proposed as a candidate species by the USFWS (69 FR 24875, May 4, 2004).

#### 1.10.4 Seabirds

Because halibut fisheries are federally regulated activities, any negative affects of the fisheries on listed species or critical habitat and any takings<sup>4</sup> that may occur are subject to ESA Section 7 consultation. NOAA Fisheries Service initiates the consultation and the resulting biological opinions are issued to NOAA Fisheries Service. The Council may be invited to participate in the compilation, review, and analysis of data used in the consultations. The determination of whether the action “is likely to jeopardize the continued existence of” endangered or threatened species or to result in the destruction or modification of critical habitat is the responsibility of the appropriate agency (NOAA Fisheries Service or

<sup>4</sup> 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)).

USFWS). If the action is determined to result in jeopardy, the opinion includes reasonable and prudent measures that are necessary to alter the action so that jeopardy is avoided. If an incidental take of a listed species is expected to occur under normal promulgation of the action, an incidental take statement is appended to the biological opinion.

In addition to those species listed under the ESA, other seabirds occur in Alaskan waters which may indicate a potential for interaction with halibut fisheries. The most numerous seabirds in Alaska are northern fulmars, storm petrels, kittiwakes, murre, auklets, and puffins. These groups, and others, represent 38 species of seabirds that breed in Alaska. Eight species of Alaska seabirds breed only in Alaska and in Siberia. Populations of five other species are concentrated in Alaska but range throughout the North Pacific region. Marine waters off Alaska provide critical feeding grounds for these species as well as others that do not breed in Alaska but migrate to Alaska during summer, and for other species that breed in Canada or Eurasia and overwinter in Alaska. Additional discussion about seabird life history, predator-prey relationships, and interactions with commercial fisheries can be found in the 2004 FPSEIS. Since charter halibut gear are typically rod-and-reel with a maximum of two hooks, interactions with seabirds are unlikely. There are no known reported takes of seabirds in charter fisheries off Alaska, based on best available information.

None of the alternatives under consideration would affect the prosecution of the halibut fisheries in a way not previously considered in consultations. The proposed alternatives to the status quo would limit charter halibut removals and any associated bycatch, although seabirds are not a known incidental harvest in this fishery. A likely result of the proposed alternatives is that commercial halibut harvests may increase; this fishery is subject to strict seabird avoidance requirements (<http://www.fakr.noaa.gov/protectedresources/seabirds/guide.htm>). None of the alternatives would affect takes of listed species and therefore, none of the alternatives are expected to have a significant impact on endangered or threatened species.

**Short-tailed albatross.** In 1997, NOAA Fisheries Service initiated a Section 7 consultation with USFWS on the effects of the halibut fishery off Alaska on the short-tailed albatross. USFWS issued a Biological Opinion in 1998 that concluded that the halibut fishery off Alaska was not likely to jeopardize the continued existence of the short-tailed albatross (USFWS, 1998). USFWS also issued an Incidental Take Statement of two short-tailed albatross in two years (1998 and 1999), reflecting what the agency anticipated the incidental take could be from the fishery action. No other seabirds interact with the halibut fisheries. Under the authority of ESA, USFWS identified non-discretionary reasonable and prudent measures that NOAA Fisheries Service must implement to minimize the impacts of any incidental take.

### **1.10.5 Marine Mammals**

The charter halibut fishery in the EEZ of Alaska is classified as Category III fishery under the Marine Mammal Protection Act. A fishery that interacts only with non-strategic stocks and whose level of take has insignificant impact on the stocks is placed in Category III. No takes of marine mammals by the charter halibut fishery off Alaska have been reported; therefore, none of the alternatives is expected to have a significant impact on marine mammals.

### **1.10.6 Biodiversity and the Ecosystem**

Halibut is one of four groundfish, in terms of biomass as measured by the trawl surveys, which dominate the Gulf of Alaska ecosystem (S. Gaichas, pers. comm.). The others include arrowtooth flounder, walleye pollock, and Pacific cod (in order of importance). Halibut is an apex predator in the GOA, and appears to be dependent on pollock stocks as pollock comprised over half of adult halibut's diet composition measured in the early 1990s. Most mortality on halibut is from fishing because they have few natural predators, especially as adults.

Halibut harvests by the charter fishery as well as all other fishery harvests, removes predators, prey, or competitors and thus could conceivably alter predator-prey relationships *relative to an unfished system*. Studies from other ecosystems have been conducted to determine whether predators were controlling prey populations and whether fishing down predators produced a corresponding increase in prey. Similarly, the examination of fishing effects on prey populations has been conducted to evaluate impacts on predators. Finally, fishing down of competitors has the potential to produce species replacements in trophic guilds. Evidence from other ecosystems presents mixed results about the possible importance of fishing in causing population changes of the fished species' prey, predators, or competitors. Some studies showed a relationship, while others showed that the changes were more likely due to direct environmental influences on the prey, predator, or competitor species rather than a food web effect. Fishing does have the potential to impact food webs but each ecosystem must be examined to determine how important it is for that ecosystem.

Little research has been conducted on the specific trophic interactions of halibut. With trophic interactions and inter-specific competition so poorly understood, it is not possible to clearly specify the effects to the ecosystem of the charter halibut fishery. However, given the nature of the action, the presumed effects of the alternatives on the ecosystem are insignificant.

### **1.10.7 Social and Economic Environment**

A description of the charter halibut fishery and detailed discussions of the socioeconomic impacts of the alternatives may be found in the RIR in Chapter 7. Chapter 8 contains an IRFA, conducted to evaluate the impacts of the suite of potential alternatives being considered, including the alternatives, on small entities, in accordance with the provisions of the RFA.

### **1.11 Cumulative Effects**

Effects of an action can be direct or indirect. According to the definition in the Council on Environmental Quality (CEQ) regulations (40CFR1500.1) providing guidance on NEPA, direct effects are caused by the action and occur at the same time and place, while indirect effects are those caused by the action and occur later in time or farther removed in distance, but are still reasonably foreseeable. Although the CEQ regulations draw this distinction between direct and indirect effects, legally both must be considered equally in determining significance. In practice, according to "The NEPA Book" (Bass et al. 2001, p. 55), "the distinction between a reasonably foreseeable effect and a remote and speculative effect is more important than the question of whether an impact is considered direct or indirect."

The alternatives under consideration in this EA are designed to limit halibut harvests in the charter fishery to the GHL. Any direct effects or reasonably foreseeable indirect environmental effects from the action would be minor, as explained in the EA. The action itself would not entail changes in stock levels, and any environmental effects, such as the removal of halibut biomass from the ecosystem, are so minor as to make it difficult to reasonably predict further indirect effects of those changes.

Possible future actions currently under consideration by the Council include annual changes to the guideline harvest level (GHL) policy, limited entry, setting an allocation (rather than a GHL) to the charter sector, and the development of a share-based allocation program to individual charter operators or to the charter sector. ADF&G has received authority to limit the number of lines being fished on a charter vessel to the number of paying clients (already in effect in Southeast Alaska) and prohibit retention of halibut by the skipper and crew, while charter fishing. ADF&G has exercised this authority in Area 2C in 2006 and 2007 to prohibit retention of crew caught fish and to limit the lines to the number of paying passengers, but not to exceed six lines. The State Legislature is considering a bill to allow the State to share otherwise confidential charter boat fishery data with Federal managers, which would facilitate

implementation of the limited entry (moratorium) program and GHL management measures. A delegation of authority to the State to manage halibut is being sought by the State of Alaska.

Cumulative effects are linked to incremental policy changes that individually may have small outcomes, but that in the aggregate and in combination with other factors can result in major resource trends. This action would not interact synergistically with other actions or with natural trends to significantly affect the halibut resource of the Gulf of Alaska. Measures intended to regulate the harvests of halibut under a Council preferred alternative may supersede the NMFS preferred alternative for 2007 and beyond. The nature of future Council actions on allocations, compensated reallocation, permit endorsements and/or share-based systems is speculative. Thus, no reasonably foreseeable future actions would have impacts that would cause significant cumulative effects when combined with the effects from this action.

## 2.0 REGULATORY IMPACT REVIEW

### 2.1 Introduction

The Council developed the following suite of alternatives to reduce harvest for anglers fishing from a charter vessel in regulatory Area 2C:

Alternative 1. No action

Alternative 2. Implement one or more measures to restrict charter halibut harvest to the Area 2C GHL. Thirteen management measures and/or combination of measures are being considered. These are listed under Section 2.6.

### 2.2 Purpose of the Regulatory Impact Review

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

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

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

- Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President’s priorities, or the principles set forth in this Executive Order.

The key elements of a RIR include:

- A description of the management objectives (Section 1.4);
- A description of the fishery (Section 2.3);
- A statement of the problem (Section 2.4);
- A description of each selected management, including the status quo (Section 2.7); and
- An economic analysis of the expected effects of each selected alternative relative to the baseline (Section 2.7).

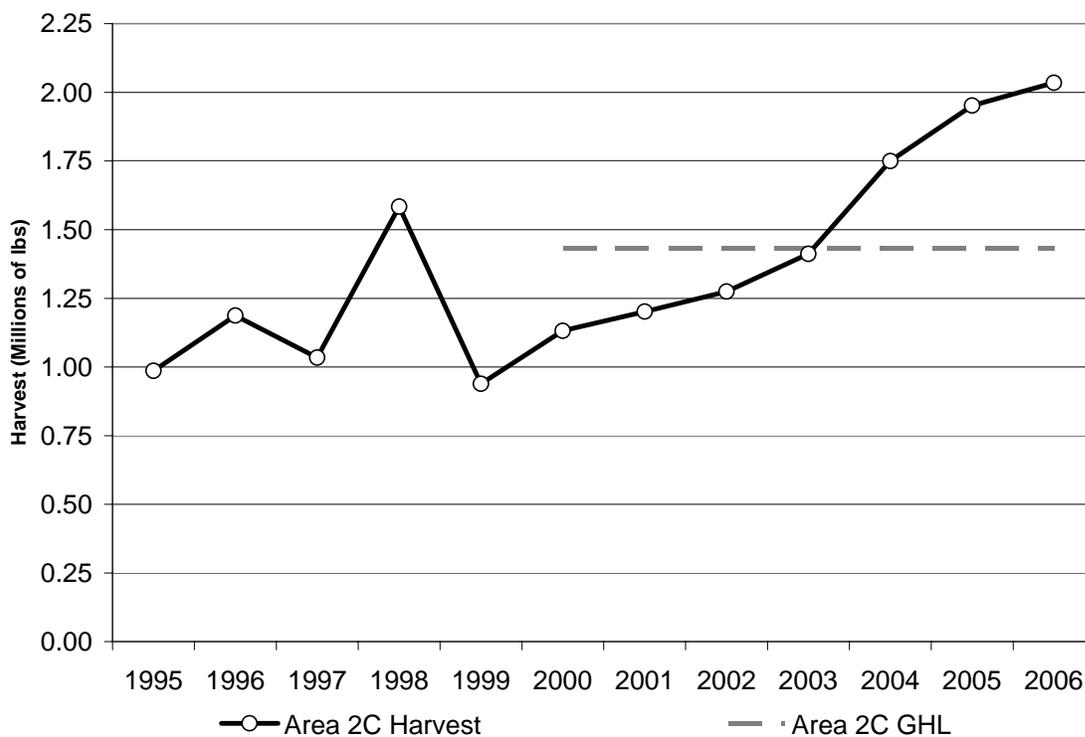
In addition, this document includes an analysis of the effect of each alternative management option (Section 2.6), a Regulatory Flexibility Analysis (Section 1.0), and a discussion of other applicable laws (Section 4.0).

### 2.3 Description of the Fishery

The charter fleet is a fairly homogeneous group with similar operating characteristics and vessel sizes. The exceptions are a few larger, ‘headboat’ style vessels, and several vessels that are operated by lodges, which offer accommodations as well as an assortment of visitor activities. Nearly all of the vessels are 25 to 50 ft. in length and carry up to six paying fishermen each. Larger vessels can carry a dozen passengers or more (NPFMC 2005). A summary of fishery participants is provided in Section 1.10.1. Halibut fishing practices is described at <http://www.sf.adfg.state.ak.us/statewide/halibut.cfm#manage>.

### 2.4 Statement of the Problem

The purpose of the proposed action is to reduce charter halibut harvests in Area 2C to the GHL. The GHL is intended to stop the reallocation from the commercial to charter sector. In addition to the no action alternative, the Council is considering the 13 options listed under Alternative 2 to reduce halibut harvests to the GHL of 1.432 Milb in Area 2C. Charter halibut harvests in Area 2C have grown at an annualized growth rate of 6.8 percent over the past 11 years. Figure 6 shows the growth of charter halibut harvests relative to the GHL of 1.432 Milb. While the harvest of the charter industry rose and fell from year to year between 1995 and 1999, the industry has seen upward growth since that time. Annualized growth since 1999 averaged 11.7 percent per year.



**Figure 6 Charter Fleet Halibut Harvests Year**

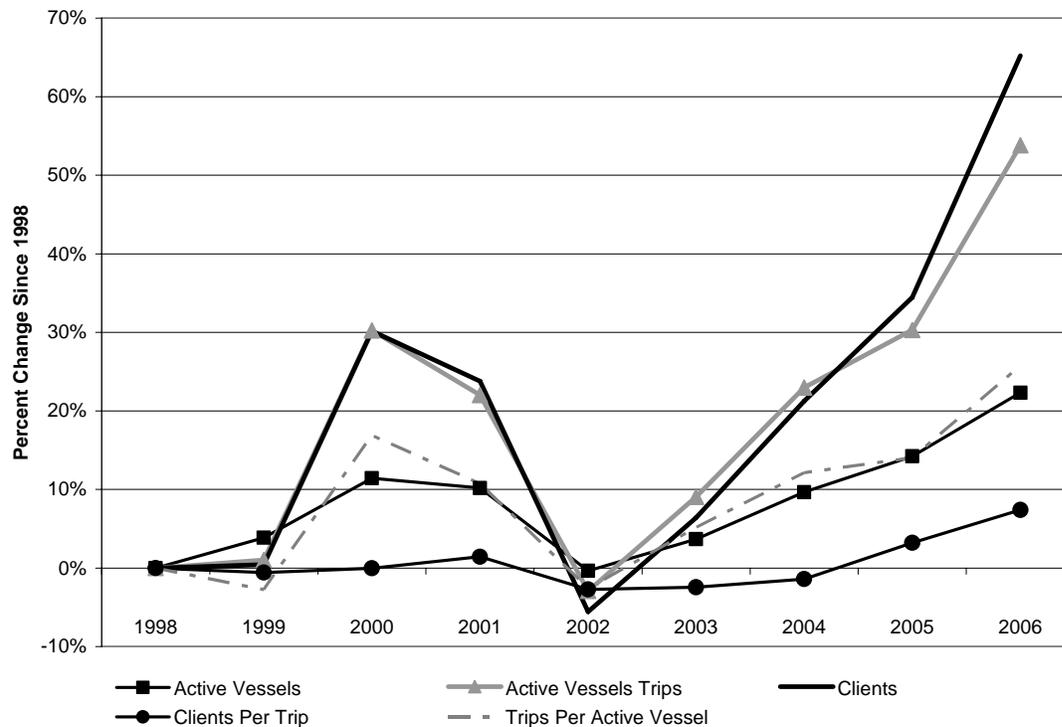
Source: ADF&G, Statewide Harvest Survey Data 1995-2006, 2007.

As shown by Table 23 and Figure 7, charter pressure (as measured by the number of active vessels, the total number of active trips, the total number of clients, the average number of clients per trip, and the average numbers of trips per vessel) increased in the last several years. All of these are at their highest level in the recorded data period of 1998 through 2006. We note that one of the best indicators of upward pressure on demand, the number of clients per trip, has increased steadily in recent years. This increase indicates that the number of clients is rising faster than the number of trips and is likely an indicator of healthy demand for the services provided by the charter fleet.

**Table 23 Effort in the Area 2C charter halibut fishery, 1998-2006**

Year	Number of "active" vessels	Total Number of Trips Conducted by "active" vessels	Total Number of Clients	Average Clients Per Trip	Average Trips Per Vessel
1998	569	15,541	55,922	3.60	27.31
1999	591	15,700	56,173	3.58	26.57
2000	634	20,241	72,803	3.60	31.93
2001	627	18,965	69,222	3.65	30.25
2002	567	15,085	52,809	3.50	26.60
2003	590	16,948	59,498	3.51	28.73
2004	624	19,111	67,803	3.55	30.63
2005	650	20,248	75,195	3.71	31.15
2006	696	23,907	92,394	3.86	34.35

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.



**Figure 7 Charter Fleet and Effort Growth, 1998-2006**

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

## 2.5 Baseline Analytical Data

Baseline data for this analysis come from the ADF&G Logbook program and the Statewide Harvest Survey (SWHS) program. This analysis is somewhat different from recent prior analyses of GHL management options, in that ADF&G 2006 logbooks directly record halibut catch, harvest, and effort for the first time in several years. This change allows for improved estimation of effects, but also means that estimates for some options prior to 2006 are not directly comparable to these 2006 estimates. Estimating the effect of options on years prior to 2006 would have required using two estimation methods, and time did not allow this approach. In addition, the analysis includes key informant interviews with a number of charter industry participants in IPHC Area 2C.

The number and total weight of charter harvested halibut increased in Area 2C between 1995 and 2006. Table 24 shows estimated Pacific halibut harvest (number of fish, average net weight, and biomass) by charter anglers. This information represents a combination of total estimated Pacific halibut harvest obtained from the SWHS and on-site catch or creel sampling programs conducted in Area 2C. While the year to year halibut harvest and rate of change in the harvest are highly variable, the Area 2C harvest is now at 142.1 percent of the 1.432 million lb GHL established in 2000.

**Table 24 Charter Halibut Harvest, 1995-2006**

Year	IPHC Area 2C			
	Charter-Harvested Halibut	Average Net Weight (lbs) per Halibut	Total Charter Halibut Harvest (Mlb)	Rate of Change from Previous Year <sup>5</sup>
1995	49,615	19.9	0.986	N/A
1996	53,590	22.1	1.187	20.4%
1997	51,181	20.2	1.034	-12.9%
1998	54,364	29.1	1.584	53.2%
1999	52,735	17.8	0.939	-40.7%
2000	57,208	19.8	1.132	20.6%
2001	66,435	18.1	1.202	6.2%
2002	64,614	19.7	1.275	6.1%
2003	73,784	19.1	1.412	10.7%
2004	84,327	20.7	1.750	23.9%
2005	102,206	19.1	1.952	11.5%
2006 <sup>6</sup>	107,238	19.0	2.035	4.3%
5-Year Average	86,434	19.5	1.685	N/A

Source: ADF&G, Statewide Harvest Survey Data 1995-2005. ADF&G Logbook Projections for 2006.

ADF&G provided logbook estimates for the number of total “active” vessels, total trips conducted by “active” vessels, number of bottomfish trips per season, per “active” vessel (in total), along with a summary of the total number of additional trips within one day conducted by “active” vessels in Area 2C (Table 25).<sup>7</sup> For data prior to 2006, all statistics are for bottomfish-targeted trips only and if a charter

<sup>5</sup> This column added by Northern Economics, Inc.

<sup>6</sup> 2006 harvest numbers including average weight and total fish harvested are based on extrapolation of logbook data through August 15, 2006, and are provisional in nature and represent the best available estimates at the time of this analysis.

<sup>7</sup> An active vessel is defined as a vessel which recorded at least one trip per year with bottomfish harvesting effort.

operator reported more than one trip per day, both trips had to be targeted at bottom fishing in order for the second trip in a day to be used for the information summary below.<sup>8</sup> The 2006 logbook allowed ADF&G to count the number of second day trips where halibut was actually harvested. The data show that a relatively small portion of trips are the second or more trips in a day for charter vessels and that the portion of trips qualifying as such was relatively low from 2001 to 2004 then increased sharply in 2005 and 2006.

**Table 25 Logbook Estimates of Second Trips per Day for Halibut in Area 2C, 1998-2006.**

Year	Number of "active" vessels	Total Number of Trips Conducted by "active" vessels	Total Number of Trips after the 1st Trip within a Day	Second Trips as a % of Total Trips	Total Number of Vessels that made more than 1 Trip per Day	Portion of All Vessels taking a Second Trip
1998	569	15,541	308	2.0	86	15.1
1999	591	15,700	No Data	No Data	No Data	No Data
2000	634	20,241	390	1.9	104	16.4
2001	627	18,965	226	1.2	71	11.3
2002	567	15,085	182	1.2	79	13.9
2003	590	16,948	223	1.3	90	15.3
2004	624	19,111	178	0.9	73	11.7
2005	650	20,248	395	2.0	162	24.9
2006	696	23,907	623	2.6	175	25.1

Source: Alaska Department of Fish and Game 1998-2006 Logbook Data, 2007.

ADF&G provided data on the frequency of "second trips" for halibut. Overall, the portion of harvest has increased from between 0.5 to 1.2 percent for data collected in 1998, 2000, and 2001, to between 1.8 and 2.4 percent in 2006 (Table 26).

**Table 26 Proportion of Harvest Occurring in Vessel Trips Beyond 1 trip per day**

Year	<i>Minimum</i> occurring in trips beyond the 1st trip in a day	<i>Average</i> occurring in trips beyond the 1st trip in a day
Older Logbook Data		
1998	0.6	1.1
2000	0.8	1.2
2001	0.5	0.7
2006 Logbook Data		
2006	1.8	2.4

Source: Alaska Department of Fish and Game 1998, 2000, 2001 and 2006 Logbook Data, 2007.

An improvement attributable to the updated 2006 logbooks is the ability of ADF&G to directly count the annual number of halibut caught by anglers while on charter trips. The inclusion of angler license numbers in logbooks makes this direct accounting method possible. Prior documents such as NPFMC (2006) relied on estimates based on Statewide Harvest Survey data. The majority of fish (55 percent) are taken by anglers who catch two or fewer fish per year. (Table 27).

<sup>8</sup> In 1999 a supplemental log sheet was to be used by charter operators when reporting additional trips within a day. However, the rate of reporting second trips in a day was substantially below the rates observed for all other years (1998, 2000-2004) in which the second trip within the day was reported on the main log sheet for the day. Accordingly, information on multi-trips within a day is not reported for 1999.

**Table 27 Charter Harvest Level Estimates per Angler in Area 2C, 1996-2004**

Pacific Halibut Harvested per Angler per Year	Percentage of Harvest due to $n^{th}$ fish in annual take	Percentage of Anglers harvesting $n$ or more fish over the entire year	Percentage of Harvest Saved by a $n^{th}$ fish limit
0		54.86%	
1	30.70%	45.14%	69.30%
2	25.03%	36.80%	44.27%
3	15.67%	23.03%	28.61%
4	12.16%	17.88%	16.45%
5	7.11%	10.46%	9.33%
6	5.00%	7.35%	4.34%
7	1.95%	2.87%	2.39%
8	1.30%	1.92%	1.08%
9	0.44%	0.65%	0.64%
10+ fish	0.64%	0.42%	

Source: Alaska Department of Fish and Game 2006 Logbook Data, 2007.

ADF&G analyzed 2006 logbook and port sampling data of angler harvests for the analysis of the option reducing the charter bag limit to one fish. The data show the division of “first fish” in anglers’ bag limits and “second fish”. Overall, “second fish” account for fewer than 40 percent of the overall harvest (Table 28).

**Table 28 “Second” Fish as Portion of Area 2C Charter Angler Harvests, 2006**

Month	Area 2C				
	Harvest of “First” Fish	Harvest of “Second” Fish	Total Harvest	“Second” Fish as a Percentage of Overall Harvest	“Second” Fish by Weight
Jan	0	0	0	0.0	0.00
Feb	4	0	4	0.0	0.00
Mar	15	10	25	0.0	0.00
Apr	18	12	30	0.0	0.00
May	3,616	1,955	5,571	1.8	0.037
Jun	16,813	10,780	27,593	10.0	0.206
Jul	22,435	15,553	37,988	14.5	0.295
Aug	19,177	12,893	32,070	12.0	0.244
Sep	2,445	1,486	3,931	1.4	0.028
Oct	15	14	29	0.0	0.00
Nov	0	0	0	0.0	0.00
Dec	0	0	0	0.0	0.00
Total	64,537	42,701	107,238	39.7	0.81

Source: Alaska Department of Fish and Game 2006 Logbook and Port Sampling Data, 2007.

For the second fish option, ADF&G provided estimates of the harvest frequency for the four lengths included in that sub-option. More than 80 percent of the halibut harvested in Area 2C in 2006 were below the shortest second fish minimum length of 45 inches. More than 97 percent of the harvest is below the longest minimum length (Table 29).

**Table 29 Expected Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish, No Demand Effects**

Minimum Length for the Second Fish (In)	Estimated Round Weight (lbs)	Proportion of 2006 charter harvest below target length by Number of Fish	Proportion of 2006 charter harvest below target length by Weight
45	43	83.7%	48.4%
50	60	89.3%	59.2%
55	82	94.0%	71.2%
60	109	97.4%	82.7%

Source: Alaska Department of Fish and Game 2006 Port Sampling Data, 2007.

## 2.6 Analysis

This section contains a discussion of the individual effects of the proposed options under Alternative 2. The effect of the management options on communities is located in Section 2.7.

- Option 1. No more than one trip per vessel per day
- Option 2. No harvest by skipper and crew and line limits
- Option 3. Annual limits of four, five, or six fish per angler
- Option 4. Reduced bag limits of one fish per day in May, June, July, August, September or for the entire season
- Option 5. A one-fish bag limit with the option to harvest a second fish larger than 45 inches or 50 inches
- Option 6. A two-fish bag limit with one fish of any size and one fish 32 inches or less in length
- Option 7. A two-fish bag limit with one fish of any size and one fish 32 inches or less in length or larger than 45 inches or 50 inches
- Option 8. Combination of Options 1, 2, and 5
- Option 9. Combination of Options 1, 2, and 6
- Option 10. Combination of Options 1, 2, and 7
- Option 11. Combination of Options 1, 2, 3, and 5
- Option 12. Combination of Options 1, 2, 3, and 6
- Option 13. Combination of Options 1, 2, 3, and 7

This analysis represents a departure from prior analyses in that the 2006 logbook data provide enhanced information on angler effort and catch. For this reason, the analysis only provides estimates of the effect of the management options as if the options were in place in 2006. Prior analytical documents have provided estimates of the effect over a number of years. However, in this case, that would have required two separate analyses for each management option because the enhanced data in the 2006 logbooks are not available in prior years. While viewing the effect of the management options over several years would be useful, the expedited nature of the analysis did not allow enough time for ADF&G to produce two sets of data for the analysis.

## 2.6.1 Option 1 – No More than One Trip per Vessel per Day

Option 1 would limit charter operators to one trip per vessel per day. A prior analysis estimates that this management option would reduce overall harvest by less than one percent in Area 2C (NPFMC, 2006). However, these prior analyses depended on logbook data from 1999, 2000, and 2001 to determine the portion of harvest that came from second trips of the day. The re-initiation of logbook data for 2006 has simplified this analysis and shows that the number of “second trips” in a day increased considerably in 2005 and 2006 in Area 2C and that a greater portion of the charter fleet is using this business model at least in part. As shown in Table 30, the number of “second trips” per day more than doubled since 1998 even though the overall number of trips is up by just over 50 percent. As a portion of trips, second trips of the day are still a relatively small portion of overall effort and the amount of effort is variable from year to year, but that portion has increased from a low of 0.9 percent in 2004 to 2.6 percent in 2006. The portion of vessels that took at least one “second trip” for halibut during a year has increased from 15.1 percent of vessels in 1998 to 25.1 percent of vessels in 2006. However, given that only 2.6 percent of trips qualified as second trips, it would seem that the portion of vessels specializing in targeting halibut more than once in a day is very small. Instead, it seems that many vessels must occasionally conduct multiple halibut trips in a single day while normally either conducting just one trip per day or multiple trips with one trip targeting halibut and the other trip targeting a different species.

**Table 30 Logbook Estimates of Second Trips per Day for Halibut**

Year	Number of “active” vessels	Total Number of Trips Conducted by “active” vessels	Total Number of Trips after the 1st Trip within a Day	Second Trips as a % of Total Trips	Total Number of Vessels that made more than 1 Trip per Day	Portion of All Vessels taking a Second Trip
1998	569	15,541	308	2.0	86	15.1
1999	591	15,700	No Data	No Data	No Data	No Data
2000	634	20,241	390	1.9	104	16.4
2001	627	18,965	226	1.2	71	11.3
2002	567	15,085	182	1.2	79	13.9
2003	590	16,948	223	1.3	90	15.3
2004	624	19,111	178	0.9	73	11.7
2005	650	20,248	395	2.0	162	24.9
2006	696	23,907	623	2.6	175	25.1

Source: Alaska Department of Fish and Game 1998-2006 Logbook Data, 2007.

Overall, between 1.8 and 2.4 percent of 2006 harvest resulted from vessels making multiple trips per day (see Table 26). The analysis estimates that a ban on vessels making more than one trip per day where halibut is harvested would have reduced harvest in 2006 to between 138.7 and 139.5 percent of the GHL. This reduction is equivalent to between 38,000 and 49,000 lb (Table 31). For comparison, the NMFS preferred alternative for 2007 would save nearly 478,000 lb more than Option 1.

**Table 31 Estimated Harvest Savings from Limiting Vessels to One Trip per Day, 2006**

Estimate Level	Effects of 1 Trip per Day		Alt. 1. 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
	Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
Lower	0.038	1.8%	1.997	139.5%	164.1%	1.519	106.05%	124.8%
Upper	0.049	2.4%	1.986	138.7%	163.2%	1.519	106.05%	124.8%

As noted in NPFMC (2006), key informant interviews with operators concurred that this management option would reduce halibut harvests by very small amounts—in the low single digit percentage range. However, they also indicated that the change might not reduce harvest at all. The predicted reduction associated with the management option assumes that the displaced clients could not find replacement charters to take them fishing. However, the key informant interviews indicated that many clients would likely find open seats on other boats within the fleet. They indicated that while there might be shortages in a specific time and place, many clients would be able to find replacement trips. If clients are able to find replacement bookings, then the effect of the management option is likely to be overstated by the numerical analysis.<sup>9</sup> We note that the average number of clients per trip and the average number of trips per vessel have increased in the last several years (Table 32). While displaced anglers could likely find replacement seats at current client densities, if the number of vessels is limited and the number of clients continues to grow, then it would eventually be difficult for displaced anglers to find replacement seats.

**Table 32 Effort Statistics for Area 2C, 1998-2006**

Year	Number of "active" vessels	Total Number of Trips Conducted by "active" vessels	Total Number of Clients	Average Clients Per Trip	Average Trips Per Vessel
1998	569	15,541	55,922	3.60	27.31
1999	591	15,700	56,173	3.58	26.57
2000	634	20,241	72,803	3.60	31.93
2001	627	18,965	69,222	3.65	30.25
2002	567	15,085	52,809	3.50	26.60
2003	590	16,948	59,498	3.51	28.73
2004	624	19,111	67,803	3.55	30.63
2005	650	20,248	75,195	3.71	31.15
2006	696	23,907	92,394	3.86	34.35

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

Option 1 would also likely result in overnight charter operators converting to the traditional one trip per day business model.<sup>10</sup> These operators usually run larger vessels capable of holding more passengers, and interviewees told us these operators usually limit the number of passengers on overnight trips to a level below their legal operating capacity. If these operators were forced to switch to one trip per day, they would be forced to run their boats at or near their full legal capacity. This change would reduce its efficacy and could actually result in *more* halibut being harvested over the long run depending on the excess capacity of these boats (NPFMC, 2006).

## 2.6.2 Option 2 – No Harvest by Skipper and Crew and Line Limits

Option 2 includes two measures that are currently implemented through State regulations and emergency orders. Effective May 26, 2006, ADF&G banned harvest by skipper and crew while paying clients are on a charter vessel by emergency order. This order was enacted again on May 1, 2007. The State implemented a 6-line limit in Southeast Alaska in 1983, and the regulation capping the number of lines fished to the number of paying clients was implemented in 1997, such that sport fishing may be conducted only by the use of a single line per angler, and not more than six lines may be fished from a vessel.<sup>11</sup> Line limits were implemented in

<sup>9</sup> These operators also indicated that in the long-run, such a change would not have an appreciable affect on overall halibut harvests because multiple-trip per day operators could buy another vessel.

<sup>10</sup> These operators leave in the evening and return the next morning to provide their clientele with a “double-limit.” These boats then sail again twelve hours later after the morning return. Thus, they are essentially running two trips per day and would have to change their business model under the proposed actions.

<sup>11</sup> 5 AAC 47.030. Methods, means, and general provisions - Finfish

State regulations at 5 AAC 47.030(b) and (g) since about 1997. Charter vessels have a 6-line limit and the number of lines fished cannot exceed the number of paying clients (except when jigging for herring or smelt for bait).

Therefore, charter halibut reductions as a result of these measures are currently included under Alternative 1 and no additional savings are expected if this option is adopted by the Council. Instead, adopting Option 2 would implement these measures under Federal regulations. As a policy, it may appear to be counter productive since the State has suggested that managing the charter halibut fishery under State authority provides the flexibility and timeliness that is missing from the Federal regulatory process. However, the benefit of Federal implementation lies with the ability to apply these measures to halibut charter fisheries only. The State can not directly regulate the halibut fishery, so must apply these measures to all charter fisheries. However, Federal line limits on halibut only would be difficult to enforce.

According to ADF&G logbook data from 1999 through 2001, harvests by crew members accounted for between 3.3 and 4.5 percent of the annual halibut harvest in Area 2C (Table 33).

**Table 33 Crew Harvest, 1999-2001**

Year	Client Harvest (Number of Fish)	Crew Harvest (Number of Fish)	Total Harvest (Number of Fish)	Percent of Total Harvest
<b>Area 2C</b>				
1999	68,327	2,355	70,682	3.3
2000	91,772	4,156	95,928	4.3
2001	91,299	4,272	95,571	4.5

Source: Northern Economics, Inc. estimates based on 1999-2001 ADF&G Logbook Data, 2005.

Prior analyses of crew harvest data estimated overall reductions from a ban of skipper and crew harvest by using an upper and lower bound approach (NPFMC, 2006). These prior analyses used the 1999 estimate of crew’s portion of halibut as a lower bound for estimating the effect of banning crew harvest on overall halibut harvests while the estimate the analysis generates from the 2001 data is used as an upper-bound estimate. NPFMC (2006) predicted that a ban of skipper and crew harvest would have saved between 58,000 and 78,000 lb in 2004.

ADF&G estimates from November 2006 concluded that the State prohibition on crew caught halibut reduced harvest by approximately 84,000 lb. These estimates are verified by comparing the estimates of Area 2C harvest based on linear trends in the SWHS data (which include crew catch because in prior years crew caught halibut while on trips) and extrapolation of 2006 logbook data collected through August 15. The linear trend estimates predicted a harvest of 2.113 Mlb while the logbook projects a harvest of 2.035 Mlb. The 78,000 lb difference in these estimates is in part due to the fact that the linear SWHS projections would have included crew harvest while the logbooks (which reflect the actual catch) reflect the fact that crew harvest was banned under the Emergency Order. The 78,000 lb estimate and the 86,000 lb estimate are 3.8 percent and 4.2 percent of 2006 charter harvests. These portions corroborate estimates by the earlier analysis. These savings would become permanent if the ban were implemented through this proposed Federal action.<sup>12</sup>

<sup>12</sup> This statement assumes that the number of individuals employed in the charter sector continues to grow. When new boats enter the sector we expect crew harvest to increase, but when existing boats increase the number of trips

Prior interviews with charter operators indicated that the elimination of crew harvest was the most effective and palatable of the options offered in the previous analysis. Federal implementation of this ban is also preferable since ADF&G's E.O. bans the retention of all species during charter operations; not just halibut. Area 2C charter operators told the analysts that they rarely harvest fish for their own use and that *the State's line limit regulation effectively limits their opportunities to harvest additional crew fish*. Conversely, large lodge operators in the area indicate that their crew members may catch and keep fish over the season because of the lodge's storage capacity. These crew members can store large amounts of halibut at the lodge during the summer and take fish home with them at the end of the season. Operators indicated that the portion of the crew harvest that is used by crew to feed their families would most likely shift from harvesting during charter trips to harvest during unguided trips. Thus, some harvest will shift from the GHL-managed charter industry to the non-guided sector.

### 2.6.3 Option 3 – Effect of an Annual Limit

Option 3 would establish a four or five-fish annual limit on the number of halibut an individual could harvest while on charter trips in Area 2C. Table 34 shows the estimated reduction in harvest associated with this management option. ADF&G statisticians estimate that in 2006, a six-fish annual limit would have reduced harvest by charter clients by 4.3 percent; a five-fish annual limit would have reduced overall harvest by charter clients by approximately 9.3 percent, and a four-fish limit would reduce overall harvest by nearly 16.5 percent. Under Alternative 1, the current status quo, these options would have reduced the overall charter fleet harvest in Area 2C from 142.1 percent of the GHL to between 118.7 and 135.9 percent of the GHL. Compared with the NMFS preferred alternative for 2007, these sub-options would result in a smaller level of savings when considered alone. A five-fish limit was the Council's April 2006 preferred alternative, but was rescinded in December 2006 on NMFS' recommendation because of its high enforcement costs.

**Table 34 Effect of an Annual Limit on Charter Industry Halibut Harvest in Area 2C**

Sub-Option	Effect of Annual Catch Limit		Alt. 1. 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
	Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
Four Fish	0.335	16.4%	1.700	118.7%	139.7%	1.519	106.05%	124.8%
Five Fish	0.190	9.3%	1.845	128.8%	151.6%	1.519	106.05%	124.8%
Six Fish	0.088	4.3%	1.947	135.9%	160.0%	1.519	106.05%	124.8%

Source: Northern Economics, Inc. estimates based Alaska Department of Fish & Game Logbook Data, 2005.

An annual limit is unlikely to affect the clientele of most charter operators; in fact it only affects the heaviest users of charter services. ADF&G data indicate that in 2006 a five-fish limit would have affected just 10 percent of all Area 2C anglers taking charters, while a four-fish limit would have affected 18 percent of all charter anglers. A six-fish annual limit would affect just over seven percent of clients (Section 2.5). During the key informant interviews for this analysis and prior analyses, operators of day-trip business indicated that this management option would only affect a small portion of their clients and would be unlikely to affect any of the clients who come from cruise boats. However, this management option is most likely to restrict harvest by the clientele of lodge operators and those charter boat operators that offer multi-day packages. Many of the operators provide clientele with a choice of trip length. The management options for four and five fish annually would limit the amount of halibut that those clients who wish to stay longer than three days at a lodge could harvest. For example, a visitor who currently stays with a lodge for four days could now leave with as

they take or when client density increases on existing boats there is no automatic increase in crew harvest as pre-existing trips may be enough to fill crew demand for halibut.

many as eight fish. A five-fish limit would reduce the visitor's take by 37.5 percent, while a five-fish limit would reduce the visitor's take by 50 percent. Operators told the analysts that they had already seen cancellations by some clients and reduced willingness to book in advance by other clients when told that this option was under consideration.

In prior analyses, the public indicated that restrictions on anglers could negatively impact public safety by reducing the number of charter operations and forcing more individuals to bareboat rentals. US Coast Guard (USCG) staff responded to those comments by reporting to the Council that the Coast Guard is not convinced that an increase in the use of bareboat charters would occur and does not have an overarching safety concern with the proposed action (NPFMC 2006).

This analysis represents a departure from prior analyses in that the current estimate derives from the new 2006 logbooks, which record not only angler harvest, but each individual charter angler's sport fish license number. These data allow ADF&G to directly count catch by angler license number. Prior estimates depended on projections from the Statewide Harvest Survey (SWHS). The estimates for 2006 using the new logbooks are very close to past-year estimates using SWHS data (Table 35 and Table 34).

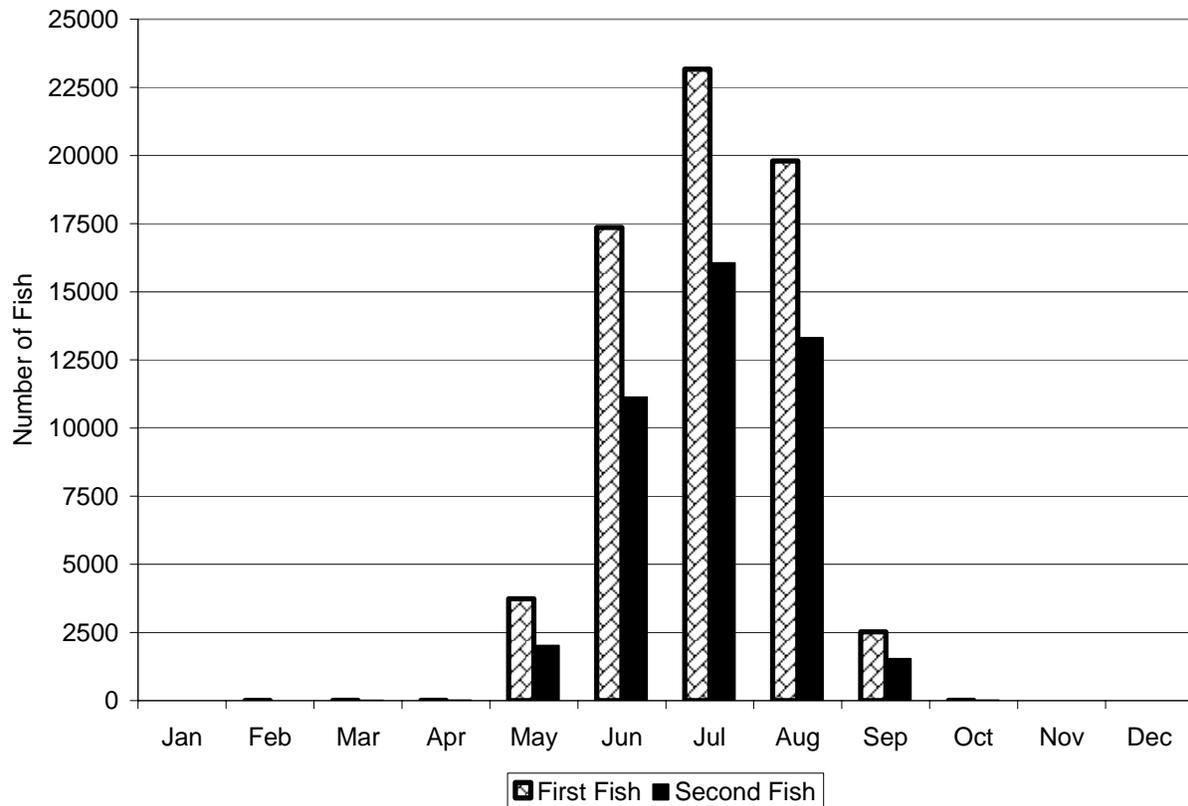
**Table 35 Prior-Year Estimate of Annual Limit Effects, 1996-2004**

Year	Percent Saved		
	4 Fish Limit	5 Fish Limit	6 Fish Limit
1996	14.4%	9.9%	6.26%
1997	14.9%	10.3%	6.35%
1998	16.2%	10.4%	5.49%
1999	14.1%	9.4%	5.36%
2000	17.9%	12.1%	6.67%
2001	17.0%	11.1%	5.99%
2002	19.7%	13.7%	8.25%
2003	19.8%	13.1%	7.51%
2004	18.6%	12.2%	6.96%

Source: Alaska Department of Fish & Game SWHS Data, 2005.

#### 2.6.4 Option 4 – Effect of 1-Fish Bag Limit

Option 4 would lower the bag limit to one fish from the current bag limit of two fish. This option includes six sub-options of lowering the bag limit in May, in June, in July, in August, in September or for the entire season. Figure 8 shows the distribution of “first” and “second” fish within angler's bag limits. As shown by the figure, total harvest peaks in July with strong harvests in June and August. These three months accounted for 91 percent of total harvest in 2006. Overall, 66 percent of anglers who harvest a “first” fish also harvest a second fish. Within the three primary fishing months, the chance of harvesting a second halibut is the highest in July at 69.3 percent and lowest in June, at 64.1 percent. These differences are small but statistically significant.



**Figure 8 Distribution of Area 2C Harvest Halibut by Number of Fish, 2006**

Source: Alaska Department of Fish and Game 2006 Logbook Data, 2007.

In 2006, charter anglers harvested 107,238 halibut between February and October.<sup>13</sup> As noted above, the vast majority of the harvest occurred during the three month period between the beginning of June and the end of August. Overall, the second fish in an anglers bag limit accounted for 39.8 percent of total harvest or 0.81Milb (Table 36). As previously noted, 2006 logbook data are provisional and we expect these numbers to change slightly as ADF&G finalizes their estimates.

<sup>13</sup> The number of halibut harvested is based on provisional data and does not represent final, official ADF&G estimates.

**Table 36 “Second” Fish as Portion of Area 2C Charter Angler Harvests, 2006**

Month	Area 2C			“Second” Fish as a Percentage of Overall Harvest	“Second” Fish by Weight
	Harvest of “First” Fish	Harvest of “Second” Fish	Total Harvest		
Jan	0	0	0	0.0	0.00
Feb	4	0	4	0.0	0.00
Mar	15	10	25	0.0	0.00
Apr	18	12	30	0.0	0.00
May	3,616	1,955	5,571	1.8	0.037
Jun	16,813	10,780	27,593	10.1	0.206
Jul	22,435	15,553	37,988	14.5	0.295
Aug	19,177	12,893	32,070	12.0	0.244
Sep	2,445	1,486	3,931	1.4	0.028
Oct	15	14	29	0.0	0.00
Nov	0	0	0	0.0	0.00
Dec	0	0	0	0.0	0.00
<b>Total</b>	<b>64,537</b>	<b>42,701</b>	<b>107,238</b>	<b>39.8</b>	<b>0.81</b>

Source: Alaska Department of Fish and Game 2006 Logbook Data, 2007.

### 2.6.4.1 Secondary Effects Discussion

The effectiveness of Option 4 is likely to be affected by a number factors including:

- potential changes in average fish size through changes in angler behavior
- changes in demand for halibut charter trips
- potential changes in discards

The ability to account for each of these factors varies greatly. The analysis is unable to account for effects stemming from changes in angler behavior such as increase in average harvest rate or increase in catch per unit effort. It can account for some of the mortality effects of a bag limit reduction and can also account for the effect of reduced demand. Each of these factors is discussed in greater detail below.

#### 2.6.4.1.1 Changes in Angler Behavior during Trips

It is likely that anglers will change their behavior during charter trips because of the lowered bag limits. Anglers that are fishing for consumptive purposes will face greater pressure to ensure that their single halibut is larger than the average size they are keeping under the current bag limit. Increasing the average size of the retained halibut, and pursuing other species, are the only two ways an angler can increase the edible meat weight provided by a single charter experience. Unfortunately, data on angler behavior while on charter boats are mostly qualitative. While the 2006 logbooks record the total number of fish caught by species, there are no specific data on the size of halibut that anglers caught but did not keep. This lack of data makes it impossible to quantify the effect of angler efforts to harvest larger fish or to determine how many additional fish anglers will need to catch and discard before they can harvest that larger fish. This analysis acknowledges that anglers will pursue larger fish because of the lower bag limit, but has not found a method of quantifying that effect. Key questions that remain unanswered include:

- What is the size composition of discarded sport catch?
- Will anglers be able to increase their catch per trip by spending more time on the water or more time fishing overall? The current two-fish limit allows anglers who want to focus on time spent fishing to keep one fish and then spend the rest of the day fishing or pursuing a larger fish.
- How much will anglers replace lost halibut with other species?

An additional discussion on angler behavior as it relates to discard mortality is found below.

#### 2.6.4.1.2 Changing Demand for Charter Trips

The literature has long shown that anglers are sensitive to trip attributes such as species availability, catch rates, trip cost, and bag limits. While there are no published studies that discuss the effect of changing bag limits on the Area 2C halibut fishery, there are several papers that discuss the effect of trip attributes on Area 3A anglers fishing specifically for halibut (Criddle et al, 2003; Hamel et al., 2003) while ISER (1999) discusses the relative regional sensitivity of anglers fishing for all species to trip cost. This analysis is able to use these studies to estimate the sensitivity of anglers to a change in bag limit for halibut.

Changing the bag limit on charter trips is likely to reduce the demand for charter trips. Charter fishing is expensive, with trips costing between \$150 and \$300 for a single-day trip. In addition, ADF&G reports that 96 percent of anglers in Southeast Alaska are from out of state, which means that in addition to the cost of the trip itself, anglers are also paying for rooms, meals, and transportation costs. For an angler solely interested in halibut (e.g., unwilling to substitute other species) halving the bag limit from two fish per day to one fish per day could be considered the equivalent of doubling the angler’s cost per fish. While this isn’t the same as doubling the angler’s trip cost, it is likely to have some effect on overall demand. Previous studies have noted that anglers in Area 2C are more sensitive to price than anglers in Area 3A, but that non-residents are less sensitive than residents (ISER 1999). Additionally, Criddle et al. (2003) noted that non-residents are less sensitive to catch rate changes than residents. Non-residents are also less likely to be on their trips solely for the purposes of fishing than residents. Herrmann et al. (2001) reported that among the survey respondents who went halibut fishing, 88 percent of the Alaskan residents indicated that halibut fishing was the primary purpose of their trip to the Kenai Peninsula while only 43 percent of non-residents indicated that halibut fishing was a primary purpose of their trip to the Kenai Peninsula. The most relevant studies to the question of how a change in bag limit will effect demand (Criddle et al. (2003), Hamel et al. (2003)) are from a 1997 study of anglers by the University of Alaska Fairbanks (UAF) with recent saltwater sport fishing trips in Lower and Central Cook Inlet. The investigators estimated the price elasticity of demand for fishing trips in the region and found that demand is inelastic (i.e., a one percent change in price results in a less than one percent change in demand). However, the results do show that a change in the price of a trip will likely have some effect on demand. The study showed that a roughly one-third increase in price would lead to an approximately 21 percent reduction in demand. A 50 percent increase in the price of trip would reduce demand by one-third.

**Table 37 Estimated Changes in Demand Relative to Changes in Price of a Trip from Criddle et al. (2003)**

Change in Cost	Percent Change in the Price of Trip	Percent Change in Demand
\$5.00	3.5	-1.8
\$10.00	6.9	-3.6
\$15.00	10.4	-5.6
\$25.00	17.3	-9.7
\$50.00	34.6	-21.3

Source: Criddle et al. (2003).

Criddle et al. (2003) and Hamel et al. (2003) used data from the same study to estimate how changing catch rates would affect angler demand for trips. It is likely that changing catch rates underestimate the effect of changing a bag limit because catch rates can fall substantially in some fisheries before they truly affect angler take home catch. For example, the 1997 UAF study found that charter anglers targeting halibut caught an average of 3.5 fish per trip and retained 1.43 fish per day. There is very little information on the distribution of catches between anglers, but anecdotal information suggests that a

small minority of anglers are disproportionately successful while another portion catches very little. For example, in 2006 in Area 2C, the “average” angler caught 1.71 fish per day. However, 29.4 percent of anglers caught nothing. So the average number of fish caught by anglers who caught anything was actually 2.4 fish per day. Changes in bag limits would most likely affect those who only regularly retain more than one fish because these anglers have become accustomed to retaining more than one fish and would have largest effect on their halibut retention.

**Table 38 Estimated Changes in Demand from Changing Catch Rates**

Change in Catch Rate (%)	Percent Change in Participation
0	0
-10	-6.5
-20	-14.8
-30	-25.1
-40	-37.1
-50	-50.2

Source: Criddle et al. (2003); Hamel et al. (2003).

The analysis is unable to definitely answer how much angler demand will decline because of a change in bag limit beyond saying that demand will likely be reduced and that the change in the bag limit is more likely to affect local anglers, anglers with a strong preference for halibut, and those whose trips are specifically for fishing. No survey has looked at the effect of changing bag limits in Area 2C for halibut, and data on prior bag limit changes for other species is limited. ADF&G provided data on king salmon tag sales in the year before and after the mid-season 2000 emergency order changing the daily bag limit for king salmon. The total number of resident tags sold grew 6.8 percent between 1999 and 2000 and shrank 3.64 percent between 2000 and 2001; a 10.4 percent swing in the year-to-year growth rate. The overall growth rate swung more than 4.5 percentage points as growth non-resident purchases slowed, but did not fall. The total number of tags sold fell by one nearly one percent. This data indicates that anglers do respond to bag limit changes. However, the analysis cautions against using this data as a proxy given that tags sold is not necessarily indicative of trips taken. If anglers both bought fewer tags and took fewer trips (for those that bought tags) then using tags would underestimate the actual demand change. Additionally, king salmon anglers had other species whose bag limit did not change that they could target. There is the potential for a cumulative effect as anglers see the bag limits reduced on species that are substitutes for each other.

**Table 39 King Salmon Tags Sold in Southeast Alaska, 1999-2001**

Year	Number of Tags			Change from Previous Year		
	Resident	Non-Resident	Total	Resident	Non-Resident	Total
1999	15,379	39,838	55,217			
2000	16,425	40,944	57,369	6.80%	2.78%	3.90%
2001	15,827	41,106	56,933	-3.64%	0.40%	-0.76%

Source: ADF&G 2007.

The best proxies for demand reduction are the studies discussed above, which looked at changes in catch rates and trip costs. If one accepts that halving the bag limit results in the same order of magnitude change as a large reduction in catch rates or a large increase in price, then these studies would seem to suggest that halving the bag limit might result in demand reduction as high as one-third. On the other hand, the data from the king salmon tag sales showed much smaller changes. Conversations with charter captains have revealed “best guess” estimates of reduced participation rates as high as 50 percent amongst certain user groups, but that overall reduction in demand might be between 25 and 40 percent. Some operators would be forced out of business because they would not have enough client days at sea to pay their fixed

costs. More than one captain has indicated that the potential for a one-fish bag limit and other management options has already resulted in the cancellation of trips by some customers.

#### **2.6.4.1.3 Changes in Discard Mortality**

Discard mortality is not currently a component of charter harvest accounting methods. Any changes in discard mortality that result from implementation of any of the alternatives would not affect catch accounting or derivation of the commercial fishery catch limits in any direct way. However, both the SSC and the IPHC have asked that this analysis discuss discard mortality. Discard mortality might reduce harvest savings from this option even without any change in angler behavior or demand if anglers who previously harvested a second halibut catch the same number of fish in per trip. However, if anglers catch fewer fish because they spend less time fishing, then discard mortality could fall. ADF&G staff suggested that this analysis use a five percent mortality rate for discarded halibut and the analysis is able to account for the fact that more fish will be discarded.<sup>14</sup> We assume that every second fish caught in 2006 would now be discarded in order to provide a conservative estimate of the potential effect of discards. This assumption ignores that fact that some anglers will not catch as many fish under single-fish bag limit as they do under a two-fish bag limit. However, some anglers faced with the lower bag limit will not keep the same first fish that they normally would keep and will continue fishing in pursuit of a larger fish. The authors believe that assumption allows us to show the maximum effect of discards if anglers are not able to significantly increase their catch per unit of effort (i.e., the angler day). Additionally, the assumption also allows us to show that changes in discard mortality are likely to be small when compared to changes in overall mortality (e.g., harvest plus discard mortality) from a drop in demand.

ADF&G logbook data for 2006 show that there were 92,775 charter client days. These anglers discarded 51,155 fish and harvested 107,238 halibut for a total of 158,393 successfully landed fish. Applying the 5 percent mortality rate to the number of fish discarded yields a discard mortality estimate of 2,558 fish (Table 40). These anglers harvested 1.16 fish and discarded 0.55 fish for a total catch of 1.71 fish per client day. Discard mortality was 0.03 fish per client day with total mortality at 1.18 fish per client day. If we assume that total client catch stays the same and there is no change in client behavior, then under the one-fish bag limit, harvest per client day would fall to 0.7 halibut per day. This calculation assumes that clients who harvested zero fish would continue to harvest zero fish while those who harvested more than one halibut would be reduced to harvesting one halibut and discarding the halibut they otherwise would have kept. Under this scenario, total discards rise from 51,155 fish to 93,836 and discard mortality rises from 2,558 fish to 4,693 fish. However, total mortality (harvest + discard mortality) falls from 109,796 fish to 69,230 fish. This decline is equivalent to approximately 37 percent and assumes no efforts by anglers to increase the average size of the fish they retain.<sup>15</sup>

---

<sup>14</sup> A discussion of how ADF&G staff reached an estimate of five percent mortality is included in Appendix III.

<sup>15</sup> The study is unable to account for anglers efforts to increase the average size of the fish they catch because there is not enough data on the weights of fish that anglers currently catch.

**Table 40 Effect of 5 Percent Discard Mortality on Harvest Reductions without Reduced participation, 1-Fish Bag Limit for the Entire Season**

Unit	Effort (Client Days)	Harvest (No. Fish)	Discards (No. Fish)	Estimated Discard Mortality (No. Fish)	Total Mortality (No. Fish)	Total Catch (No. Fish)
2006 with a 2-Fish Bag Limit						
Aggregate Area 2C	92775	107,238	51155	2558	109796	158393
Per Client Day		1.16	0.55	0.03	1.18	1.71
Estimated 2006 Conditions with a 1-fish Bag Limit						
Aggregate	92775	64537	93836	4693	69230	158393
Per Client Day		0.70	1.01	0.05	0.75	1.71

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

Decisions that anglers make while fishing also influence overall discard mortality. A portion of change in overall mortality associated with this option depends on how anglers respond to the bag limit. The current bag limit of two fish allows anglers a number of options with regards to their angling experience. How angler behavior, in aggregate, changes will determine how this management option changes losses associated with mortality. For example, consider two models of angler behavior:

- Assume anglers with a two-fish bag limit harvest the first two halibut they successfully land. If the one-fish bag limit encourages anglers to keep fishing for a longer period in search of a larger fish and the anglers successfully land more than two fish, there will likely be increased discard mortality (in aggregate).
- Assume anglers with a two-fish bag limit use the bag limit to balance the desire for larger fish with the desire for a longer angling experience. These anglers likely keep the first acceptable weight fish they successfully land, but then keep fishing for the rest of the fishing day until they keep their second fish toward the end of the day. These anglers are focusing on landing as many fish as possible during the day. Under a one-fish bag limit, discard mortality would likely not increase because the anglers may still focus on successfully landing a halibut during their experience and there is no reason to think they would land more fish during the same time period under a one-fish bag limit. Discussions with charter captains indicate that this type of behavior is relatively common among clients interested in recreational fishing itself as an activity and experience.

On average, anglers are likely somewhere between these two models. However, our information on angler behavior is generally limited to the number and size of halibut anglers kept and the number of halibut anglers discarded. There is no comprehensive source of information on angler behavior while on charter boats although several studies are currently underway (Lew 2007, Lee 2007).

In the long run, reduced demand for trips is likely a more important factor than discard mortality. In 2006, a one-percent reduction in angler demand, as measured by days of effort, would have reduced total mortality by 1,354 fish, while a similar increase in angler demand increases total mortality by 82 fish. Given that the current two-fish limit allows anglers to effectively fish all day while searching for larger-than-average fish, the potential for increased mortality through increasing catch per unit effort is very limited when compared with the effects of reduced participation.

#### **2.6.4.2 Bag Limit Reduction Analytical Results**

Table 41 summarizes the estimated effect of Option 4 without accounting for any changes in angler demand. Note that the analysis used the overall length composition for 2006, effectively assuming the same length composition each month, when in fact they were likely different. Increased discards are

likely to reduce the overall efficacy of the option. The June, July and August estimates do not account for anglers switching from a month with a reduced bag limit to a month without a reduced bag limit. Over the long run, anglers who change the timing of their trips to account for bag limit changes *will erode the savings from these options*. Thus, the estimates for single-month bag limits are viewed as maximum estimates of the short-term effect of this management sub-option. In 2006, Area 2C harvests were approximately 142.1 percent of the area GHL. Instituting a season-long, one-fish bag limit would reduce harvests to approximately 85.7 percent of the area GHL without any demand effects. A 30 percent demand reduction, the upper level predicted by both peer-reviewed literature and key informant interviews, would result in harvest equivalent to 59.9 percent of the current GHL. In comparison to the NMFS preferred alternative for 2007, the stand-alone, month-long closures would result in lower savings while the full season sub-option would result in greater savings.

**Table 41 Effect of a One-Fish Bag Limit Accounting for the Reduced Participation**

Sub-Option	Demand Reduction	Effect of Reduced Bag Limit		Alt. 1. 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
May	None	0.037	2.6%	1.998	139.6%	164.2%	1.519	106.05%	124.8%
	30 Percent	0.053	3.7%	1.982	138.4%	162.8%	1.519	106.05%	124.8%
June	None	0.204	14.2%	1.832	127.9%	150.5%	1.519	106.05%	124.8%
	30 Percent	0.297	20.7%	1.738	121.4%	142.8%	1.519	106.05%	124.8%
July	None	0.295	20.6%	1.740	121.5%	143.0%	1.519	106.05%	124.8%
	30 Percent	0.430	30.0%	1.605	112.1%	131.9%	1.519	106.05%	124.8%
August	None	0.244	17.1%	1.791	125.1%	147.1%	1.519	106.05%	124.8%
	30 Percent	0.356	24.9%	1.679	117.2%	138.0%	1.519	106.05%	124.8%
September	None	0.028	2.0%	2.007	140.1%	164.9%	1.519	106.05%	124.8%
	30 Percent	0.042	2.9%	1.993	139.2%	163.8%	1.519	106.05%	124.8%
Entire Season	None	0.808	56.4%	1.227	85.7%	100.8%	1.519	106.05%	124.8%
	30 Percent	1.178	82.2%	0.857	59.9%	70.4%	1.519	106.05%	124.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

As noted above, peer-reviewed literature and key informant interviews both seem to indicate the potential for demand reductions. However, the magnitude of those demand reductions is unclear. The study reports a predicted maximum of 30 percent, but the actual effect could be higher or lower. Table 42 and Table 43 shows harvest as a percentage of GHL with varying levels of demand reduction.

**Table 42 Season Long One-Fish Bag Limit with Reduced Participation, Current Status Quo**

Demand Reduction	Without Mortality		
	Harvest Reduction (%)	Harvest Reduction (Mlb)	Harvest as Percentage of the GHL
<b>0%</b>	<b>39.7%</b>	<b>0.808</b>	<b>85.7%</b>
10%	45.8%	0.933	77.0%
20%	51.9%	1.055	68.4%
<b>30%</b>	<b>57.9%</b>	<b>1.178</b>	<b>59.9%</b>
40%	63.9%	1.300	51.3%
50%	69.9%	1.423	42.8%
60%	75.9%	1.545	34.2%
70%	81.9%	1.668	25.7%
80%	88.0%	1.790	17.1%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007 and Criddle et al. (2003).

**Table 43 Month One-Fish Bag Limit Accounting for Reduced participation**

Within Month Demand Reduction	May	June	July	August	Sept.
0%	139.6%	127.9%	121.5%	125.1%	140.1%
10%	137.2%	125.7%	118.3%	122.4%	137.2%
20%	134.8%	123.5%	115.2%	119.8%	134.3%
30%	132.5%	121.4%	112.1%	117.2%	131.4%
40%	130.1%	119.2%	108.9%	114.7%	128.5%
50%	127.8%	117.1%	105.8%	112.1%	125.6%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007 and Criddle et al. (2003).

### 2.6.5 Option 5 – Size Limits for Second Fish

A variation on the one-fish bag limit is allowing anglers to keep fishing for a larger, or “trophy,” second fish. Under this option, anglers would generally have a one-fish bag limit except that they could keep fishing after harvesting their first fish to pursue a second halibut that met a minimum length standard. The option contains two sub-options establishing this minimum length for the second halibut at either 45 inches or 50 inches. At its April 2007 meeting, the Council rejected sub-options for second fish minimum lengths of 55 inches and 60 inches over concerns for the difficulty of measuring such large fish without bringing them aboard. As shown in Table 44, the higher this limit is set, the closer this option comes to replicating the equivalent of a one-fish bag limit. Without accounting for reduced participation or changes in discard mortality, ADF&G analysts predicted that a 45-inch limit would reduce harvest by 19.2 percent or 0.391 Mlb, based on the proportions of these fish in the 2006 harvest. A 50-inch bag limit would reduce harvests by 23.5 percent or 0.478 Mlb. If the measures result in a 10 percent reduction in demand, then harvest could be reduced by as much as 23.5 percent and 31.3 percent respectively. In comparison to the NMFS preferred alternative for 2007, allowing one fish of any size and one fish below 32 inches, the sub-option requiring a 45-inch minimum size limit is likely to be slightly less effective, but could lead to slightly greater harvest reductions if angler demand for trips is reduced by 10 percent. The 50-inch sub-option would save roughly 38,000 lb less than the NMFS preferred alternative, but could be save 121,000 lb if angler demand for trips falls by 10 percent.

**Table 44 Expected Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish**

Sub-Option	Demand Reduction	Effect of 2 <sup>nd</sup> Fish Size Min.		Alt. 1. Current 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)
45"	None	0.391	19.2%	1.644	114.8%	135.1%	1.519	106.05%	124.8%
	10 Percent	0.559	27.4%	1.476	103.1%	121.3%	1.519	106.05%	124.8%
50"	None	0.478	23.5%	1.557	108.7%	127.9%	1.519	106.05%	124.8%
	10 Percent	0.637	31.3%	1.398	97.7%	114.9%	1.519	106.05%	124.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

It is unclear how Option 5 would affect overall demand for halibut charters. Clearly, anglers targeting smaller halibut would essentially face a one-fish bag limit and might show decreased demand for a charter experience. That said, an angler interested in fishing first and harvesting second might view the charter experience as close to what they experienced before the change in management regime because the option wouldn't affect the amount of time one could spend fishing. These anglers could still fish after harvesting their first fish because they could say they were in pursuit of their "trophy" fish. At best, there will be no demand reduction, especially if charter captains can replace halibut with other species. At worst, the demand reduction will be something less than what would be experienced under a one-fish bag limit. Hence, it would not be unreasonable to expect a demand reduction in the 0 to 10 percent range if all other trip attributes stay the same. Interviews with operators indicated that they expected a much smaller effect on demand from this option and the consensus best guess were reductions of up to 10 percent in aggregate. As with all of these options, the gains from this option will be eroded by changes in angler behavior.

**Table 45 Expected Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish with Demand Effects**

Demand Reduction	45" Min	50" Min
0%	111.8%	106.0%
<b>10%</b>	<b>100.4%</b>	<b>95.3%</b>
20%	89.3%	84.7%
30%	78.1%	74.1%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

Option 5 has several negative features regarding discard mortality. First, the opportunity to keep a second halibut will encourage individuals to maximize effort throughout the day. While some anglers currently maximize effort as part of their personal preferences, the pursuit of the larger second fish could be inculturated into the charter experience as charter providers seek to keep all clients happy while clients truly interested in harvesting a second fish pursue their quarry. Second, the establishment of the upper limit means that anglers who otherwise might have stopped fishing with a 42-inch fish, for example, will be forced to throw those fish back and may choose to keep fishing. In this scenario, the savings of releasing the 42-inch fish will be reduced by increased harvest mortality if the angler keeps fishing or succeeds in replacing the 42-inch fish with a fish above the minimum size limit.

As noted above, increasing discard mortality will generally require anglers to discard more than the 51,155 lb that were discarded in the 2006 charter fishery. It is unclear whether this option would result in increased or decreased discard mortality. Discard mortality could decrease if reduced participation lowers the number of fish anglers catch. Reduced participation is most likely to occur with a higher minimum

size limit on one of two fish because the chances of harvesting a second fish are greatly reduced. On the other hand, if the regime does not reduce demand and encourages anglers who would have stopped fishing earlier to continuing pursuing their fish, then the number of discarded fish and discard mortality could increase. There are not enough data on angler behavior while fishing to reliably estimate how this option will affect discard mortality, but there is enough uncertainty that IPHC staff did not recommend this option to the IPHC without a better understanding of incremental mortality.

Interviews with the charter industry revealed mixed opinions about Option 5. It is generally preferred to the one-fish bag limit because it preserves the opportunity for anglers to retain two fish. Some operators said that the reduction in demand would not be that large, particularly in the first year. They reported that savings might be greater than expected from those in multi-species trips because salmon angling usually occurs after fishing for halibut is completed and many anglers will not wait around to fish for halibut that they may not be able to keep when they could be catching salmon they can keep. Some industry participants also expressed concerns about the logistics of measuring a larger halibut during capture to ensure it met the minimum size requirement. Effectively measuring these animals prior to killing them is difficult and could represent a safety threat for those on board charter vessels. Additionally, the extra time spent measuring halibut could mean higher mortality for those animals which are found to be below the minimum size limit. If faced with sufficient probability of enforcement action, crew are likely to only keep animals that are demonstrably larger than the minimum limit given that accurate measurements will be difficult before bringing the animal on board the boat.

Commercial operators also expressed concerns about the enforceability of this option given the difficulty charter operators will have when measuring trophy fish. Specific concerns were raised about increased mortality from fish that are brought on board as trophy fish, but turn out to be below minimum lengths. Charter operators suggested that regulations be promulgated that fish brought on board as trophies must be kept and that all fish should be kept whole until the vessel returns to port to in order to facilitate enforcement of this option.

### 2.6.6 Option 6 – One Fish 32 inches or less

Option 6 duplicates the current NMFS preferred alternative for 2007, which allows one fish of any size and requires one of two fish in the bag limit to be smaller than 32 inches. It was added to the analysis in April 2007 after NMFS identified it as its preferred alternative for implementation in 2007; however, it could not be considered part of the status quo until the final rule is published (which is expected be after release of this draft but prior to final action). The analysis predicts that this measure would reduce harvest by 0.516 Mlb or 25.4 percent under 2006 conditions. A reduction of this magnitude would have reduced harvest to 106.1 percent of the 1.432 Mlb GHL. A demand reduction is not expected with this option given that 48 percent of the current harvest in numbers measures 32 inches or less, but it is a possibility amongst anglers who target larger halibut specifically. A ten percent demand reduction combined with the option itself would result in harvest reductions of 0.737 Mlb. This option achieves harvest reductions by reducing the average weight.

**Table 46 Expected Effect of a Two-Fish Bag Limit with One Fish of Any Size and One Fish 32 inches or less in Length**

Demand Reduction	Effect of 2-fish Bag Limit w/1-fish < 32 (NMFS Preferred Alternative for 2007)				
	Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
None	0.516	25.4%	1.519	106.05%	124.8%
10 Percent	0.737	36.2%	1.298	90.63%	106.6%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

Option 6 is likely to have limited economic effects on charter operators. Additionally, the option does not have the same issues with measuring larger fish that reverse slot or “trophy” options exhibit. It does raise the potential for increased mortality in fish larger than 32 inches that must be discarded. However, the area’s angler catch rates and the relatively high abundance of fish 32 inches or less in length would seem to indicate that the magnitude of this problem will be limited, at least in the short term. The effectiveness of this option in reducing harvest, and the amount of discard mortality resulting from it will both be affected by longer term changes in the halibut population size structure.

### 2.6.7 Option 7 – One Fish of Any Size with a Reverse Slot Limit for the Second Fish

Option 7 would allow one fish of any size while establishing a reverse slot limit for allowing the retention of a second fish in the 2-fish bag limit, if one of the fish is below 32 inches or above either 45 or 55 inches. The analysis estimates that the *45 inch reverse slot limit has the potential to actually increase harvest weight* as some fish between 32 and 45 inches will be replaced with fish above 45 inches. The analysis assumes the catch rates will remain the same and that “in-slot” fish will be replaced by fish smaller or larger than the slot at the same ratio equivalent to those found in 2006 harvest data.<sup>16</sup> Under these assumptions, some fish close to 32 inches will be replaced by much larger fish above 45 inches. The analysis estimates that the particular combination of 32 inch/45 inch reverse slot limit would result in an increase of average harvest weight to 20.39 lb from the 2006 average harvest weight of 18.98 lb. The 32/50 inch reverse slot is more effective, resulting in a slight harvest savings of 5,000 lb. However, it is not clear that a reverse slot limit at these lengths would result in any harvest savings areawide. The potential for increased harvest weight was also an issue for the minimum size option rejected by the Council in April 2007. The same dynamics that drove the potential for increased harvest weight in that option also drive the potential for increased harvest weight in this option.

**Table 47 Expected Effect of a Reverse Slot Limit**

Sub-Option	Demand Reduction	Effects of No Crew Harvest		Alt. 1. 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)
45"	None	-0.060	19.2%	2.095	146.3%	172.2%	1.519	106.05%	124.8%
	10 Percent	0.153	27.4%	1.882	131.4%	154.7%	1.519	106.05%	124.8%
50"	None	0.005	23.5%	2.030	141.8%	166.8%	1.519	106.05%	124.8%
	10 Percent	0.211	31.3%	1.824	127.3%	149.8%	1.519	106.05%	124.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

There is no a priori expectation of significant demand changes under Option 7. However, the potential for demand reductions should not be ignored it effectively eliminates half of the opportunity the charter clients have to harvest fish in the 15 to 40 lb range. Anglers often consider fish in this size range to be of superior quality for consumption. As noted in prior options, operators have noted the potential for difficulty in measuring fish and increased mortality for fish that unexpectedly do not meet length requirements.

<sup>16</sup> For example, if fish below 32 inches were 60 percent of the harvest by number and fish above 45 inches were 15 percent of the harvest by number, then “in-slot” fish would be replaced by four fish below 32 inches to every one fish above 45 inches.

### 2.6.8 Option 8 – Combination of Options 1, 2, & 5

Option 8 would limit vessels to one trip per day, ban harvest by skipper and crew, and establish a minimum size limit of 45 inches or 50 inches on one of two fish in an angler’s bag limit. The analysis estimates that the 45-inch minimum size limit would have reduced harvest in 2006 between 0.429 and 0.608 Mlb, a reduction that would have reduced harvest to between 99.7 and 112.2 percent of the GHL.<sup>17</sup> This range bounds the estimated effect of the NMFS preferred alternative for 2007. A 50-inch minimum size limit sub-option would have reduced harvest between 0.516 and 0.686 Mlb and lowered the harvest to between 110.9 and 124.8 percent of the GHL. Both the lower and upper estimates for this sub-option exceed the harvest reductions associated with the NMFS preferred alternative for 2007.

**Table 48 Expected Effect of a One Trip per Day, No Harvest by Skipper and Crew, and a Minimum Size Limit on the Second Fish**

Sub-Option	Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
45"	Lower	0.429	21.1%	1.606	112.2%	132.0%	1.519	106.05%	124.8%
	Upper	0.608	29.9%	1.427	99.7%	117.3%	1.519	106.05%	124.8%
50"	Lower	0.516	25.3%	1.519	106.1%	124.8%	1.519	106.05%	124.8%
	Upper	0.686	33.7%	1.349	94.2%	110.9%	1.519	106.05%	124.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

Insights from industry members on the constituent components of this option are discussed in detail in other sections. Industry members noted that the effects of one trip per day are likely to be transitory. However, these effects make up a very small portion of the overall effect of this option. One effect of a tailored federal ban of harvest by skipper in skipper and crew will likely be that the elimination of ADF&G’s blanket ban on harvest of all saltwater species by charter skipper and crew. Hence, the federal ban would result in a less onerous system for crew than the current emergency order. A minimum size limit on a second fish could result in slight demand reductions, but extensive reductions do not seem likely while the Council’s decision to eliminate the 55-inch and 60-inch sub-option from the analysis reduces concerns about measuring large fish in the water. That said, the concern about the minimum size limit leading to higher mortality rates remains.

### 2.6.9 Option 9 – Combination of Options 1, 2, & 6

Option 9 limits vessels to one trip per day, bans harvest by skipper and crew, limits lines to a maximum of 6 with the number equal to paying passengers, and places a length limit on one of two fish in an angler’s daily bag of 32 inches or less. The analysis estimates that this option would have reduced harvest in 2006 between 0.554 and 0.565 Mlb, a reduction which would have reduced harvest to between 102.6 and 103.4 percent of the GHL. Both the lower and upper estimates for this sub-option exceed the harvest reductions associated with the NMFS preferred alternative for 2007.

<sup>17</sup> For Option 8-13 lower estimates include the lowest estimate from each individual option and no estimated reduction in demand while upper estimates include the highest estimate from each individual option including expected demand reductions if applicable.

**Table 49 Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and the Second Fish 32 inches or less**

Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
	Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)
Lower	0.554	27.2%	1.481	103.4%	121.7%	1.481	103.4%	121.7%
Upper	0.565	27.8%	1.470	102.6%	120.8%	1.470	102.6%	120.8%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

As noted in the constituent component sections, the primary drawbacks associated with this combination option are:

- The effects of one trip per day are likely to be transitory, but these effects make up a very small portion of the overall effect of this option.
- One effect of a tailored federal ban of harvest by skipper and crew will likely be that the elimination of ADF&G’s blanket ban on harvest of all saltwater species by charter skipper and crew. Hence, the federal ban would result in a less onerous system for crew than the current emergency order.
- Line limits will be difficult to enforce.
- The 32-inch maximum size limit on one of two fish could result in increased mortality of larger fish, but the magnitude of this effect is likely to be very limited, at least in the near term.

**2.6.10 Option 10 – Combination of Options 1, 2, & 7**

Option 10 limits vessels to one trip per day, bans harvest by skipper and crew, limits lines to a maximum of 6 with the number equal to paying passengers, and establishes a reverse slot limit between 32 inches and 45 or 50 inches on one of two fish in an angler’s bag limit. The analysis estimates that the 45-inch sub-option could result in a slight increase in harvest or a reduction of up to 0.202 Mlb.. A 50-inch minimum size limit sub-option would have reduced harvest between 0.042 and 0.260 Mlb and lowered the harvest to between 123.9 and 139.1 percent of the GHl. The authors note that the large differences between the lower and upper estimates for both sub-options are driven entirely by the inclusion of a 10 percent reduction in demand for the upper estimates. Given that there is currently no expectation for the demand reduction to be that high, the authors believe that the lower estimate is a better predictor of the potential effects of these sub-options.

**Table 50 Summary Effect of a One Trip per Day, No Harvest by Skipper and Crew, and the Reverse Slot Limit**

Sub-Option	Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHl (%)	As a Portion of the 1.217Mlb GHl (%)
45"	Lower	-0.023	-1.1%	2.058	143.7%	169.1%	1.934	135.07%	158.9%
	Upper	0.202	9.9%	1.833	128.0%	150.6%	1.938	135.31%	159.2%
50"	Lower	0.042	2.1%	1.993	139.1%	163.7%	1.999	139.62%	164.3%
	Upper	0.260	12.8%	1.775	123.9%	145.8%	2.003	139.86%	164.6%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

As noted in the constituent component sections, the primary drawbacks associated with this combination option are:

- The effects of one trip per day are likely to be transitory, but these effects make up a very small portion of the overall effect of this option.
- One effect of a tailored federal ban of harvest by skipper in skipper and crew will likely be that the elimination of ADF&G's blanket ban on harvest of all saltwater species by charter skipper and crew. Hence, the federal ban would result in a less onerous system for crew than the current emergency order.
- Line limits will be difficult to enforce.
- The reverse slot limit is likely to have limited effect on harvest rates given the current slot sizes. The primary component of this combination of items is from the ban on skipper and crew harvest.

### 2.6.11 Option 11 – Combination of Options 1, 2, 3, & 5

Option 11 limits vessels to one trip per day, bans harvest by skipper and crew, establishes an annual limit of four fish, five fish, or six fish, and places a minimum size limit of 45 inches or 50 inches on an angler's second fish in their daily bag. These combinations result in six different sub-options; all but one of which would result in more harvest savings than the NMFS preferred alternative for 2007. Additionally, all but one of the sub-options would have reduced 2006 harvest to a level slightly greater or lower than the GHl. The sub-option with the smallest effect is the 45 inch minimum size on one of two fish combined with a six fish annual limit. This sub-option would reduce harvest between 0.498 and 0.502 Mlb and have resulted in a harvest between 1.533 and 1.542 Mlb. These levels are above the GHl and equivalent to 107.0 percent to 107.7 percent of the GHl. The remaining sub-options would reduce harvest below the GHl. The most effective sub-option is the 50 inch minimum size on one of two fish combined with a four fish annual limit. This sub-option would have reduced harvest between 0.815 and 0.843 Mlb, a harvest equivalent to 83.2 to 85.2 percent of the GHl. The effects of the remaining sub-options are:

- The 45 inch minimum with a 4 fish annual limit would have reduced harvest between 0.692 and 0.701 Mlb, a harvest equivalent to 93.1 to 93.8 percent of the GHl.
- The 45 inch minimum with a 5 fish annual limit would have reduced harvest between 0.575 and 0.584 Mlb, a harvest equivalent to 101.3 to 101.9 percent of the GHl.

- The 50 inch minimum with a 5 fish annual limit would have reduced harvest between 0.704 and 0.733 Mlb, a harvest equivalent to 90.9 to 93.0 percent of the GHL.
- The 50 inch minimum with a 6 fish annual limit would have reduced harvest between 0.626 and 0.655 Mlb, a harvest equivalent to 96.4 to 98.4 percent of the GHL.

**Table 51 Expected Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits, and a Minimum Size Limit on the Second Fish**

Sub-Option	Estimate	Base Effect of Combined Options		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
45" & 4 Fish	Lower	0.692	34.0%	1.343	93.8%	110.4%	1.635	114.18%	134.4%
	Upper	0.701	34.5%	1.334	93.1%	109.6%	1.402	97.94%	115.2%
45" & 5 Fish	Lower	0.575	28.3%	1.460	101.9%	120.0%	1.784	124.59%	146.6%
	Upper	0.584	28.7%	1.451	101.3%	119.2%	1.551	108.34%	127.5%
45" & 6 Fish	Lower	0.493	24.2%	1.542	107.7%	126.7%	1.889	131.90%	155.2%
	Upper	0.502	24.7%	1.533	107.0%	126.0%	1.656	115.66%	136.1%
50" & 4 Fish	Lower	0.843	41.4%	1.192	83.2%	97.9%	1.581	110.38%	129.9%
	Upper	0.815	40.0%	1.220	85.2%	100.3%	1.568	109.46%	128.8%
50" & 5 Fish	Lower	0.733	36.0%	1.302	90.9%	107.0%	1.725	120.47%	141.7%
	Upper	0.704	34.6%	1.331	93.0%	109.4%	1.634	114.11%	134.3%
50" & 6 Fish	Lower	0.626	30.8%	1.409	98.4%	115.8%	1.736	121.20%	142.6%
	Upper	0.655	32.2%	1.380	96.4%	113.4%	1.827	127.55%	150.1%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

Insights from industry members on the constituent components of this option are discussed in detail by other sections. These comments include:

- The effects of one trip per day are likely to be transitory. However, these effects make up a very small portion of the overall effect of this option.
- One effect of a tailored federal ban of harvest by skipper in skipper and crew will likely be that the elimination of ADF&G's blanket ban on harvest of all saltwater species by charter skipper and crew. Hence, the federal ban would result in a less onerous system for crew than the current emergency order.
- A minimum size limit on a second fish could result in slight demand reductions, but extensive reductions do not seem likely while the Council's decision to eliminate the 55-inch and 60-inch sub-option from the analysis reduces concerns about measuring large fish in the water. That said, the concern about the minimum size limit leading to higher mortality rates remains.
- The annual limit sub-options have the potential to result in economic losses to multi-day package operators. That said, this option has broader support now from the charter community than it has received in the past.

## 2.6.12 Option 12 – Combination of Options 1, 2, 3, & 6

Option 12 limits vessels to one trip per day, bans harvest by skipper and crew, establishes an annual limit of four, five, or six fish, and places a maximum size limit of 32 inches on an angler’s second fish in their daily bag. All sub-options except the six fish sub-option are more effective at reducing harvest than the NMFS preferred alternative for 2007. They have the following results:

- The four-fish annual limit would reduce annual harvests .574 to .794 Mlb, resulting in a harvest of 86.6 to 102.0 percent of the current GHL.
- The five-fish annual limit would reduce annual harvests .551 to .603 Mlb, resulting in a harvest of 100.0 to 103.7 percent of the current GHL.
- The six-fish annual limit would reduce annual harvests .449 to .502 Mlb, resulting in a harvest of 107.1 to 110.8 percent of the current GHL.

**Table 52 Expected Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits, and the Second Fish 32 inches or less**

Sub-Option	Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
Four Fish	Lower	0.574	28.2%	1.461	102.0%	120.0%	1.461	102.02%	120.0%
	Upper	0.794	39.0%	1.241	86.6%	102.0%	1.241	86.65%	102.0%
Five Fish	Lower	0.551	27.1%	1.484	103.7%	122.0%	1.484	103.66%	122.0%
	Upper	0.603	29.7%	1.432	100.0%	117.6%	1.432	99.97%	117.6%
Six Fish	Lower	0.449	22.1%	1.586	110.8%	130.3%	1.586	110.77%	130.3%
	Upper	0.502	24.7%	1.533	107.1%	126.0%	1.533	107.08%	126.0%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

Previously noted comments on the constituent component of this combination option include:

- The effects of one trip per day are likely to be transitory, but these effects make up a very small portion of the overall effect of this option.
- One effect of a tailored federal ban of harvest by skipper in skipper and crew will likely be that the elimination of ADF&G’s blanket ban on harvest of all saltwater species by charter skipper and crew. Hence, the federal ban would result in a less onerous system for crew than the current emergency order.
- Line limits will be difficult to enforce.
- The 32-inch maximum size limit on one of two fish could result in increased mortality of larger fish, but the magnitude of this effect is likely to be very limited.
- The annual limit sub-options have the potential to result in economic losses to multi-day package operators. However, this option has broader support now from the charter community than it has received in the past.

### 2.6.13 Option 13 – Combination of Options 1, 2, 3, & 7

Option 13 limits vessels to one trip per day, bans harvest by skipper and crew, establishes an annual limit of four, five, or six fish, and places a reverse slot limit between 32 and 45 or 50 inches on an angler's second fish in their daily bag. These combinations result in six different sub-options. The sub-option with the smallest effect is the 45 inch minimum size on one of two fish combined with a six fish annual limit. This sub-option would reduce harvest between 0.069 and 0.294 Mlb and have resulted in a harvest between 1.741 and 1.966 Mlb. These levels are well above the GHL and equivalent to 121.6 to 137.3 percent of the GHL. The most effective sub-option is the 50 inch minimum size on one of two fish combined with a four fish annual limit. This sub-option would have reduced harvest between 0.376 and 0.467 Mlb, a harvest equivalent to 109.5 percent to 115.8 percent of the GHL. The effects of the remaining sub-options are:

- The 45 inch minimum with a 4 fish annual limit would have reduced harvest between 0.323 and 0.548 Mlb, a harvest equivalent to 103.8 to 119.6 percent of the GHL.
- The 45 inch minimum with a 5 fish annual limit would have reduced harvest between 0.174 and 0.399 Mlb, a harvest equivalent to 114.2 to 130.0 percent of the GHL.
- The 50 inch minimum with a 5 fish annual limit would have reduced harvest between 0.232 and 0.401 Mlb, a harvest equivalent to 114.1 to 125.9 percent of the GHL.
- The 50 inch minimum with a 6 fish annual limit would have reduced harvest between 0.130 and 0.299 Mlb, a harvest equivalent to 121.2 to 133.0 percent of the GHL.

**Table 53 Expected Effect of a One Trip per Day, No Harvest by Skipper and Crew, Annual Limits and the Reverse Slot Limit**

Sub-Option	Estimate	Combined Effect		Alt. 1. Unaltered 2-fish Bag Limit			NMFS Preferred Alternative for 2007		
		Harvest Reduction (Mlb)	Harvest Reduction (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)	2006 Harvest with Option (Mlb)	As a Portion of the 1.432Mlb GHL (%)	As a Portion of the 1.217Mlb GHL (%)
45" & 4 Fish	Lower	0.323	15.9%	1.712	119.6%	140.7%	1.712	119.55%	140.7%
	Upper	0.548	26.9%	1.487	103.8%	122.2%	1.487	103.84%	122.2%
45" & 5 Fish	Lower	0.174	8.5%	1.861	130.0%	152.9%	1.861	129.96%	152.9%
	Upper	0.399	19.6%	1.636	114.2%	134.4%	1.636	114.25%	134.4%
45" & 6 Fish	Lower	0.069	3.4%	1.966	137.3%	161.5%	1.966	137.27%	161.5%
	Upper	0.294	14.5%	1.741	121.6%	143.0%	1.741	121.56%	143.0%
50" & 4 Fish	Lower	0.376	18.5%	1.659	115.8%	136.3%	1.659	115.84%	136.3%
	Upper	0.467	23.0%	1.568	109.5%	128.8%	1.568	109.46%	128.8%
50" & 5 Fish	Lower	0.232	11.4%	1.803	125.9%	148.2%	1.803	125.92%	148.2%
	Upper	0.401	19.7%	1.634	114.1%	134.3%	1.634	114.11%	134.3%
50" & 6 Fish	Lower	0.130	6.4%	1.905	133.0%	156.5%	1.905	133.01%	156.5%
	Upper	0.299	14.7%	1.736	121.2%	142.6%	1.736	121.20%	142.6%

Source: NEI Estimates based on Alaska Department of Fish and Game 2006 Logbook Data, 2007.

As previously discussed:

- The effects of one trip per day are likely to be transitory, but these effects make up a very small portion of the overall effect of this option.
- One effect of a tailored federal ban of harvest by skipper in skipper and crew will likely be that the elimination of ADF&G's blanket ban on harvest of all saltwater species by charter skipper and crew. Hence, the federal ban would result in a less onerous system for crew than the current emergency order.
- Line limits will be difficult to enforce.
- The reverse slot limit is likely to have very limited effect on harvest rates given the current slot sizes. The primary component of this combination of items is from the ban on skipper and crew harvest.
- The annual limit sub-options have the potential to result in economic losses to multi-day package operators. However, this option has broader support now from the charter community than it has received in the past.

## **2.7 Economic and Socioeconomic Impacts of Alternatives**

At its February 2007 meeting, the Scientific and Statistical Committee, referencing the March 2006 EA/RIR/IRFA on options to limit charter halibut harvest in both Area 2C and Area 3A, noted that the discussion of the potential impact and efficacy of the action options should reflect an anticipation that halibut sportfishing charter service providers and their clients will respond strategically to the proposed management options. For example, the SSC noted that it should be anticipated that some anglers will substitute bare-boat charters and other self-guided activities for charter halibut trips if such trips become less attractive due to restrictive annual bag limits. It should also be anticipated that some charter service providers and some anglers would shift their effort to alternative fisheries or alternative recreation services and activities. This analysis includes a similar anticipation that anglers will adapt to management options where they are capable of doing so. For example, it should be anticipated that a portion of the anglers faced with restrictive bag limits in Area 2C may shift their effort to Area 3A. These strategic responses will reduce the efficacy of the proposed action options and will reduce the potential opportunity costs to the halibut charter industry and its customers of the proposed action options. Therefore, it should be expected that harvest reductions associated with some of the proposed options would be dissipated as angler behavior responds to those restrictions.

### **2.7.1 Expected Effect of Alternative 1. No Action**

Taking no action would not implement management measures to reduce charter halibut harvests to the Area GHL, as outlined in the Council's 2000 GHL policy. The No Action alternative includes pending action by NMFS whose preferred alternative for 2007 would require that at least one of the two halibut in a Federal could be no longer than 32 inches with its head on. Option 6 duplicates this preferred alternative. The analysis predicts that NMFS preferred alternative would reduce harvest by 0.516 Mlb, or 25.4 percent, under 2006 conditions. A reduction of this magnitude would have reduced harvest to 106.1 percent of the 1.432 Mlb GHL. The economics and socioeconomic effects of this alternative on the charter industry are likely to be limited in nature. On the other hand, the commercial industry will benefit through NMFS preferred alternative and increased biomass available for commercial harvest.

## **2.7.2 Expected Effect of Each Option within Alternative 2**

The analysis estimates that while the management options would result in reduced charter industry halibut harvest, the amount of the reduction varies widely between the options. The sections below briefly summarize the result of each option. More detailed discussions of each option are included in Section 2.6.

### **2.7.2.1 Option 1 – No More than One Trip per Day**

Option 1, a limit on vessels of no more than one trip per day, would have reduced harvest under 2006 conditions between 0.038 and 0.049 Mlb (between 1.8 and 2.4 percent). With this option, the GHL overage would have stood at between 138.7 and 139.5 percent of the GHL instead of the estimated 142.1 percent. The analysis for this option showed that “second trips” of the day for halibut are increasing as a percentage of overall trips, but still represent a relatively small portion of overall effort (Section 2.6). Key informant interviews and ADF&G data indicate that a very small portion of the charter fleet in 2C relies on this business model, which is much more common in Area 3A. More interviewees viewed this option as the least painful for the industry.

### **2.7.2.2 Option 2 – No Harvest by Skipper and Crew and Line Limits**

ADF&G banned harvest by skipper and crew while paying clients are on charter vessel effective May 26, 2006. The analysis expects ADF&G to renew the emergency order (EO) this year. Data from 2006 indicate that ADF&G’s 2006 EO saved between 3.8 and 4.2 percent of the harvest. This range is inside the range of previous estimates (NPFMC, 2006). The analysis expects that continued EOs or a federal action to permanently ban skipper and crew harvest would continue to reduce future harvests by approximately 4 percent. However, given that the ban existed in 2006 the reduction from the EO is included in the status quo.

ADF&G limited the number of lines in charter fisheries in Southeast in the 1980s. Implementing similar measures in Federal regulations would ease the burden of these limits on other State managed fisheries, but makes those regulations difficult to enforce on one species in this multi-species fishery.

### **2.7.2.3 Option 3 – An Annual Limit**

Option 3, an annual limit of either four, five, or six fish, would have reduced harvest under 2006 conditions by 0.88 (six fish limit), 0.190 (five fish limit) and 0.335 Mlb (four fish limit). These amounts are equal to between 4.3 percent, 9.3 percent, and 16.3 percent of the 2006 harvest respectively. With these options, the GHL overage would have stood at between 118.7 percent and 135.9 percent of the GHL instead of the estimated 142.1 percent. While key informant interviewees told us that this option would disproportionately affect lodge operators and operators who offered multi-day packages, the lodge operators interviewed for this analysis indicated that this option is preferable compared to other options. The analysis notes that the four-fish limit is the only single element option not involving an effective change in the bag limit that results in a more than 20 percentage point decline in the GHL overage. NOAA Fisheries has expressed concerns about the enforcement costs of this option. However, the analysis notes that the new 2006 logbooks have lowered enforcement costs because they track angler harvest by sport fishing license number.

### **2.7.2.4 Option 4 – 1 Fish Bag Limit**

Option 4 would lower the daily bag limit from two halibut to one halibut in May, June, July, August, September, or for the entire season. This analysis may reduce demand for charter halibut trips. Key informant interviews and a review of the peer-review literature indicate that the expected demand

reduction could be as high as 30 percent. The analysis presents two estimates for each sub-option. These are the effect of the option without any demand reduction and the effect of the option with a 30-percent demand reduction. For the full season bag limit, the demand reduction is likely to be within these two points. The month-long bag limit reductions are more complicated as anglers can transfer effort to other months. There are no data available to help predict the magnitude of these transfers. However, key informant interviews indicate that one possibility is that the demand reduction and demand transfers cancel each other out and that the base estimate of no demand decline stands as the best estimate of the option's overall effect.

The analysis estimates that:

- A reduction in bag limit in May 2006 would have reduced total season harvest between 0.037 and 0.053 Mlb, which is equivalent to between 2.6 and 3.7 percent of the total 2006 harvest.
- A reduction in bag limit in June 2006 would have reduced total season harvest between 0.204 and 0.297 Mlb, which is equivalent to between 10.0 and 14.6 percent of the total 2006 harvest.
- A reduction in bag limit in July 2006 would have reduced total season harvest between 0.295 and 0.430 Mlb, which is equivalent to between 14.5 and 21.1 percent of the total 2006 harvest.
- A reduction in bag limit in August 2006 would have reduced total season harvest between 0.244 and 0.356 Mlb, which is equivalent to between 12.0 and 17.5 percent of the total 2006 harvest.
- A reduction in bag limit in September 2006 would have reduced total season harvest between 0.028 and 0.042 Mlb, which is equivalent to between 2.0 and 2.9 percent of the total 2006 harvest.
- The full season bag limit reduction would have reduced total season harvest between 0.808 and 1.178 Mlb, which is equivalent to a 39.7 to 57.9 percent reduction in the harvest. This level of reduction would have reduced the GHL overage from 142.1 percent to between 59.9 and 85.7 percent of the GHL.

These results do not include changes in discard mortality because discard mortality is not included in IPHC calculations for the charter fleet. However, the full discussion of this analysis in Section 2.6 addresses the effect of discard mortality on these estimates. Additionally, these estimates do not include a shift toward higher average weight. As discussed in Section 2.6, there is not currently enough information about angler behavior to make reliable estimates of this type of shift.

Key informant interviewees indicated that a June or August bag limit reduction would be preferable to a July or full-season reduction, because many operators depend on halibut between the King and Coho salmon seasons. Operators indicated a full-season reduction would be highly detrimental to their businesses and rated this option toward the bottom of the eight considered here. Conversely, a full season bag limit reduction has the highest benefit for the commercial fleet.

#### **2.7.2.5 Option 5 – Size Limits for Second Fish**

Option 5 would establish an effective one-fish bag limit with an option to harvest a second fish above a minimum length. The option includes sub-options of establishing a 45-inch or 50-inch minimum size limit. As with Option 4, this option may reduce angler demand for charter trips. However, key informant interviews indicated that this option would likely lead to much smaller reduction in demand than a full-season bag limit reduction. These interviewees estimated demand reductions overall could be in the 10

percent range. This summary presents the no demand decline and 10 percent demand decline scenarios as high and low estimates of the potential effects of these option. The analysis estimates that:

- A 45-inch minimum length on one of two fish would have reduced 2006 harvest in Area 2C between 0.434 and 0.597 Mlb. These amounts are equivalent to a 21.3 and 29.3 percent decline in 2006 harvest. Under this option, the GHL overage would have declined from 142.1 percent of the GHL to between 100.4 percent and 111.8 percent of the GHL.
- A 50-inch minimum length on one of two fish would have reduced 2006 harvest in Area 2C between 0.516 and 0.671 Mlb. These amounts are equivalent to a 25.4 and 33.0 percent decline in 2006 harvest. Under this option, the GHL overage would have declined from 142.1 percent of the GHL to between 95.3 percent and 106.0 percent of the GHL.

As with the discussion for Option 4, these results do not include changes in discard mortality as discard mortality is not included in IPHC calculations for the charter fleet. However, the full discussion of this analysis in Section 2.6 discusses the effect of discard mortality on these estimates.

#### **2.7.2.6 Option 6 – One Fish of Any Size with a Maximum Length of 32 inches or less for the Second Fish**

Option 6 duplicates the current NMFS preferred alternative for 2007, which allows one fish of any size and requires one of two fish be smaller than 32 inches. The analysis predicts that this measure would reduce harvest by 0.516 Mlb, or 25.4 percent, under 2006 conditions. A reduction of this magnitude would have reduced harvest to 106.1 percent of the 1.432 Mlb GHL. A demand reduction is not expected with this option given that 48 percent of the current harvest measures 32 inches or less, but it is a possibility amongst anglers who target larger halibut specifically. A 10 percent demand reduction combined with the option itself would result in harvest reductions of 0.737 Mlb.

#### **2.7.2.7 Option 7 – One Fish of Any Size with a Reverse Slot Limit for the Second Fish**

Option 7 combines Option 6 with Option 5 and allows one fish of any size, but requires that one of two fish in the anglers' daily limits measure 32 inches or less or more than 45 or 55 inches. The analysis estimates that the particular combination of a 32/45-inch reverse slot limit would result in an increase of average harvest weight to 20.39 lb from the 2006 average harvest weight of 18.98 lb. The 32/50-inch reverse slot is more effective, resulting in a slight harvest saving of 5,000 lb.

#### **2.7.2.8 Option 8 – Combination of Options 1, 2, & 5**

Option 8 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), requiring one of two fish in an angler's daily bag to exceed a specified minimum size of 45 inches or 50 inches (Option 5). The analysis estimates that the 45-inch minimum size limit would have reduced harvest in 2006 between 0.429 and 0.608 Mlb, a reduction which would have reduced harvest to between 99.7 percent and 112.2 percent of the GHL.<sup>18</sup> This range bounds the estimated effect of the NMFS preferred alternative for 2007. A 50-inch minimum size limit sub-option would have reduced harvest between 0.516 and 0.686 Mlb and lowered the harvest as percentage of the GHL to between 94.2 percent and 106.1 percent of the GHL. The upper estimate for this sub-option exceeds the harvest reductions associated with the NMFS preferred alternative for 2007.

---

<sup>18</sup> For Options 8 through 13, lower estimates include the lowest estimate from each individual option and no estimated reduction in demand while upper estimates include the highest estimate from each individual option including expected demand reductions if applicable.

### **2.7.2.9 Option 9 – Combination of Options 1, 2, & 6**

Option 9 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), and requiring one of two fish in an angler's daily bag to be shorter than 32 inches (Option 6). The analysis estimates that the option would have reduced harvest in 2006 between 0.554 and 0.565 Mlb, a reduction which would have reduced harvest to between 102.6 percent and 103.4 percent of the GHL. Both the lower and upper estimates for this sub-option exceed the harvest reductions associated with the NMFS preferred alternative for 2007.

### **2.7.2.10 Option 10 – Combination of Options 1, 2, & 7**

Option 10 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), and requiring one of two fish in an angler's daily bag to meet a reverse slot limit (Option 7). The analysis estimates that the 32/45-inch sub-option could result in slightly increased harvest to a reduction of 0.202 Mlb. A 32/50-inch minimum size limit sub-option would have reduced harvest between 0.042 and 0.260 Mlb and lowered the harvest as percentage of the GHL to between 123.9 and 139.1 percent of the GHL. Key informant interviews indicated that industry affects associated with this option will be similar to those mentioned for Options 1, 2, and 7.

### **2.7.2.11 Option 11– Combination of Options 1, 2, 3, & 5**

Option 11 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), an annual limit (Option 3), and requiring one of two fish in an angler's daily bag to exceed a specified minimum size (Option 5). These combinations result in six different sub-options. The sub-option with the smallest effect is the 45 inch minimum size on one of two fish combined with a six fish annual limit. This sub-option would reduce harvest between 0.498 and 0.502 Mlb and have resulted in a harvest between 1.533 and 1.542 Mlb. These levels are above the GHL and equivalent to 107.0 percent to 107.7 percent of the GHL. The remaining sub-options would reduce harvest below the GHL. The most effective sub-option is the 50 inch minimum size on one of two fish combined with a four fish annual limit. This sub-option would have reduced harvest between 0.815 and 0.843 Mlb, a harvest equivalent to 83.2 to 85.2 percent of the GHL. The effects of the remaining sub-options are:

- The 45 inch minimum with a 4 fish annual limit would have reduced harvest between 0.692 and 0.701 Mlb, a harvest equivalent to 93.1 to 93.8 percent of the GHL.
- The 45 inch minimum with a 5 fish annual limit would have reduced harvest between 0.575 and 0.584 Mlb, a harvest equivalent to 101.3 to 101.9 percent of the GHL.
- The 50 inch minimum with a 5 fish annual limit would have reduced harvest between 0.704 and 0.733 Mlb, a harvest equivalent to 90.9 to 93.0 percent of the GHL.
- The 50 inch minimum with a 6 fish annual limit would have reduced harvest between 0.626 and 0.655 Mlb, a harvest equivalent to 96.4 to 98.4 percent of the GHL.

Key informant interviews indicated that industry affects associated with this option will be similar to those mentioned for Options 1, 2, 3 and 5 which means burdens will fall on multi-day operators, crew members, and those operators with repeat or multi-day customers.

### **2.7.2.12 Option 12 – Combination of Options 1, 2, 3, & 6**

Option 12 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), an annual limit (Option 3) and requiring one of two fish in an angler's daily bag to be shorter than 32 inches (Option 6). All sub-options except the six fish sub-option are more effective at reducing harvest than the NMFS preferred alternative for 2007. They have the following results:

- The four-fish annual limit would reduce annual harvests .574 to .794 Mlb, resulting in a harvest of 86.6 to 102.0 percent of the current GHL.
- The five-fish annual limit would reduce annual harvests .551 to .603 Mlb, resulting in a harvest of 100.0 to 103.7 percent of the current GHL.
- The six-fish annual limit would reduce annual harvests .449 to .502 Mlb, resulting in a harvest of 107.1 to 110.8 percent of the current GHL.

Key informant interviews indicated that industry affects associated with this option will be similar to those mentioned for Options 1, 2, 3 and 6 which means burdens will fall on multi-day operators, crew members, and those operators with repeat or multi-day customers. This result is very similar to Option 11 and Option 13.

### **2.7.2.13 Option 13 – Combination of Options 1, 2, 3, & 7**

Option 13 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), an annual limit (Option 3) and requiring one of two fish in an angler's daily bag to meet a reverse slot limit (Option 7). These combinations result in six different sub-options. The sub-option with the smallest effect is the 45 inch minimum size on one of two fish combined with a six fish annual limit. This sub-option would reduce harvest between 0.069 and 0.294 Mlb and have resulted in a harvest between 1.741 and 1.966 Mlb. These levels are well above the GHL and equivalent to 121.6 to 137.3 percent of the GHL. The most effective sub-option is the 50 inch minimum size on one of two fish combined with a four fish annual limit. This sub-option would have reduced harvest between 0.376 and 0.467 Mlb, a harvest equivalent to 109.5 percent to 115.8 percent of the GHL. The effects of the remaining sub-options are:

- The 45 inch minimum with a 4 fish annual limit would have reduced harvest between 0.323 and 0.548 Mlb, a harvest equivalent to 103.8 to 119.6 percent of the GHL.
- The 45 inch minimum with a 5 fish annual limit would have reduced harvest between 0.174 and 0.399 Mlb, a harvest equivalent to 114.2 to 130.0 percent of the GHL.
- The 50 inch minimum with a 5 fish annual limit would have reduced harvest between 0.232 and 0.401 Mlb, a harvest equivalent to 114.1 to 125.9 percent of the GHL.
- The 50 inch minimum with a 6 fish annual limit would have reduced harvest between 0.130 and 0.299 Mlb, a harvest equivalent to 121.2 to 133.0 percent of the GHL.

Key informant interviews indicated that industry affects associated with this option will be similar to those mentioned for Options 1, 2, 3 and 7 which means burdens will fall on multi-day operators, crew

members, and those operators with repeat or multi-day customers. This result is very similar to Option 11 and Option 12.

### **2.7.3 Economic Effects on Industry and Communities**

The analysis conducted key informant interviews with a number of charter, broker, and lodge operators in Area 2C with a set of specific questions for each business type. This section describes the results of those interviews, discusses those results in relation to available data from ADF&G and peer-reviewed economic research. This information is viewed as a complementary addition to the numerical analyses conducted above, and in many ways confirms the results of that analysis. The analysis notes that time does not permit comparing producer surplus and consumer surplus in each sector as affected by each option (2004).

#### **2.7.3.1 Effect of Alternative 1. No Action**

The effect of the no action alternative would likely be continuation of a pattern of long-term growth in the area's halibut harvest. As requested by the SSC in earlier analyses, this analysis provides comparative static estimates of commercial losses based on 5 and 10-year projections of charter-based sport fishing catches and 2006 ex-vessel prices. This analysis proved more difficult than expected given that the estimates of losses must also include estimates of biological productivity. For prior analyses, the analysis contacted IPHC staff about the best way to model long-term losses and harvests. Each year the IPHC conducts a complicated stock assessment to predict CEY. This assessment includes estimates of total biomass and the long-term effect of commercial and sport overages and underages. Given the complexity of the model, IPHC staff suggested that the best way to estimate long-term effects would be to hold current estimates of total CEY, legal-sized bycatch, subsistence catch, unguided sport catch, and commercial wastage constant while allowing guided sport catch to increase along long-term growth estimates. While this methodology is not as accurate as full-blown population modeling, it provides a reasonable estimate of losses that could result under the no action alternative. Using these guidelines, the model makes the following simplifying assumptions:

- 2007 estimates of total CEY, legal-sized bycatch, subsistence catch, unguided sport catch, and commercial wastage remain constant across time between 2006 and 2015.
- Ex-vessel prices remain constant in real terms at \$3.80 per lb in Area 2C (\$US 2006).
- Charter harvests grow from 2006 ADF&G estimates at their long-term growth rate calculated for 1995-2006. Under this assumption, Area 2C has a yearly growth rate of 6.8 percent.

Using these assumptions, the model predicts the Area 2C GHM overage could grow from 0.603 Milb in 2006 (roughly 4.3 percent of total CEY) to 2.250 Milb in 2014 (roughly 26 percent of total CEY). These increases reflect a reduction in total CEY as noted in the IPHC's estimates for 2007. Related losses in ex-vessel value would increase from \$2.3 million in 2007 to approximately \$8.54 million in 2015 (Table 54). Losses in ex-vessel value directly affect crew and communities dependent on the commercial fleet and the combined affect of losses from CEY reductions and increases in GHM overages are likely to affect the commercial fleet in a substantial way. Under these comparative static estimates, the combined losses from CEY reductions and GHM overage could total more than \$22.8 million in 2007. While the CEY reduction accounts for approximately \$22.0 million of that estimated loss, the ex-vessel losses from charter harvests will continue to grow and represent a larger portion of those losses each year.

**Table 54 Long-Term Commercial Losses in Ex-Vessel Value based on Estimated Commercial CEY Reductions and Guided Sport Catch-Area 2C**

Year	Total Commercial CEY	Legal-sized Bycatch	Subsistence catch	Unguided Sport Catch	Guided Sport catch	Commercial wastage	Commercial CEY	GHL Overage	Ex-Vessel Losses (\$M)
2006	13.73	0.14	0.68	0.995	2.035	0.04	9.840	0.603	\$2.289
2007	8.51	0.14	0.68	0.905	2.174	0.04	4.571	0.742	\$2.815
2008	8.51	0.14	0.68	0.905	2.322	0.04	4.423	0.890	\$3.377
2009	8.51	0.14	0.68	0.905	2.480	0.04	4.265	1.048	\$3.977
2010	8.51	0.14	0.68	0.905	2.648	0.04	4.097	1.216	\$4.618
2011	8.51	0.14	0.68	0.905	2.829	0.04	3.916	1.397	\$5.302
2012	8.51	0.14	0.68	0.905	3.021	0.04	3.724	1.589	\$6.033
2013	8.51	0.14	0.68	0.905	3.227	0.04	3.518	1.795	\$6.814
2014	8.51	0.14	0.68	0.905	3.447	0.04	3.298	2.015	\$7.649
2015	8.51	0.14	0.68	0.905	3.682	0.04	3.063	2.250	\$8.539

Source: Northern Economics Estimates based on IPHC 2006 Stock Assessment Estimates and 2006 ADF&G estimates of guided and unguided sport catch.

Note: All non-dollar figures are in millions of lb.

We note that these losses in 2007 could be substantially lower if the NMFS preferred alternative for that year succeeds in reducing harvest by several hundred thousand lb.

### 2.7.3.2 Effect of Alternative 2

This section discusses the effect of the proposed action options contained in Alternative 2.

#### 2.7.3.2.1 Option 1 – One Trip per Day

As previously analyzed in NPFMC (2006), a likely economic effect associated with a limit of charter vessels to one trip per day under Option 1 would be that a number of boats would be forced to change their business models. While the analysis does not know the number of businesses that rely on this business model, Table 55 shows the number of vessels that made more than one trip in a day during the 1998 through 2006 seasons. The number of “second trips” per day more than doubled since 1998, even though the overall number of trips is up by just over 50 percent. As a portion of trips, second trips of the day are still a relatively small portion of overall effort, but that portion has increased from 2.0 percent in 1998 to 2.6 percent in 2006. However, the percentage of vessels that now conduct at least one “second trip” during a year has increased to more than 25 percent of the fleet. Operators dependent on these second trips would face a significant disruption of their business model. In particular, this option is likely to affect operators in the major cruise ship ports such as Ketchikan, Juneau, and Sitka. An argument heard during the analysis for NPFMC (2006) and this analysis is that because of the limited range and duration of these trips (i.e., most trips are less than 4 hours) they do not generate the catch per unit of effort that other operators generate. Thus, this management option would have a substantial negative effect on these operators while having a negligible effect on harvest.<sup>19</sup> As noted in Section 2.6, limiting charter fleet vessels to one trip per day would reduce harvest between 1.85 and 2.4 percent. However, interviews with charter industry members indicated that the long-term effect of the alternative is likely to be even less.

<sup>19</sup> The catch per unit effort argument could potentially be verified through ADF&G data, but sub-area data for the analysis were not available for this draft.

**Table 55 Area 2C Vessels Affected by the limiting Vessels to One Trip per Day**

Year	Total Number of Trips after the 1st Trip within a Day	Second Trips as a % of Total Trips	Total Number of Vessels that made more than 1 Trip per Day	Portion of All Vessels taking a Second Trip
1998	308	2.0	86	15.1
1999	No Data	No Data	No Data	No Data
2000	390	1.9	104	16.4
2001	226	1.2	71	11.3
2002	182	1.2	79	13.9
2003	223	1.3	90	15.3
2004	178	0.9	73	11.7
2005	395	2.0	162	24.9
2006	623	2.6	175	25.1

Source: ADF&G Logbook Data (1998-2006).

Another potential effect of this component is the possibility that some clients who would have chosen to go halibut fishing might choose to pursue another activity in the area or could choose not to take their trip to Alaska at all. Herrmann et al.(2001), based on a 1998 postal survey of Kenai saltwater anglers, noted that charter clients spent between \$167.47 and \$294.21 daily depending on whether they were local or from out of state. If clients could not, or chose not to, take a halibut trip and didn't spend this money elsewhere in the local economy, then the management option would result in economic losses related to client expenditures. However, the analysis is currently unable to quantify how many anglers would be unable to find a replacement charter trip, would choose not to take halibut trip altogether, or would spend their money in another sector of the economy. As shown in Table 55, the number of trips after the first trip of day in Area 2C is less than 3 percent of the total number of trips in the area. Thus, the overall effects would be small relative to the total expenditures related to halibut charters, but localized losses could be felt by individual businesses.

### 2.7.3.2.2 Option 2 – No Harvest by Skipper and Crew and Line Limit

ADF&G banned harvest of all species by skipper and crew during charter trips by an annual emergency order in 2006 and 2007. Option 2 would implement these measures in Federal regulation. As noted in NPFMC (2006), charter operators indicated that the elimination of harvest by crew members was likely to have little economic impact on their business. In fact, many interviews for that analysis and this analysis indicated that the elimination of the crew harvest was the most acceptable option presented to them. The economic impact of this management option is most likely to fall on crew members themselves, if they are unable to acquire halibut for personal use through other low-cost means. The analysis in NPFMC (2006) estimated that in 2004 crew harvested between 58,000 and 78,000 lb of halibut while ADF&G estimates that crew would have harvested approximately 80,000 in Area 2C without the EO. Halibut that is not replaced through low-cost means would have to be replaced at retail prices or by substituting other protein sources, leading to higher costs for crew members. For, example if halibut costs an average of \$15 per lb at the retail counter then it would have cost crew approximately \$645,000 to replace the lost halibut on a lb for lb basis at the retail counter. At least one interviewee told us that crew at lodges considered the halibut to be part of their wages. If true, it means that the elimination of crew harvest could lead to higher labor costs for operators if crew members demand to be compensated for the reduction in wages. However, many operators told us that if crew harvest were eliminated, crew would conduct personal recreational trips on days when they did not have paying clients or in the shoulder season so that skippers, deck hands, and family members could continue to acquire halibut for personal use and offsetting the potential costs of the option. One benefit of a federal ban on crew harvest is that it would allow ADF&G

to remove the EO which prevents skippers and crew from retaining any species of fish while on saltwater charter. Thus, this option could improve the financial situation for crew over the current emergency order.

The State 6-line limit was implemented in Southeast Alaska in 1983, and the regulation capping the number of lines fished to the number of paying clients was implemented in 1997. As described in more detail under Section 2.7.4.3, line limits in Federal regulations would be difficult to enforce.

### **2.7.3.2.3 Option 3 – Annual Harvest Limit**

Option 3 would limit clients to four, five, or six fish annually. This annual limit is likely to economically affect a significant number of charter operators and could affect local economies. Key informant interviews revealed that lodge operators and charter boat operators offering packages of four or more consecutive fishing days are the most likely to be affected by this management option of the alternative, because the limit makes longer experiences less marketable to potential clients. A four or five-fish bag limit would likely affect the experience of anglers on a three-day experience or longer, because four fish equals two daily bag limits for halibut. Businesses likely to be affected by this change told us they expect higher marketing costs, higher operating costs, lower demand, and lower margins associated with such a change. Interviewees also indicated that pressure could increase on other species as operators work to retain clients interested in longer trips. These economic effects are likely to be experienced throughout Area 2C as many individual charter boat operators offer these trips. Charter boat operators catering to the portion of the public that takes few trips a season are less likely to be affected than the aforementioned groups.

Sitka and Prince of Wales Island, which are home to several large lodges, could feel the effects of this management option more acutely than other communities. As noted above, saltwater anglers spend a significant amount of money each day (between \$167.47 and \$294.21 per day on the Kenai Peninsula in 1997). If anglers chose not to travel to Area 2C for these experiences, then local economies and companies would suffer. As noted above, Criddle et al., (2003) estimated that a 30 percent reduction in expected halibut catch per day would result in a 25.1 percent reduction in angler participation in Kenai area fisheries. However, an annual limit does not necessarily reduce catch per day if catch and release fishing is allowed. Discussions with NMFS economists indicated a lack of elasticity estimates that would allow the analysis to estimate how annual limits might affect demand for longer charter experiences. NMFS economists indicated that such work was in progress, but is unavailable at this time (Lee, 2007; Lew, 2007). However, less formal estimates indicate that anglers will respond to lower limits by seeking other angling or recreational opportunities. For example, a 2004 study of charter clients in Sitka, AK found that 70 percent of charter clients indicated that a change in bag (not annual) limits would negatively affect the future probability of a return trip to Sitka, depending on the size of the change and the species of fish involved (McDowell 2005). While a change in annual limits may not affect the daily bag limit for most anglers, the study does show that anglers are sensitive to such changes. The economic effects of such changes are likely to be local because while anglers would experience a loss in welfare surpluses associated with catch reductions, they might also choose to redirect their angling dollars to other locations resulting in no changes in net benefits on a national level.

This option have a greater impact over the long term on operators in inside passage communities such as Petersburg and Wrangell, which rely on halibut during the month of July when other species are scarce, than on charter operators with access to outside waters, such as those based on the western side of Sitka and Prince of Wales Islands. These latter communities have the option of pursuing other species to make up for a reduced annual limit. This change makes the trips offered by “outside passage” operators more desirable than those offered by operators from inside communities. In the long run, inside operators would be reduced to offering single or two-day packages during July, while fishing pressure and effort from clients desiring longer experiences would shift to outside communities. Thus, the alternative could

result in additional negative effects for inside communities, with a somewhat mitigating economic effect for outside communities, and increased pressure on alternative species in outside areas. Again, anglers would experience a loss in welfare surpluses associated with catch reductions.

#### **2.7.3.2.4 Option 4 – One-fish bag limit**

The effect of the one-fish bag limit under Option 4 would depend primarily on how anglers react to the fact that the reduced bag limit changes some of the essential characteristics of the current product/experience being offered by charter operators. Any reduction in demand will mean lower revenues for charter operators and potentially lower expenditures in communities. If clients could not, or chose not to, take a halibut trip and didn't spend this money elsewhere in the local economy, then the management option would result in economic losses related to client expenditures. However, if those clients spend the dollars they would have otherwise spent on charter experiences on other experiences within the same community, then the change results in a redistribution of expenditures rather than a reduction in community-specific expenditures.

A number of studies show that anglers spend significant amounts of money on their angling experiences and are sensitive to bag limit reductions. The McDowell Group's 2005 study of charter clients in Sitka, AK found that 70 percent of charter clients indicated that a change in bag limits would negatively affect the future probability of a return trip to Sitka depending on the size of the change and the species of fish involved (McDowell 2005). This same study estimated that air visitors to Sitka who came specifically for fishing spent an average of \$1,931 per person.

The economic effects of this management option are likely to depend on geographic and temporal factors. For example, anglers are more likely to reduce participation when substitute species are not available, which means that many communities will experience the most reduction in participation between the end of June and the beginning of August when king and coho salmon are not available. Inside passage communities are more likely to experience these effects than western communities such as Sitka, which have greater multi-species availability.

As in Option 5, anglers on four hour trips associated with cruise vessels are less likely to be affected by this option because their current trips do not generally offer the opportunity to quickly harvest two halibut. Thus, these anglers may be less sensitive to the bag limit change.

Unfortunately, there is very limited data on market segmentation, which prevents the analysis from projecting lost revenues by community or over the entire area beyond gross estimates. The analysis noted a potential for between a 0 and 30 percent demand shift (Section 2.6). A 30-percent decline in angler days would eliminate 27,800 angler days. If angler expenditures from UAF's 1997 study are updated for changes in the Consumer Price Index, then estimates of average angler expenditures increase to between \$210 and \$370 per day. If none of this money is spent on other activities in Alaska communities, then direct local community effects would be between \$5.8 million and \$10.3 million in reduced angler expenditures. Of course, some money will be spent in communities on other activities and it is not a given that this option would result in a 30 percent reduction.

#### **2.7.3.2.5 Option 5 – One-fish bag limit with an Option to Harvest a Second Fish above a Minimum Size**

Under Option 5, a one-fish bag limit with the option to take a second fish above a minimum size would likely result in lower spending by certain types of anglers, particularly those focused on taking two fish. Interviews with charter operators revealed that:

- Anglers on some multi-species trips (which are common for anglers on multi-day package trips) may target halibut in the morning and then target salmon or other species after catching a limit of halibut. These anglers would face a choice about whether to search for a larger second halibut or leave their halibut fishing site to pursue salmon. Interviews suggested that these anglers would be generally accepting of a minimum size on one of two fish as long as the option existed to pursue that fish if the anglers got into an area where large fish were abundant.
- Anglers on four-hour trips associated with cruise vessels are less likely to be affected by this option because their current trips do not generally offer the opportunity to quickly harvest two halibut. At the same time, the range of these trips is generally limited when compared to the range of anglers on full-day trips. This limited range generally restricts the ability of these anglers to pursue larger fish, so this option could effectively result in a one-fish bag limit for these anglers. However, as stated above, anecdotal information suggests these anglers have lower success rates in comparison to full-day anglers and the change in effective bag limit may not have much effect on angler demand.
- Anglers who target halibut specifically are mostly likely to be affected by this option, but to a much lesser extent than a one-fish bag limit. These anglers likely spend the most time targeting halibut and thus have the greatest chance to catch larger fish. That said, demand from this group will likely fall if they are unable to successfully replicate their current harvest rates with roughly equivalent harvest rates.

Communities that focus primarily on halibut-dedicated anglers are most likely to feel economic effects from this option. Additionally, when this type of angler stops spending on angler trips, it means they aren't coming to communities they currently visit. This change is different than cruise visitors who may spend their disposable income on other experiences, goods, or services in the same community. On the other hand, communities that focus on short-range, short-duration trips for cruise visitors would likely feel fewer effects from this option.

Key informant interviewees rated this option in the middle of the pack for overall economic effects on their industry.

#### **2.7.3.2.6 Option 6 – One Fish of Any Size with a Maximum Length of 32 inches or less for the Second Fish**

The analysis expects that Option 6, one fish of any size and one of two fish 32 inches or less, would have very limited socioeconomic effects with the exception of the potential for reduced spending by anglers specifically targeting two large halibut. However, most anglers must accept catching smaller halibut on a regular basis. Halibut 32 inches or less made up 48 percent of the total charter catch in Area 2C in 2006. Hence, fish of this size are relatively common and angler could likely expect that they could replace larger halibut with smaller halibut. Additionally, for the 29 percent of anglers who do not catch a fish while on their trip this change will mean difference in their angling experience. In 2006, the average angler who caught a halibut on their trip caught 2.4 halibut per trip and kept 1.65 halibut per trip. This option could change the experience for those who kept more than one fish. Those anglers that kept only one fish would have experienced no change in the fish they took home.

This option would not have the socioeconomic effects associated with limiting the number of fish in an angler's bag or the socioeconomic effects associated with limiting angler annual catch.

#### **2.7.3.2.7 Option 7 – One Fish of Any Size with a Reverse Slot Limit for the Second Fish**

Option 7 combines Option 6 with Option 5 and allows one fish of any size, but requires that one of two fish in the anglers' daily limit measure 32 inches or less or more than 45 or 50 inches. Consequently, this option is less strict than either Option 5 or Option 6, and the combination helps to limit the socioeconomic effects associated with each of the constituent options. The primary effect on anglers will be loss of targeting mid-size halibut for one of two fish of the day. These fish are in the 20 to 45 lb range and are widely considered to be some of the best halibut for consumption given the quality of flesh and the amount of meat per fish. This change could affect demand for trips from anglers who focus on harvesting fish of this size. The primary socioeconomic effect of this option will likely be on the commercial industry, as this option does little to reduce charter angler harvest. Hence, this option would not limit ex-vessel losses to the industry and will not likely slow the growth of the industry in the future.

#### **2.7.3.2.8 Option 8 – Combination of Options 1, 2, & 5**

Option 8 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), requiring one of two fish in an angler's daily bag to exceed a specified minimum size (Option 5). The socioeconomic effects of this option reflect this combination and include:

- A number of boats would be forced to change their business model from focusing on more than one halibut trip per day to a maximum of one halibut trip per day. Data from ADF&G indicates that the portion of the charter fleet in Area 2C that relies on the multi-day business model is very small.
- The economic impact of banning skipper and crew fish is most likely to fall on crew members themselves, if they are unable to acquire halibut for personal use through other low-cost means. NPFMC (2006) estimated that in 2004 crew harvested between 58,000 and 78,000 lb of halibut while ADF&G estimates that crew would have harvested approximately 80,000 lb in Area 2C without the EO. Halibut that is not replaced through low-cost means would have to be replaced at retail prices or by substituting other protein sources, leading to higher costs for crew members. For example, if halibut costs an average of \$15 per lb at the retail counter, then it would have cost crew approximately \$645,000 to replace the lost halibut on a lb-for-lb basis at the retail counter. One benefit of a federal ban on crew harvest is that it would allow ADF&G to remove the EO which prevents skipper and crew from retaining any species of fish while on saltwater charter. Thus, this option could improve the financial situation for crew over the current emergency order.
- Communities that focus primarily on halibut-dedicated anglers are most likely to feel economic effects from a minimum size limit on a second fish. When this type of angler stops spending on angler trips, it means they aren't coming to communities they currently visit. This change is different than cruise visitors who may spend their disposable income on other experiences, goods, or services in the same community. On the other hand, communities that focus on short-range, short-duration trips for cruise visitors would likely feel fewer effects from this option.

#### **2.7.3.2.9 Option 9 – Combination of Options 1, 2, & 6**

Option 9 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), and requiring one of two fish in an angler's daily bag to be shorter than 32 inches (Option 6). The socioeconomic effects of this option reflect this combination and include:

- A number of boats would be forced to change their business model from focusing on more than one halibut trip per day to a maximum of one halibut trip per day. Data from ADF&G indicates that the portion of the charter fleet in Area 2C that relies on the multi-day business model is very small.
- The economic impact of banning skipper and crew fish is most likely to fall on crew members themselves, if they are unable to acquire halibut for personal use through other low-cost means. NPFMC (2006) estimated that in 2004 crew harvested between 58,000 and 78,000 lb of halibut while ADF&G estimates that crew would have harvested approximately 80,000 lb in Area 2C without the EO. Halibut that is not replaced through low-cost means would have to be replaced at retail prices or by substituting other protein sources, leading to higher costs for crew members. For example, if halibut costs an average of \$15 per lb at the retail counter, then it would have cost crew approximately \$645,000 to replace the lost halibut on a lb-for-lb basis at the retail counter. One benefit of a federal ban on crew harvest is that it would allow ADF&G to remove the EO which prevents skipper and crew from retaining any species of fish while on saltwater charter. Thus, this option could improve the financial situation for crew over the current emergency order.

#### **2.7.3.2.10 Option 10 – Combination of Options 1, 2, & 7**

Option 10 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), and requiring one of two fish in an angler's daily bag to meet a reverse slot limit (Option 7). These effects include:

- A number of boats would be forced to change their business model from focusing on more than one halibut trip per day to a maximum of one halibut trip per day. Data from ADF&G indicates that the portion of the charter fleet in Area 2C that relies on the multi-day business model is very small.
- The economic impact of banning skipper and crew fish is most likely to fall on crew members themselves, if they are unable to acquire halibut for personal use through other low-cost means. NPFMC (2006) estimated that in 2004 crew harvested between 58,000 and 78,000 lb of halibut while ADF&G estimates that crew would have harvested approximately 80,000 lb in Area 2C without the EO. Halibut that is not replaced through low-cost means would have to be replaced at retail prices or by substituting other protein sources, leading to higher costs for crew members. For example, if halibut costs an average of \$15 per lb at the retail counter, then it would have cost crew approximately \$645,000 to replace the lost halibut on a lb-for-lb basis at the retail counter. One benefit of a federal ban on crew harvest is that it would allow ADF&G to remove the EO which prevents skipper and crew from retaining any species of fish while on saltwater charter. Thus, this option could improve the financial situation for crew over the current emergency order.
- Reductions in angler demand and lost revenue from fewer bookings are a possibility, but the magnitude of these effects would appear to be limited.

#### **2.7.3.2.11 Option 11 – Combination of Options 1, 2, 3, & 5**

Option 11 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), an annual limit (Option 3), and requiring one of two fish in an angler's daily bag to exceed a specified minimum size (Option 5). The socioeconomic effects of this option reflect this combination and include:

- A number of boats would be forced to change their business model from focusing on more than one halibut trip per day to a maximum of one halibut trip per day. Data from ADF&G indicates that the portion of the charter fleet in Area 2C that relies on the multi-day business model is very small.
- The economic impact of banning skipper and crew fish is most likely to fall on crew members themselves, if they are unable to acquire halibut for personal use through other low-cost means. NPFMC (2006) estimated that in 2004 crew harvested between 58,000 and 78,000 lb of halibut while ADF&G estimates that crew would have harvested approximately 80,000 lb in Area 2C without the EO. Halibut that is not replaced through low-cost means would have to be replaced at retail prices or by substituting other protein sources, leading to higher costs for crew members. For example, if halibut costs an average of \$15 per lb at the retail counter, then it would have cost crew approximately \$645,000 to replace the lost halibut on a lb-for-lb basis at the retail counter. One benefit of a federal ban on crew harvest is that it would allow ADF&G to remove the EO which prevents skipper and crew from retaining any species of fish while on saltwater charter. Thus, this option could improve the financial situation for crew over the current emergency order.
- The annual limit is likely to economically affect a significant number of charter operators and could affect local economies. Key informant interviews revealed that lodge operators and charter boat operators offering packages of four or more consecutive fishing days are the most likely to be affected by this management option of the alternative, because the limit makes longer experiences less marketable to potential clients. A four or five-fish bag limit would likely affect the experience of anglers on a three-day experience or longer, because four fish equals two daily bag limits for halibut. Businesses likely to be affected by this change told us they expect higher marketing costs, higher operating costs, lower demand, and lower margins associated with such a change. Interviewees also indicated that pressure could increase on other species as operators work to retain clients interested in longer trips. These economic effects are likely to be experienced throughout Area 2C as many individual charter boat operators offer these trips. Charter boat operators catering to the portion of the public that takes few trips a season are less likely to be affected than the aforementioned groups.
- Communities that focus primarily on halibut-dedicated anglers are most likely to feel economic effects from a minimum size limit on a second fish. When this type of angler stops spending on angler trips, it means they aren't coming to communities they currently visit. This change is different than cruise visitors who may spend their disposable income on other experiences, goods, or services in the same community. On the other hand, communities that focus on short-range, short-duration trips for cruise visitors would likely feel fewer effects from this option.

#### **2.7.3.2.12 Option 12 – Combination of Options 1, 2, 3, & 6**

Option 12 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), an annual limit (Option 3) and requiring one of two fish in an angler's daily bag to be shorter than 32 inches (Option 6). The socioeconomic effects of this option reflect this combination and include:

- A number of boats would be forced to change their business model from focusing on more than one halibut trip per day to a maximum of one halibut trip per day. Data from ADF&G indicates that the portion of the charter fleet in Area 2C that relies on the multi-day business model is very small.
- The annual limit is likely to economically affect a significant number of charter operators and could affect local economies. Key informant interviews revealed that lodge operators and charter boat operators offering packages of four or more consecutive fishing days are the most likely to be affected by this management option of the alternative, because the limit makes longer experiences

less marketable to potential clients. A four or five-fish bag limit would likely affect the experience of anglers on a three-day experience or longer, because four fish equals two daily bag limits for halibut. Businesses likely to be affected by this change told us they expect higher marketing costs, higher operating costs, lower demand, and lower margins associated with such a change. Interviewees also indicated that pressure could increase on other species as operators work to retain clients interested in longer trips. These economic effects are likely to be experienced throughout Area 2C as many individual charter boat operators offer these trips. Charter boat operators catering to the portion of the public that takes few trips a season are less likely to be affected than the aforementioned groups.

- The economic impact of banning skipper and crew fish is most likely to fall on crew members themselves if they are unable to acquire halibut for personal use through other low-cost means. NPFMC (2006) estimated that in 2004 crew harvested between 58,000 and 78,000 lb of halibut while ADF&G estimates that crew would have harvested approximately 80,000 lb in Area 2C without the EO. Halibut that is not replaced through low-cost means would have to be replaced at retail prices or by substituting other protein sources, leading to higher costs for crew members. For example, if halibut costs an average of \$15 per lb at the retail counter, then it would have cost crew approximately \$645,000 to replace the lost halibut on a lb-for-lb basis at the retail counter. One benefit of a federal ban on crew harvest is that it would allow ADF&G to remove the EO which prevents skipper and crew from retaining any species of fish while on saltwater charter. Thus, this option could improve the financial situation for crew over the current emergency order.

#### **2.7.3.2.13 Option 13 –Combination of Options 1, 2, 3, & 7**

Option 13 combines limiting vessels to one trip per day (Option 1), banning skipper and crew from retaining halibut caught while on charter trips (Option 2), an annual limit (Option 3) and requiring one of two fish in an angler's daily bag to meet a reverse slot limit (Option 7). These effects include:

- A number of boats would be forced to change their business model from focusing on more than one halibut trip per day to a maximum of one halibut trip per day. Data from ADF&G indicates that the portion of the charter fleet in Area 2C that relies on the multi-day business model is very small.
- The annual limit is likely to economically affect a significant number of charter operators and could affect local economies. Key informant interviews revealed that lodge operators and charter boat operators offering packages of four or more consecutive fishing days are the most likely to be affected by this management option of the alternative, because the limit makes longer experiences less marketable to potential clients. A four or five-fish bag limit would likely affect the experience of anglers on a three-day experience or longer, because four fish equals two daily bag limits for halibut. Businesses likely to be affected by this change told us they expect higher marketing costs, higher operating costs, lower demand, and lower margins associated with such a change. Interviewees also indicated that pressure could increase on other species as operators work to retain clients interested in longer trips. These economic effects are likely to be experienced throughout Area 2C as many individual charter boat operators offer these trips. Charter boat operators catering to the portion of the public that takes few trips a season are less likely to be affected than the aforementioned groups.
- The economic impact of banning skipper and crew fish is most likely to fall on crew members themselves if they are unable to acquire halibut for personal use through other low-cost means. NPFMC (2006) estimated that in 2004 crew harvested between 58,000 and 78,000 lb of halibut while ADF&G estimates that crew would have harvested approximately 80,000 lb in Area 2C without the EO. Halibut that is not replaced through low-cost means would have to be replaced at retail prices or by substituting other protein sources, leading to higher costs for crew members. For example, if halibut costs an average of \$15 per lb at the retail counter, then it would have cost crew

approximately \$645,000 to replace the lost halibut on a lb-for-lb basis at the retail counter. One benefit of a Federal ban on crew harvest is that it would allow ADF&G to remove the EO which prevents skipper and crew from retaining any species of fish while on saltwater charter. Thus, this option could improve the financial situation for crew over the current emergency order.

- Reductions in angler demand and lost revenue from fewer bookings are a possibility, but the magnitude of these effects would appear to be limited.

#### **2.7.4 Enforcement Issues and Recordkeeping and Reporting Requirements**

Enforcement is a key management option of any fishery harvest management program. In 2003, NMFS, USCG, ADPS, and ADF&G all reported that they do not have enforcement programs specifically directed at the recreational charter fishery (NPFMC 2003). This document reported:

*...enforcement occurs on an opportunistic basis. All agencies agreed at that time some level of additional enforcement would be needed under a GHL system, depending upon the allocation and implementation scheme adopted. Also, the decision to allocate additional enforcement to this program would properly entail an evaluation of the public interest in doing so, versus doing less enforcement somewhere else. Staff discussed GHL enforcement issues, especially the implications of activating the various options like line, bag, and trip limits. Although a state enforcement officer was not present, the other agencies essentially reported that additional enforcement resources would not be forthcoming to support this program.*

*Having said that, there are characteristics of the recreational charter fishery that suggest a different and lesser level of enforcement may be needed to ensure an adequate level of compliance with the program. Several characteristics of the fishery differentiate it from other fisheries and work to the advantage of regulators:*

*a. The recreational charter fishery operates in the public eye. Requiring operators to prominently post GHL control options like bag limits and line limits onboard charter would help promote compliance. The State could further support this by requiring those businesses selling sportfishing licenses to do the same.*

*b. The recreational charter fishery is highly competitive. While there are some operations in isolated locations, many boats tie up and operate in close proximity to other charter. It is reasonable to expect that those operators who are following the rules would be quick to notice another operator who wasn't following the rules.<sup>20</sup>*

*c. Charter operators are required to have a current Coast Guard license to operate. One of the conditions of the license requires the operator to comply with all Federal regulations. Charter operators potentially risk losing their Coast Guard license if they violate Federal fisheries regulations. It is reasonable to conclude that because of the nature of the Coast Guard license, inferring a trust and responsibility to the licensee, as well as the double jeopardy implications, charter operators would likely have a higher rate of compliance with GHL options than might otherwise be expected.*

Additionally, note that ADF&G currently regulates the recreational harvest of king salmon, rainbow trout, salmon sharks, and other species in certain areas by requiring anglers to record harvests of these species

---

<sup>20</sup> Charter operators cannot offer a "trip with higher bag or rod limits," as suggested in this excerpt. Those limits are set in regulation and operators would not advertise illegal activity.

on the back of their fishing licenses immediately upon harvest. A similar system that utilizes the logbook or a system involving charter stamps could be used to regulate annual harvest limits in Area 2C.

These attributes associated with a charter fishery, along with an enforcement priority for recreational fisheries and appropriate recordkeeping and reporting may provide a level of compliance sufficient to ensure the alternatives have the desired effect in controlling charter halibut removals in Area 2C.

#### 2.7.4.1 Use of state recordkeeping and reporting tools

State recordkeeping and reporting requirements meet federal information requirements for options 1 and 3. Current state statute and administration policy prevents NOAA OLE from accessing the state logbook or angler license information. Federal access to these sources of information would require the following regulatory and administrative changes:

- (1) The State of Alaska legislature would need to amend the State confidentiality statute to allow NOAA OLE and NMFS access to confidential angler and operator information. Without this information, NOAA OLE cannot seize angler license information and logbooks for inspection and evidence, enter logbook and license data in Federal court, or perform post season audits of data to pursue violators (Table 56). NMFS would also need access to angler and charter operator registration and logbook information to provide the necessary program support (e.g., database management). A memorandum of understanding between the State, NOAA OLE, and NMFS would also likely be needed to allow data sharing.
- (2) NOAA OLE would need to be deputized by the State of Alaska Commission of Public Safety. NOAA OLE needs the authority to inspect logbooks, angler licenses, or catch cards (Table 56). Without this authority, anglers and charter operators are not obligated to show their license information to a Federal enforcement officer.

**Table 56. Summary of NOAA OLE enforcement actions and their applicable State laws.**

Enforcement Method	Enforcement Action	Current Federal Authority	State law prohibiting Enforcement Action
At-sea and dockside inspection	Inspect State sport fishing license, or Permanent Identification Card	None	State confidentiality/ NOAA OLE not deputized by State
	Inspect State charter logbooks	None	State confidentiality/ NOAA OLE not deputized by State
	Seize license or logbook as evidence	None	State confidentiality
	Enter licenses or logbooks into Federal court	None	State confidentiality
End of season audit of logbooks	Review logbooks (electronic databases) maintained by the State	None	State confidentiality

Note that implementation of the halibut charter moratorium program will require NMFS RAM Division, NOAA Enforcement, and U.S Coast Guard to have access to state logbook and business information. The preferred approach to obtaining access to these data is explicit authorization in state statute to allow logbook and business data to be transferred from the State of Alaska to NOAA. ADF&G staff conveyed that language accomplishing this need has been submitted to the Governor's office and is intended to be reviewed by the legislature during the 2007 session. If these changes do not meet Federal recordkeeping and reporting requirements, or state recordkeeping and reporting tools do not meet Federal enforcement needs, then Federal recordkeeping and reporting tools would be required.

#### **2.7.4.2 Trip limit (Option 1)**

The trip limit described in Alternative 2, Option 1 would require NOAA OLE to determine the number of trips taken by a charter vessel for a given day. The regulation for a trip limit would indicate that a charter halibut trip begins on a charter fishing vessel when a halibut is harvested and ends (1) when any halibut is offloaded from that vessel; (2) when any person that was present on that vessel when a halibut was harvested disembarks; or (3) at 23:59 hours, whichever comes first. This language indicated that a trip is focused on the harvesting of halibut and does not include trips where halibut harvest did not occur or clients were being transported between sites. This definition would require NOAA OLE to have onboard documentation of angler-specific trip and harvest information that is linked to the day a trip started and ended. The language used in the final rule would likely be different from the proposed language, but would contain all the important elements in the proposed language, including a trip linked to each day fished and client/halibut offloading being a termination point for a trip.

The ADF&G logbook currently collects this information and is specific to the both the trip and day fished. To provide onsite enforcement of the regulation, NOAA OLE would need the date when the trip started, the date when the trip ended, and information that would identify clients who harvested halibut. The State 2007 logbook will indicate the day a fishing trip occurred. This would provide NOAA OLE with information about the date the trip started, including the number of trips that occurred on a given day, and the date the trip ended. An operator could cheat on the trip limit by recording two trips as a single trip in the logbook. This would be a violation of the regulation. NOAA OLE would have a difficult time enforcing this type of recordkeeping problem unless the number of clients recorded in the logbook did not match the number of clients onboard the vessel. Moreover, recording multiple trips under the auspices of a single trip would also be detrimental to the logbook information collected by ADF&G.

If the State logbook meets Federal recordkeeping and reporting requirements, additional reporting requirements associated with this regulation would be minimal. Section 2.1 discusses the legal requirements for NOAA OLE to use the State logbook. If the State logbook cannot be used by NOAA OLE or does not meet enforcement needs, a Federal logbook program would be required. A Federal logbook program would require operators/business owners to register with NMFS, obtain a logbook, and meet the reporting requirements. The type of information required annually under a Federal logbook program includes operator contact information, guide contact information, client harvest information, port of offloading, start/stop date for a trip, and vessel identification. A Federal logbook would substantially increase the reporting burden on charter operators because they would be required to meet State and Federal recordkeeping and reporting requirements. Moreover, the types of information recorded in each logbook would largely be duplicative.

#### **2.7.4.3 Prohibition of retention by skipper or crew and line limits (Option 2)**

An option to prohibit the retention of halibut by skipper and crew was promulgated by ADF&G in area 2C for 2006 (Emergency Order, EO, # 1-R-01-0631) and areas 3A and 2C for 2007 (EO # 2-R-03-02-07 and 1-R-02-07, respectively). These EO regulations apply to the charter fishery (including species other than halibut) and are enforced by the State of Alaska Department of Public Safety. State regulations must be applied to the charter fishery in general and cannot single out halibut angling. A Federal regulation could only apply to halibut angling and not other State managed species.

Federal enforcement of a regulation prohibiting skipper and crew retention would require enforcement officers to observe skipper or crew harvest at sea or determine that the number of harvested halibut exceeded the collective bag limit for clients. NOAA OLE can identify guides using their ADF&G guide license; however, crew are not required to be licensed by the State or Federal government and thus do not have any identification information indicating they are crew. Without crew documentation, it would be

very difficult for NOAA OLE to distinguish crew from anglers if charter guides wanted to circumvent the regulation. However, charter guides (often business owners) may not want to risk the enforcement sanctions (especially with clients onboard) associated with allowing crewmembers to harvest halibut. Some charter guides instead provide legal methods for crew to obtain halibut. Crewmembers may retain halibut as private recreational anglers when not working and often have access to a fishing vessel from which they may harvest halibut. Crewmembers may also receive halibut “gifted” from clients.

According to ADF&G logbook data from 1999 through 2001, harvests by crew members accounted for between 3.3 percent and 4.5 percent of the annual halibut harvest in Area 2C. ADF&G harvest estimates made in November 2006 indicate that the May 24, 2006 Emergency Order that banned skipper and crew harvest of halibut while paying clients were on the vessel saved approximately 84,000 pounds. This estimate results in an approximate harvest reduction of 5 percent using the 2006 SWHS information. This suggests compliance with the ADF&G skipper and crew prohibition is currently occurring in the fishery. The level of non-compliance is unknown, but enforcement of this regulation and the others proposed would likely improve commensurate with an increased enforcement presence.

Enforcement of line limits in Federal regulations would be difficult because Federal regulations would only apply to halibut fishing, and halibut is only one target in a multi-species fishery. If someone simply has a line in the water, NOAA OLE cannot determine whether he/she is targeting halibut or another State managed species. NMFS could only enforce the line limit if any harvested halibut were onboard the vessel. Thus, a person who harvested a halibut and then went salmon fishing would still be limited by the line limit. Such a regulation would also require at-sea enforcement. No additional recordkeeping and reporting requirements have been identified.

#### **2.7.4.4 Annual limit (Option 3)**

The annual limit would substantially increase Federal enforcement and administrative costs in Area 2C. In 2006, approximately 87,700 charter clients, distributed over 681 charter vessels, fished from a charter vessel in Area 2C (ADF&G 2006). ADF&G estimates that approximately 7 percent of these clients harvested six or more halibut and approximately 10 percent of the clients harvested five or more halibut. Given the 2-fish daily bag limit described in status quo, anglers harvesting more than four fish would have fished for at least three days.

Regulations for the proposed annual limit would be directed at anglers fishing for halibut and charter operators offering guided halibut services in Area 2C. The annual limit would apply to anglers paying for charter services to fish for halibut. However, under this interpretation of the annual limit, crew and skipper could continue to harvest halibut and give those halibut to the anglers. The regulation could be promulgated to enforce the annual limit on charter anglers fishing from a vessel in which at least one angler on-board the vessel hired a guide to offer halibut fishing services. Without the inclusion or ban on skipper and crew harvest, this option would allow skipper and crew to retain their bag limit of halibut and give those halibut to clients as a gift.

Enforcement of lodges and multi-day fishing charters presents a unique set of logistical issues for NOAA OLE. Lodges may have a single charter vessel or a group of charter vessels operating in remote areas that are only accessible by airplane or boat. These remote fishing operations increase the enforcement costs for several reasons: (1) travel time to and from the enforcement area is increased; (2) enforcement activities may require several days to adequately cover an area; and (3) angler patterns such as fishing locations, the timing for the departure and arrival of new clients, and daily fishing schedule are poorly understood. It is important that NOAA OLE has adequate staff and enforcement tools to overcome these issues to ensure the annual limit is perceived as credible (i.e., they may get caught if in violation) by anglers.

The credibility of an enforcement effort depends on several factors, including the likelihood of detecting a violation, the swiftness of the enforcement response, and the perception that enforcement actions are real (Iannuzzi 2002). Moreover, deterrence-based enforcement is most successful when a well developed compliance program is designed to identify and correct violations, establish an enforcement presence, collect evidence needed to support enforcement actions, and help target enforcement activities (Rechtschaffen and Markell 2003). In the case of the charter fishery, detection of a violation for the annual limit would be heavily reliant on reporting requirements for charter anglers and operators, and the ability of enforcement to enforce regulations in remote areas. Without sufficient documentation of a violation, cases will not be prosecuted, which may reduce the credibility and effectiveness of the regulation.

These issues were addressed in a June 2006 NOAA OLE memo and during a meeting between NOAA Fisheries, Council Staff, NOAA OLE, ADF&G, and NOAA General Counsel. In the memo and at the meeting, NOAA OLE indicated the following criteria must be met for the annual limit to be enforceable:

- NOAA OLE would need the ability to check for compliance at sea, dockside, and through a post-season audit of angler catch. To meet these needs, a harvest record indicating the number of halibut harvested would be needed for each angler, as well as a vessel-specific record of each angler's catch (serially matched to an angler's catch card) that would be submitted to NOAA OLE on a regular basis throughout the fishing season. A vessel-specific record would be needed to track the charter operators involved with violations. The angler harvest record would be used during dock-side or at-sea enforcement and to provide a record of angler-specific halibut harvest for the charter guide.
- Use of State recordkeeping and reporting tools would require NOAA OLE to obtain the necessary authority to inspect State recordkeeping tools (i.e., charter logbook and sport fishing license). Because of State statutory law, the Federal government cannot obtain charter logbook or angler license information at the resolution necessary for enforcement. Moreover, NOAA OLE is not authorized by the State to enforce State regulations, and thus cannot require an angler to show his or her license to an enforcement agent.
- NOAA OLE would need the ability to audit charter logbooks at the end of a charter fishing season. This audit would reveal anglers that exceeded the 5-fish annual limit, including anglers who fished on multiple charter vessels.

A detailed discussion paper about the annual limit was presented to the Council at its October 2006 meeting (NMFS 2006). The paper provides a detailed discussion on the types of recordkeeping and reporting tools that could be used and their associated costs.

#### **2.7.4.4.1 Type of information required by NOAA OLE**

To enforce the annual limit, NOAA OLE would need harvest information for each charter angler, angler contact information, charter guide contact information, and vessel identification information. NOAA OLE would need to know the number of halibut harvested for each charter angler and each charter trip taken by an angler. This would require NOAA OLE to determine the halibut harvested for each angler, the charter operator (guide and business), the number of halibut harvested by each angler, angler contact information, port of landing, and vessel identification number (USCG or Department of Motor Vehicle Registration). The ADF&G sportfish license currently requires an angler's up-to-date information on catches of species that are managed under annual limits. As stated in the GHF proposed rule (2002 FR 3867), adequate monitoring of the annual limit would require that halibut harvested aboard guided recreational vessels be

added to this list. The proposed rule also explains that adequate recordkeeping and reporting requirements are imperative to the rule enforceability and, hence, the success of the harvest option.

There are several approaches that could be used to implement an annual limit and satisfy NOAA OLE enforcement requirements. In summary, the recordkeeping and reporting alternatives in the discussion paper are as follows:

- Federal use of the State reporting tools: NMFS and NOAA OLE would work with the State and use the State charter logbook and angler licensing system to meet enforcement requirements.
- Federal recordkeeping and reporting tools: NMFS and NOAA OLE would develop and implement a Federal logbook and angler catch record to meet enforcement requirements. Two methods could be used to implement a Federal logbook:
  - Written logbook: A written logbook similar to the current ADF&G charter logbook would be submitted to NMFS by charter operators. Anglers would use a written catch record.
  - Electronic logbook. Logbook information would be electronically reported to NMFS and NOAA OLE. Anglers would use a written angler catch record.

The discussion paper concludes the most cost-effective and least burdensome method for the public and the least expensive method for NMFS would be to utilize the State logbook and angler license or catch cards. This conclusion was presented to the Council at its December 2006 meeting. For this reason, only the costs associated with using State reporting tools are discussed in the following sections.

#### **2.7.4.4.2 Cost estimate for using State reporting tools**

Federal use of the State logbook and angler licenses would require additional staff time. Federal staff would be required to coordinate with ADF&G and respond to agency needs. A part time NMFS or NOAA OLE staff person would be required to process and query operator, business, and angler information. This person would also provide assistance to NOAA OLE with the collection of evidence, administrative correspondence, preparation of cases, and maintenance of the database by working closely with NMFS programmers and ADF&G staff as needed. The expected annual cost for a GS-9 part time NMFS staff person is approximately \$50,000.

Programmer time would also be required to build and maintain a secure Federal database. Periodic data transfers would be the simplest database format, with programmer time required to construct and maintain the Federal database and workstation structure. Construction and maintenance of this database would likely be minimal, requiring one to two weeks of programmer time annually. The estimated cost for NMFS programmer time is \$2,500 to \$5,000, annually.

Federal use of State charter and angler recordkeeping and reporting tools would require ADF&G administrative support. To meet Federal data needs, ADF&G would need to provide adequate staff time to query charter operator and angler information, package this information, and send it to NMFS annually. ADF&G staff time would also be required to coordinate with the NMFS and NOAA OLE to develop a transfer methodology (including security concerns) and provide ongoing support to NMFS staff.

If the previously discussed legal and administrative issues are resolved, NMFS and NOAA OLE could use the information from the logbook, guide and business registration, and angler license database to identify and pursue cases. Once a violation was identified, NOAA OLE would use the serialized angler

license number to obtain information (including PID and DVL information) about the individual angler from the ADF&G license database, and the logbook to identify the charter operator and vessel (including the registered business). Anglers and charter operators would be contacted about their violation, and enforcement would take appropriate action.

Federal regulations implementing the annual limit would describe the type of information a charter operator and client are required to record. The State logbook and angler sport fishing license would be used to fulfill these information needs as outlined in Federal regulation. However, Federal regulations cannot only refer to the completion of the State logbook and angler license as fulfilling Federal reporting requirements. Regulations must describe the required information and indicate the State logbook could be used to meet these information needs..

The State may change its logbook and angler license requirements at any point in time, including a change to the information requirements for charter operators and anglers. These changes may result in State reporting tools not meeting the information requirements for enforcing the annual limit. Moreover, changes to State law may also prevent NOAA OLE from accessing information essential to enforcement or change the authority granted to NOAA OLE to enforce the annual limit. In either situation, NOAA OLE would not be able to enforce the annual limit using State reporting tools and a Federal logbook program would be necessary.

#### **2.7.4.5 Size limits (Options 5, 6, and 7)**

The primary enforcement issues associated with a size limit are determining the number of halibut harvested and the size of one of the halibut for each person fishing from a charter vessel. The options would require enforcement officers to check the number and size of harvested halibut at the point of offload or onboard the charter vessel. In either situation, the halibut could not be mutilated in such a manner that would prevent measurement. Regulations associated with the alternative would prohibit charter operators from discarding carcasses until all fillets are offloaded from the charter vessel.

Determining the number of halibut harvested by a person fishing from a charter vessel is difficult because halibut may be distributed among anglers, resulting in more successful anglers harvesting more than two halibut to maximize the collective daily bag limit for licensed anglers onboard the charter vessel. This practice is often referred to as a “boat limit.” To enforce the minimum size requirement, NOAA OLE officers would likely rely on angler specific information recorded in the state logbook, interview information from the anglers, and the total number and sizes of halibut harvested on a charter vessel as evidence of a violation. However, in certain situations it would be very difficult for NOAA OLE to attribute individual halibut to a person onboard the charter vessel if a boat limit has been harvested.

Option 5 would require operators to position halibut weighing at least 43 lb or 60 lb for measurement prior to release or harvest. To measure a halibut, operators would be required to bring it to the side of the vessel or onboard the vessel for measurement. The capture, measuring, and release of large species is not unprecedented in a federal or state managed recreational fishery. For example, certain shark and marlin species have minimum size requirements that are comparable to the release sizes considered under Option 5. The 2006 Atlantic shark regulations require a 54 inch minimum length limit applied to the allowable harvest of one shark per vessel per day (including mako and porbeagle sharks) and a 99 inch limit minimum size limit on blue marlin. In southeast Alaska, charter anglers are required to release Chinook salmon under 28 inches and lingcod fewer than 30 inches or over 35 inches in length. This management option would not require any additional reporting requirements for charter operators or charter anglers.

#### 2.7.4.6 Charter operator responsibilities

Charter operators (guides) may be held responsible by NOAA OLE if charter anglers exceed their annual halibut limit. Enforcement action may be taken on a charter guide and charter angler if the annual limit is exceeded. The nature of the violation and the final regulations would determine how the enforcement action is carried out. The Halibut Act provides for enforcement action on a charter guide at 773(i)(c) who has charter anglers in violation of the halibut regulations:

*If any officer authorized to enforce this subchapter (as provided for in this section) finds that a fishing vessel is operating or has been operated in the commission of an act prohibited by section 773e of this title, such officer may, in accordance with regulations issued jointly by the Secretary and the Secretary of the department in which the Coast Guard is operating, issue a citation to the owner or operator of such vessel...*

The International Halibut Commission (IPHC) regulations specify the regulation at Section 25(18):

*The operator of a charter vessel shall be liable for any violations of these regulations committed by a passenger aboard said vessel.*

The definition of an operator is specific at Section 3(1)(m):

*“Operator”, with respect to any vessel, means the owner and/or master or other individual on board and in charge of that vessel.*

In addition to the IPHC regulations, the USCG also has the authority to revoke operating licenses if a charter operator fails to comply with all Federal regulations. Thus, violation of the GHF regulation would constitute a violation of Federal regulation, which may result in enforcement action by the USCG.

NOAA OLE would have the authority to take enforcement action on the charter angler or operator depending on the infraction. Charter operators would be solely responsible for charter logbook recordkeeping and reporting requirements, as well as requirements associated with the distribution of angler catch cards. The situation associated with the violation would determine the action taken by NOAA OLE.

#### 2.7.4.7 Enforcement costs

Enforcement of all the alternative would require on-site enforcement efforts to observe a person or charter vessel with an illegal halibut. This would require regular visits by enforcement officers to areas where halibut are landed. These areas include remote areas such as lodges and urbanized areas such as Auke Bay or Sitka. In the case of time specific regulations, enforcement officers would need to check offloading sites throughout the entire fishing year and potentially board vessels to determine the presence of illegally harvested halibut. As previously discussed, the annual limit would require specific recordkeeping and reporting requirements to track the number of halibut harvested by an individual angler and to allow information collected for enforcement to be audited by NOAA OLE during and after the fishing season.

With the exception of the annual limit (Option 3), NOAA OLE does not have a cost estimate for enforcement of options that do not involve the annual limit. It is difficult to derive a cost estimate for these options because of the large number of charter vessels and anglers distributed over a large, remote geographical area. Enforcement costs would vary with the desired level of enforcement. However, given the current low priority level associated with enforcing the charter halibut two-fish bag limit, an increase in enforcement resources or a re-prioritization of resources would likely increase compliance with the

alternatives. For example, in 2006 NOAA OLE reported boarding only 14 charter trips (out of 20,000 trips), whereas in the IFQ fishery for halibut and sablefish, NOAA OLE inspected 146 trips (out of 7,500 trips). Greater compliance would likely be obtained if enforcement resources were increased to a level similar to the annual limit. This magnitude of increase would require an additional four enforcement officers at an annual cost of \$600,000. An increase in the number of enforcement officers would allow a greater proportion of the approximately 20,000 trips taken annually by charter operators in Area 2C to be inspected by NOAA OLE.

The combination of options (Option 11 – 13) all include an annual limit which, as previously discussed by NMFS during the December 2006 Council meeting and in NMFS (2006), would require a substantial increase in enforcement effort. Each of the reduction measures within the option would require the previously discussed enforcement and recordkeeping requirements. However, an increased enforcement effort for an annual limit would also likely increase compliance with the other harvest reduction measures without costs in addition to the annual limit.

In addition to an increase in enforcement presence, certain attributes associated with the charter industry may increase compliance with regulations. In a summary of a discussion between representatives from NOAA Fisheries, ADF&G, Alaska Department of Public Safety, and the United States Coast Guard (USCG), several attributes were identified that could increase compliance in the charter fishery (Council 2006):

*...there are characteristics of the recreational fishery that suggest a different and lesser level of enforcement may be needed to ensure an adequate level of compliance with the program. Several characteristics of the fishery differentiate it from other fisheries and work to the advantage of regulators.*

- a) The recreational charter fishery operates in the public eye. Requiring operators to prominently post GHL control options... onboard charter vessels would help promote compliance. The State could further support by requiring those businesses selling sport fishing licenses to do the same.*
- b) The recreational charter fishery is highly competitive. While there are some operations in isolated locations, many boats tie up and operate in close proximity to other charters. It is reasonable to expect that those operators who are following the rules would be quick to notice another operator who wasn't following the rules.*
- c) ...because of the nature of Coast Guard license requirements, inferring a trust and responsibility to the licensee, as well as the double jeopardy implications, charter operators would likely have a higher rate of compliance with GHL options than might otherwise be expected.*

These attributes associated with a charter fishery, along with an enforcement priority for recreational fisheries and appropriate recordkeeping and reporting may provide a level of compliance sufficient to ensure the alternatives have the desired effect in controlling charter halibut removals in Area 2C.

### **2.7.5 Effects on Net Benefits to the Nation**

The net benefits to the nation arising out of the options under Alternative 2 can accrue from several sources. First, the proposed options should initially reverse and then slow the growth of the open-ended reallocation between commercial and guided sport sectors. This reversal should instill commercial quota holders with greater confidence in the value of their quotas, which will in turn support the market for

quota shares and encourage appropriate investment and capitalization in the commercial sector. Further, the reallocation of halibut harvest amounts back to the commercial sector may affect the benefits realized by U.S. consumers through changes in product availability and price. This section summarizes the different effects of the options to allow comparison and conclusions concerning the overall effects of the options on net benefits to the nation.

### 2.7.5.1 Alternative 1. No Action/Status Quo

If the current management of charter halibut harvests in Area 2C continues, the net benefits to the nation are likely to follow their current trend. The open-ended reallocation to the guided sport sector from the commercial sector will continue and likely grow as guided sport sector harvest has grown in recent years. This reallocation will increase uncertainty for commercial quota holders and could affect benefits realized by U.S. consumers through changes in product availability and price.

For prior analyses, the SSC requested that the discussion of the no action alternative be expanded to include estimates of consumer losses due to reductions in the commercial TAC if charter-based sport fishing overages continued. The analysis combined the overage estimates derived for the ex-vessel revenue losses analysis with a consumer surplus and total revenue model from Herrmann and Criddle (2006) to generate estimates of total consumer losses associated with GHL overages.<sup>21</sup> This model estimates that Area 2C GHL overages would result in a \$0.233 million loss beginning in 2006 and increasing to \$1.8 million by 2015.

**Table 57 Long-Term Commercial Losses in Ex-Vessel Value based on Estimated Commercial CEY Reductions and Guided Sport Catch-Area 2C**

Year	Area 2C			
	Estimated Charter Harvest	Estimated GHL Overage	Est. Commercial Underage	Lost Consumer Surplus
2006	2.035	0.603	0.36	-\$0.233
2007	2.174	0.742	0.36	-\$0.367
2008	2.322	0.890	0.36	-\$0.510
2009	2.480	1.048	0.36	-\$0.663
2010	2.648	1.216	0.36	-\$0.825
2011	2.829	1.397	0.36	-\$0.998
2012	3.021	1.589	0.36	-\$1.183
2013	3.227	1.795	0.36	-\$1.379
2014	3.447	2.015	0.36	-\$1.588
2015	3.682	2.250	0.36	-\$1.810

Source: Northern Economics Estimates based on IPHC 2005 Stock Assessment Estimates and 2005 ADF&G estimates of guided and unguided sport catch.

Note: All non-dollar figures are in millions of lb.

While the no action alternative will result in continued and increasing consumer surplus losses, it would also result in regional increases in sport angler welfare surpluses resulting from the projected increase in

<sup>21</sup> Unlike the ex-vessel revenue analysis, the consumer surplus model requires estimates of commercial underages in the future. The analysis assumes that future commercial underages would be equivalent to the average of the commercial underages from 2001 through 2005. This amounts to an underage of 0.36 Mlb in Area 2C and 0.42 Mlb per year in Area 3A. Note that consumer surplus losses do not begin until the GHL overage is nearly larger than the commercial underage. Also, please note that the model results only approximate what the actual effects would be if ex-vessel and wholesale market conditions hold similar to conditions that were present in 2002.

charter-based sport fishing for halibut. Because the number of halibut sport fishing charter service providers is large and barriers to entry are low, halibut sport fishing charter service providers can be assumed to behave as “perfect competitors,” which generate very little or no net economic rents. Consequently, the principal source of net national benefits from the charter halibut fishery is angler surplus—the difference between the benefits that anglers derive from sport fishing for halibut onboard charter boats and the costs that they incur. While the magnitude of changes in regional economic benefits will vary, it is unlikely that the changes in regional expenditures will result in changes in net national benefits. Anglers that are unable to find the angling experience they want in Alaska may be able to find it somewhere else. Moreover, increases in regional expenditures associated with increases in charter-based sport fishing are likely to be offset by decreases in regional expenditures associated with commercial fishing.

All of the options could help reverse the open-ended reallocation between commercial and guided sport sectors and could instill commercial quota holders with greater confidence in the value of their quotas, which will in turn support the market for quota shares. A greater confidence in the value of quotas will also encourage appropriate investment and capitalization in the commercial sector. Further, the reallocation of halibut harvest amounts back to the commercial sector may affect the consumer surplus benefits realized by U.S. consumers. However, the options could result in long-term increased costs incurred by charter operators dependent on a multiple-trip per day business model, crew members dependent on halibut harvests for personal use, and operators dependent on clients interested in fishing experiences lasting longer than two days or those dependent on repeat customers who take more than two trips per year. Theoretically, if operators could adapt their operations to service the same number of clients on fewer fish, then efficiency is gained resulting in net national benefits. However, as discussed in Section 2.6, many of the options, particularly those that affect bag limits, are likely to result in fewer return clients. Thus, it isn’t clear from the available research that the industry can service the same number of clients on fewer fish.

## **2.7.6 Summary and Conclusions**

The expected effects of the options for Area 2C are discussed in Section 2.6 and 2.7. The least effective options are likely to be the reverse slot limit followed by a one-fish bag limit in May or September and one trip per day restrictions. The most effective sub-options are found in Option 11 and are those that change the daily bag limit in one form or another. Daily bag limit options would result in the highest consumer surplus gains and the largest reductions in angler welfare. As noted previously, the analysis is unable to perform full net-benefit analyses like those in Edwards 1995 and Criddle 2004.

As shown in Table 16, generally, charter operators preferred options that provided the least disruption of current business models, while commercial benefits are directly tied to the magnitude and durability of the harvest reductions that the options provide. Key informant interviews indicated that charter operators may have a preference for the no retention by skipper and crew, second fish of a specified minimum size, and annual limit options. Interviewees rated sub-options that restrict the daily bag limit to one fish as the most disruptive. From a commercial perspective, the best options are the combination of sub-options in Option 11 and Option 4 (the one-fish bag limit).

## **3.0 REGULATORY FLEXIBILITY ACT**

### **3.1 Introduction**

When an agency proposes regulations, the Regulatory Flexibility Act (RFA) (5 U.S.C. § 601-612) requires the agency to prepare and make available for public comment an initial regulatory flexibility analysis (IRFA) that describes the impact of the proposed actions on small businesses, nonprofit enterprises, local governments, and other small entities. The IRFA is to aid the agency in considering all reasonable regulatory options that would minimize the economic impact on the small entities to which the proposed actions apply.

The level of detail and sophistication of the analysis should reflect the significance of the impact on small entities. Under 5 U.S.C., Section 603(b) of the RFA, each IRFA is required to address:

- A description of the reasons why action by the agency is being considered
- A succinct statement of the objectives of, and the legal basis for, the proposed actions
- A description of and, where feasible, an estimate of the number of small entities to which the proposed actions will apply
- A description of the projected reporting, record keeping and other compliance requirements of the proposed actions, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record
- An identification, to the extent practicable, of all relevant federal rules that may duplicate, overlap or conflict with the proposed actions
- A description of any significant options to the proposed actions that accomplish the stated objectives of applicable statutes and that minimize any significant economic impact of the proposed actions on small entities

### **3.2 Reasons for Considering the Proposed Action**

As described more fully in Section 1.4 of the RIR, in 2000, the Council proposed to establish GHs for the charter halibut fishery in IPHC Area 2C and Area 3A. At its December 2006 meeting, the Council reviewed preliminary 2006 halibut charter harvest estimates from the ADF&G Sport Fish Division. The data indicated that the GHs had been exceeded by 42 percent in Area 2C. In response to the new information, the Council initiated an analysis that includes a proposed action to reduce halibut charter harvests to the GHs.

### **3.3 Objectives and Legal Basis of the Proposed Actions**

As described more fully in Section 1.2 of the RIR, the purpose and overall intent of the proposed action is to reduce charter halibut harvests in IPHC Area 2C.

The Northern Pacific Halibut Act of 1982 (16 U.S.C. 773-773k; Pub. L. 97-176, as amended) authorizes the Secretary of Commerce to enforce the terms of the Convention between the United States and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea. The Secretary promulgates regulations pursuant to this goal in 50 C.F.R. Part 301. The Regional Fishery Management Council responsible for the geographic area concerned (i.e., the Pacific or North Pacific Council) may also develop and implement, with the approval of the Secretary, regulations as deemed necessary to fulfill the purpose of the Convention and this Act. However, the implementation of these regulations is subject to approval by the Secretary of Commerce.

### **3.4 Description and Number of Small Entities to which the proposed actions will apply**

#### **3.4.1 Definition of a Small Entity**

Three types of small entities are defined in the RFA:

**Small Business.** Section 601(3) of the RFA defines a small business as having the same meaning as small business concern under Section 3 of the Small Business Act. This includes any firm that is independently owned and operated and is not dominant in its field of operation. The U.S. Small Business Administration (SBA) has developed size standards to carry out the purposes of the Small Business Act, and those size standards can be found in 13 CFR 121.201. The size standards are matched to North American Industry Classification System industries. A business involved in providing fishing charter services is a small business if it is independently owned and operated and not dominant in its field of operation and if it has combined annual receipts not in excess of \$6.5 million. The SBA definition of a small business applies to a firm's parent company and all affiliates as a single entity.

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

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

#### **3.4.2 Description of Small Entities to Which the Proposed actions will apply**

Federal courts and Congress have indicated that a RFA analysis should be limited to small entities subject to the regulation.<sup>22</sup> As such, small entities to which the rule will not apply are not considered in this analysis.

The proposed options would apply to businesses providing services in the guided Pacific halibut sport fishery in IPHC Regulatory Area 2C (Southeast Alaska). There do not appear to be any entities that are directly regulated by the proposed action that would qualify as either "small nonprofit" entities or "small government jurisdictions."

#### **3.4.3 Estimate of the Number of Small Entities to Which the Proposed actions will apply**

Prior analyses, such as the 2006 and 2003 GHF analyses and the 1997 GHF analysis (conducted by University of Alaska, Anchorage Institute for Social and Economic Research [ISER] and Council staff) indicated that there are more than 800-plus active charter operations and that historical data (ADF&G logbooks and survey data) indicate a substantial amount of entry and exit from the fishery. These analyses concluded at the time that all of the 800-plus charters are likely small entities based upon SBA criteria, since they were expected to have average annual gross revenues of less than the then annual limit of \$5 million. The largest of these companies involved in the fishery, which are lodges or resorts that offer accommodations as well as an assortment of visitor activities, may be large entities under the SBA size standard. Key informant interviews conducted for this analysis indicated that the absolute largest of these companies may gross more than \$6.5 million per year, but that it was also possible that all of the entities

---

<sup>22</sup> *Mid-Tex Elec. Coop v. FERC*, 773 F.2d 327 (D.C. Cir. 1985); *Cement Kiln Recycling Coalition et. al. v. EPA*, 255 F.3d 855 (2001).

involved in charter halibut harvest grossed less than that amount. This analysis is unable to verify these estimates.

The estimation of the number of small entities is likely over inclusive because of the limited information on vessel ownership and operator revenues. However, it is highly likely that nearly all entities qualify as small businesses.

### **3.5 Description of the Projected Reporting, Record Keeping and Other Compliance Requirements of the Analyzed Options**

#### **3.5.1 Description of Compliance Requirements of the Analyzed Options**

As currently envisioned, the proposed actions would not require any new or revised “reporting” or “record keeping” within the meaning of the Paperwork Reduction Act. The proposed actions contain compliance requirements not subject to the Paperwork Reduction Act. Specifically, the analyzed options impose harvest restriction options:

- Option 1- No more than one trip per vessel per day
- Option 2- No harvest by skipper and crew and line limits
- Option 3-Annual limits of four, five, or six fish per angler
- Option 4-Reduced bag limits of one fish per day in May, June, July, August, September or for the entire season
- Option 5- A one-fish bag limit with the option to harvest a second fish larger than 45 inches or 50 inches
- Option 6- A two-fish bag limit with one fish of any size and one fish 32 inches or less in length
- Option 7- A two-fish bag limit with one fish of any size and one fish 32 inches or less in length or larger than 45 inches or 50 inches
- Option 8- Combination of Options 1, 2, and 5
- Option 9- Combination of Options 1, 2, and 6
- Option 10- Combination of Options 1, 2, and 7
- Option 11- Combination of Options 1, 2, 3, and 5
- Option 12- Combination of Options 1, 2, 3, and 6
- Option 13- Combination of Options 1, 2, 3, and 7

#### **3.5.2 Description of Compliance Costs Associated with the Proposed Actions**

The differing options of the options have different compliance costs as explained in Section 2.7. For example, some charter operators take two or more trips in any given day and would be affected by the one-trip per day trip limit. This limit would reduce the revenues of those operators by allowing them to make only one trip per day unless operators were able to charge more than twice the price of the original trip. However, it is estimated that a relatively small percentage of charter operators make more than one daily trip per vessel.

The ban on harvest by skipper and crew could result in increased operation costs if crew view halibut harvests as part of their wages. Additionally, crew that must replace halibut harvested while on a charter trip may be forced to purchase replacement food at retail outlets.

Several options contain management measures which could affect consumer demand for halibut trips by changing quality of the charter experience. For example, Option 4 changes the daily bag limit while Option 3 establishes an annual limit. If the annual limit or change in daily bag limit reduce consumer demand for angler trips then operators' revenues will fall. In the case of Option 3, ADF&G data indicate that in 2006, 17 percent of one-angler households from the SWHS harvested more than four fish while 10 percent harvested more than five fish. Demand from this segment is more likely to be affected by the proposed regulations if these clients do not transfer their demand for halibut to other species requiring charter access (thus continuing to take the same number of charter trips per year). Charter operators who depend more on multi-day trips, repeat trips by clients within a given year, or clients who primarily target halibut will experience greater negative effects than operators with a more diverse clientele or those who focus on providing multi-species experiences.

**Commercial Fisheries Statement.** The effects of the analyzed options on the commercial fishery would be positive given that the options would help reduce charter harvest of halibut to levels closer to, or below, the Area GHLs. However, the long-term efficacy of the current options may be limited given that the options do not address the long-term growth of the charter sector through increasing client demand and the entry of new vessels into the fleet. Thus, while the options' expected effects on the commercial fleet are positive, the duration of these effects is currently unknown. Sub-options within Option 11—a combination of annual limits, restrictions on crew harvest and multiple trips per day, and a size restriction on one of two fish—would provide the largest positive effects for the commercial fleet because they generate the greatest reductions in charter fleet harvest. The analysis notes that the only non-combination option that will reduce harvest to near the GHL involves changing the bag limit including the option of a minimum size limit on one of two fish. As discussed in Section 2.7, the effect of the status quo would be increased consumer surplus and producer losses to charter fleets.

**Recreational Fisheries Statement.** The proposed options could increase demand for halibut from the non-guided sport fishery sector in several ways. Elimination of crew harvests would likely result in some transfer of demand by crew to recreational opportunities. Key informant interviews repeatedly indicated operators and crew would harvest halibut on family recreational trips or on non-working days using charter equipment. The institution of annual limits and bag limits could encourage anglers to harvest more halibut through non-guided means.

### **3.5.3 Estimate of the Regulatory Burden and Distributional Effects**

Compliance costs may affect the economic viability of small entities or their ability to provide services. The severity of the economic impact depends on the magnitude of the compliance costs associated with the rule and the economic and financial characteristics of the affected firms and industries. Firms that are relatively profitable would be better able to absorb new compliance costs without experiencing financial distress. Information on revenue, profit or other options of economic sustainability is unavailable for the small entities to which the proposed actions would apply. However, the regulatory burden is estimated to be highest for the smallest firms, those involved in multiple trips per day, those who offer multi-day packages, and those who are unable to target other species instead of halibut. These operators would either face reduced profits or losses if they are unable to raise charter prices to include the new costs. Key informant interviews indicated that margins in the industry are already slim for some operators and that the new management options could eliminate those margins and force operators out of business.

### **3.5.4 Description of Potential Benefits of the Proposed Actions to Small Entities**

The proposed options would not directly benefit small entities. Indirectly, the proposed options could protect small entities from further and more onerous regulations.

### **3.6 Identification of Relevant Federal Rules that may Duplicate, Overlap or Conflict with the Proposed Actions**

NOAA Fisheries is unaware of any duplicative, overlapping, or conflicting federal rules beyond NMFS preferred alternative for 2007.

### **3.7 Conclusion**

The analysis estimates that nearly all of the firms affected by the proposed actions would qualify as small business entities. The compliance costs of the proposed actions will vary widely depending on the size of the firm, the firm's business model, and current business practices. Compliance costs will be highest for the smallest firms, those involved in multiple trips per days, those who offer multi-day packages, and those who are unable to target other species instead of halibut. These operators would either face reduced profits or losses if they are unable to raise charter prices to include the new costs. Key informant interviews indicated that margins in the industry are already slim for some operators and that the new management options could eliminate those margins and force operators out of business. The overall effect of these costs will depend upon the size of the firm and extent of the compliance costs.

## **4.0 CONSISTENCY WITH OTHER APPLICABLE LAWS**

### **4.1 Introduction**

This section discusses the consistency of the proposed actions with the North Pacific Halibut Act of 1982, Magnuson-Stevens Act, and the Regulatory Flexibility Act.

This North Pacific Halibut Act of 1982 governs the promulgation of regulations for managing the halibut fisheries in both state and federal waters. The language in the Halibut Act regarding the authorities of the Secretary of Commerce and the Regional Fishery Management Council is excerpted below:

*“The Regional Fishery Management Council having authority for the geographic area concerned may develop regulations governing the U.S. portion of Convention waters, including limited access regulations, applicable to nationals or vessels of the U.S., or both, which are in addition to, and not in conflict with regulations adopted by the Commission. Such regulations shall only be implanted with the approval of the Secretary, shall not discriminate between residents of different States, and shall be consistent with the limited entry criteria set forth in Section 303(b)(6) of the Magnuson Act. If it becomes necessary to allocate or assign halibut fishing privileges among various U.S. fishermen, such allocation shall be fair and equitable to all such fishermen, based upon the rights and obligations in existing Federal law, reasonably calculated to promote conservation, and carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of the halibut fishing privileges...”*

From the language in the Halibut Act, it is clear that while jurisdictional authority for the limited access and other allocation options resides within the provisions of the Halibut Act, consideration of those types of options is subject to many of the same criteria described under the Magnuson-Stevens Act. In particular, the 303(b) (6) provisions of the Magnuson-Stevens Act and the language from National Standard 4 are directly referenced. Therefore, the following sections are included to discuss the

consistency of the proposed options relative to certain provisions of the Magnuson-Stevens Act and other applicable laws, without regard for whether such treatment is formally required.

#### **4.2 Section 303(a) (9) – Fisheries Impact Statement**

The Magnuson-Stevens Act requires that any management options submitted by the Council take into account potential impacts on the participants in the fisheries, as well as participants in adjacent fisheries. Without regard to whether this fisheries impact statement is formally required under the proposed action, the following information is provided. The impacts of the proposed options have been discussed in previous sections of this document. The action options would not curtail the charter fishing season, but could influence client demand for trips and require certain businesses to change their business model. In addition, certain options could shift demand from halibut to other species and change the spatial nature of demand over time. The effects of changing business models and the spatial shift of demand are likely to affect not only businesses but communities as well. Participants in other fisheries (e.g., salmon, rockfish, and lingcod) could find themselves facing additional competition from displaced halibut anglers.

Not imposing options to limit charter catches to their GHL could reduce the amount of halibut available to the commercial fisheries, particularly if the charter fishery continues to expand and the halibut quota decreases.

#### **4.3 Section 303(b)(6) – Limited Entry Requirements**

Under Section 202(b)(6) of the Magnuson-Stevens Act, the council and Secretary of Commerce are required to take into account the following factors when developing a limited access system: (a) present participation in the fisheries, (b) historical fishing practices in, and dependence on, the fisheries, (c) the economics of the fisheries, (d) the capability of fishing vessels used in the fisheries to engage in other fisheries, (e) cultural and social framework of the fisheries, and (f) any other relevant considerations. This document does not discuss limited entry options and therefore this section is not applicable.

### **5.0 REFERENCES**

- Alaska Department of Fish & Game. Statewide Harvest Survey (1995-2004). 2005.
- Alaska Department of Fish & Game. *Charter Logbook Program (1995-2004)*. 2005.
- Clark, Bill. International Pacific Halibut Commission. Personal Communication with NEI Staff, February 21, 2006
- Clark, W. G. and S. R. Hare. 2007. Assessment of the Pacific halibut stock at the end of 2006. International Pacific halibut Commission Report of Assessment and Research Activities 2006: 97-128.
- Criddle, Keith, M. Herrmann S.T. Lee, and C. Hamel, *Participation Decisions, Angler Welfare, and the Regional Impact of Sportfishing*. Marine Resource Economics. Volume 18, pp. 291-312. 2003.
- Criddle, Keith. *Economic Principles of Sustainable Multi-use Fisheries Management with a Case History Economic Model for Pacific Halibut*. American Fisheries Society Symposium. Volume 43. pp. 143-171, 2004
- Fall, J. A., D. Koster, and B. Davis. 2006. Subsistence harvests of Pacific halibut in Alaska, 2005. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper 320. Juneau.
- “Fisheries of the Exclusive Economic Zone off Alaska: North Pacific Halibut and Sablefish Individual Fishing Quota Cost Recovery Program,” Title 50 Code of Federal Register, Part 679. 2005 ed.

- Forsberg, J. E. 2007. Age distribution of the commercial halibut catch for 2006. International Pacific halibut Commission Report of Assessment and Research Activities 2006: 75-80.
- Hamel, Charles, Herrmann, M., S.T. Lee, K.R. Criddle, and H.T. Geier. *Linking Sportfishing Trip Attributes, Participation Decisions, and Regional Economic Impacts in Lower and Central Cook Inlet, Alaska*. The Annals of Regional Science. Volume 36. pp. 247-264. 2002.
- Hare, Steven and W.G. Clark. *Discussion Paper on Regularizing Bycatch, Sport, and Subsistence Catch*. International Pacific Halibut Commission. Report of Assessment and Research Activities, 2007.
- Herrmann, Mark, S.T. Lee, K.R. Criddle, and C. Hamel. *A Survey of Participants in the Lower and Central Cook Inlet Halibut and Salmon Sport Fisheries*. Alaska Fishery Research Bulletin. Volume 8, Number 2, Winter 2001.
- Herrmann, Mark, S. T. Lee, K.R. Criddle, and C. Hamel. *An Economic Assessment of the Sport Fisheries for Halibut, Chinook, and Coho Salmon in the Lower Cook Inlet*. Final Report Prepared for the Minerals Management Service, Coastal Marine Institute, April 2000, University of Alaska Fairbanks.
- Herrmann, Mark and K.R. Criddle. *An Econometric Model for the Pacific Halibut Fishery*. Marine Resource Economics. Volume 21, No. 2. 2006.
- International Pacific Halibut Commission Staff. *Discussion of IPHC Management Options for the 2007 Sport Charter Fishery in Alaska*. International Pacific Halibut Commission. February 2007
- Lee, S.Todd. NMFS. Personal Communication with NEI Staff, February 1, 2007.
- Lew, Daniel. NMFS. Personal Communication with NEI Staff, January 31, 2007.
- McCaughran, D. A. . and S. H. Hoag. 1992. The 1979 Protocol to the Convention and Related Legislation. IPHC Tech. rep. No. 26. 32 pp. IPHC, POB 95009, Seattle, WA 98145-20009.
- “Monthly Halibut IFQ Landings by Year in Lb and Percent of Annual IFQ TAC.” National Marine Fisheries Service. Juneau, Alaska. December 2005.
- National Marine Fisheries Service. 2007. Regulatory Amendment to Modify the Halibut Bag Limit in the Halibut Charter Fisheries in IPHC Regulatory Area 2C. Environmental Assessment/Regulatory Impact Review/ Initial Regulatory Flexibility Analysis. NMFS, Juneau, AK.
- North Pacific Fishery Management Council (NPFMC). 1997. Draft Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Proposed Regulatory Amendments to Implement Management Options for Guided Sport Fishery for Halibut off Alaska. North Pacific Fishery Management Council. Anchorage.
- NPFMC. 2001. Environmental Assessment/Regulatory Impact Review/Final Regulatory Flexibility Analysis for a Regulatory Amendments to Implement Management Measures Under a Guideline Harvest Level and/or Moratorium for the Charter Fishery for Pacific Halibut in Areas 2C and 3A. NPFMC. Anchorage.
- NPFMC. 2003. Environmental Assessment/Regulatory Impact Review/Final Regulatory Flexibility Analysis for a Regulatory Amendments to Implement Management Options Under a Guideline Harvest Level and/or Moratorium for the Charter Fishery for Pacific Halibut in Areas 2C and 3A. North Pacific Fishery Management Council. Anchorage.
- NPFMC. 2005. Environmental Assessment/Regulatory Impact Review/Final Regulatory Flexibility Analysis for a Regulatory Amendments to Incorporate the Charter Sector into the Individual Fishing Quota Program for Pacific Halibut in International Pacific Halibut Regulatory Areas Areas 2C and 3A. NPFMC. Anchorage.

- NPFMC. 2006. Environmental Assessment/Regulatory Impact Review/Final Regulatory Flexibility Analysis for a Regulatory Amendments to Implement Management Options Under a Guideline Harvest Level Options for the Charter Fishery for Pacific Halibut in Areas 2C and 3A. NPFMC. Anchorage.
- NPFMC. 2007. Draft Report of the Scientific and Statistical Committee to the North Pacific Fishery Management Council. February 5-7, 2007.
- “Pacific Halibut Fisheries; Guided Sport Charter Vessel Fishery for Halibut,” 72 Federal Register 66 (April 6, 2007), pp. 17071-17076.
- Williams, G. 1999. Appendix A. Pacific halibut stock assessment and evaluation. In: Stock Assessment and Fishery Evaluation Report for the Gulf of Alaska Groundfish Total Allowable Catch Specifications. Avail. From NPFMC, 605 W. 4<sup>th</sup> Ave., Suite 306, Anchorage, AK 99501.

## **6.0 LIST OF PREPARERS**

Jane DiCosimo  
North Pacific Fishery Management Council  
605 West 4<sup>th</sup> Avenue, Suite 306  
Anchorage, AK 99501  
Ph: 907.271.2809  
Fax: 907.271.2817

Jonathan King  
Northern Economics  
880 H. Street, Suite 210  
Anchorage, AK 99501  
Ph: 907.274.5600  
Fax: 907.274.5601

Ben Muse, Ph.D., and Jason Gasper  
National Marine Fisheries Service, Alaska Region  
709 W. 9<sup>th</sup> St.  
Juneau, Alaska 99802-1668  
Ph: 907-586-7228  
Fax: 907-586-7465

Scott Meyer, Allen Bingham, Doug Vincent-Lang  
Alaska Department of Fish and Game  
333 Raspberry Road  
Anchorage, AK 99802

## **7.0 INDIVIDUALS CONSULTED**

Mark Fina, Diana Evans, NPFMC  
Kelly Hepler, ADF&G Sportfish Division  
Jay Ginter, NOAA Fisheries, SF  
Gregg Williams, Cal Blood, IPHC  
Larry McQuarrie, Saltery Cove, AK  
Robby Miller, Ketchikan, AK  
Seth Bone, Sitka, AK  
Stan Malcolm, Petersburg, AK  
Bill Spencer, Ketchikan, AK  
Angela Filler, Sitka, AK  
Mike Bonfils, Juneau, AK  
Erik Lie-Nelson, Juneau, AK



## **APPENDIX I. Development of the Council’s GHL policy by year of Council action**

**1993.** The Council began considering management options for the halibut sport fisheries in September in response to a proposal from the Alaska Longline Fishermen’s Association (ALFA) in Sitka. The proposal cited the “rapid, uncontrolled growth of the guided halibut charter industry” off Alaska. Because the harvest limits for the commercial longline fishery are set after deducting the estimated harvests by sport fishing (and all other harvests), ALFA was concerned that further growth would result in a reallocation of halibut from the traditional directed longline fishery. They were particularly concerned because the resource is fully utilized and CEYs were projected to decline (ALFA proposal, May 1993).

Based on Council discussion, public testimony, and evidence citing projected continued growth of the charter industry, the Council determined that some type of management program for the halibut charter fishery, including potential limited entry, warranted further consideration. The Council also approved a control date of September 23, 1993 as a potential cutoff date in the event of a moratorium on further entry into the fishery (this control date was never published in the *Federal Register*).

The Council established a Halibut Charter Working Group (Work Group) comprised of staff, three commercial fishery representatives, one non-charter fish representative, and six charter vessel representatives to identify and examine potential management options for the sport fisheries. The Work Group was requested to further develop suitable elements and options for a regional or statewide moratorium on new entry of halibut charter vessels. Although the Working Group did not agree on appropriate management options, it did collect extensive information on the fishery for Council consideration relative to various alternative management options.

**1995.** The Council had deferred further action because of other priorities but in January, the Council again reviewed the Work Group findings, took public testimony, and discussed further development of management options. The Council formulated a problem statement and specific management options. Formal analysis, however, was delayed by other tasking priorities for staff and the lack of funding for outside research contracts to acquire the necessary analytical expertise on the sport fisheries. At the end of 1995 and beginning of 1996, Council funding was delayed due to Congressional budget debate. Funding became available in mid-1996.

**1996.** In June, the Council again discussed the halibut charter issue, and narrowed the options for analysis. The Council decided to focus management options only on the charter fishery (the fastest growing segment based on IPHC and ADF&G reports), thus removing non-charter halibut sport fishery from further consideration. The Council also deleted the alternative for a separate IFQ system for the charter fishery, but retained an option to allow the charter sector to purchase or lease existing commercial IFQs, in the event a cap closed the fishery early. Finally, the Council deleted an absolute poundage cap on the charter fleet, but retained an option for a floating cap expressed as a percentage of the overall available quota. After a research solicitation process, and after reviewing several proposals, a contract was awarded in September to the University of Alaska Institute for Social and Economic Research (ISER).

**1997.** During initial review in April, the Council added contemporary control date options of April 15, 1997, and the date of final action in September 1997. In September, the Council took final action on the following two management actions affecting the halibut charter fishery, culminating more than four years of discussion, debate, public testimony, and analysis.

*Recordkeeping and reporting requirements.* The Council approved recording and reporting requirements for the halibut charter fishery. To comply with this requirement, the Alaska Department of Fish and Game

(ADF&G) Sport Fish Division, under the authority of the Alaska Board of Fisheries (BOF), implemented a Saltwater Sportfishing Charter Vessel Logbook (SCVL) in 1998. Information collected under this program includes: number of fish landed and/or released, date of landing, location of fishing, hours fished, number of clients, residence information, number of lines fished, ownership of the vessel, and the identity of the operator. This logbook information is essential for the analysis of charter moratorium options. It complements additional sportfish data collected by the State of Alaska through the Statewide Harvest Survey (SWHS), conducted annually since 1977, and the on-site (creel and catch sampling) surveys conducted separately by ADF&G in both Southeast and Southcentral Alaska.

*Guideline Harvest Levels in IPHC Areas 2C and 3A.* The Council adopted GHLS for the halibut charter fishery, but only for IPHC Regulatory Areas 2C and 3A. They were based on the charter sector receiving 125% of their 1995 harvest (12.35% of the combined commercial/charter halibut quota in Area 2C, and 15.57% in Area 3A). The Council stated its intent that the GHLS would not close the fishery, but instead would trigger other management options in years following attainment of the GHL. The overall intent was to maintain a stable charter season of historic length, using statewide and zone specific options. If end-of-season harvest data indicated that the charter sector likely would reach or exceed its area-specific GHL in the following season, NMFS would implement the pre-approved options to slow down charter halibut harvest. Given the one-year lag between the end of the fishing season and availability of that year's catch data, it was anticipated that it would take up to two years for management options to be implemented.

Also in September, the Council adopted a framework for developing local area management plans (LAMPs) using the joint Council/Alaska Board of Fisheries protocol. LAMPs would be submitted through the BOF proposal cycle, and portions of the plans pertaining to halibut would ultimately require Council approval and NMFS implementation. One LAMP, for Sitka Sound, has been implemented (final rule published on October 29, 1999).

In December, the NMFS Alaska Regional Administrator (RA) informed the Council that the GHL would not be published as a regulation. Further, since the Council had not recommended specific management options to be implemented by NMFS if the GHL were reached, no formal decision by the Secretary was required for the GHL. Therefore, the analysis never was forwarded for Secretarial review. The Council's intent, however, partially was met by publishing the GHL as a notice in the *Federal Register* on March 10, 1998. It did not constrain the charter fishery, but did formally announce the Council's intent to establish options to maintain charter harvest at or below the GHL using 1995 as the baseline year. Following a recommendation in April 1998 to set a revised control date for possible limited entry into the halibut charter fishery, NMFS published a new control date of June 24, 1998, in the *Federal Register*.

**1998.** After being notified that the 1997 Council analysis would not be submitted for Secretarial review, the Council initiated a public process to identify GHL management options. The Council formed a GHL Committee comprised of one Council member representing the charter industry, one BOF member representing the charter industry, two charter industry representatives from Area 2C, two charter industry representatives from Area 3A, one unguided sport representative from Area 3A, and two subsistence/personal use representatives from Area 2C. The Committee's task was to recommend management options for analysis that would constrain charter harvests under the GHL. It convened in February and April and January 1999. The two subsistence/personal use committee members voluntarily stepped down from the Committee after the first meeting due to travel costs. The Council discussed and approved with modifications the recommendations of the committee and Advisory Panel for analysis in 1998 and again in early 1999.

**1999.** In April, the Council identified for analysis: (1) a suite of GHL management option options; (2) options that would change the GHL as approved in 1997; and (3) area-wide and LAMP moratorium options under all options. Recognizing that (1) reliable in-season catch monitoring is not available for the

halibut charter fishery; (2) in-season adjustments cannot be made to the commercial longline individual fishing quotas (IFQs); and (3) the Council's stated intent to not shorten the current charter fishing season resulted in the Council designing the implementing management options to be triggered in subsequent fishing years.

During initial review in December, the Council added: (1) a change in possession limits to the management options that it would consider to limit charter halibut harvests under the GHL; (2) an option to apply the GHL as a percentage of the CEY by area after non-charter and personal use deductions are made, but prior to deductions for commercial bycatch and wastage; (3) an option to manage the GHL as a 3-year rolling average. Lastly, the Council deleted an option to close the charter fishery in-season if the GHL was reached or exceeded. The Council further adopted the restructured options as proposed by staff.

**2000.** During final action in February, the Council modified Alternative 2 and selected the new alternative as its preferred alternative. The Council's preferred alternative is listed below. The analysis originally was submitted for NMFS review on July 13, 2000. In December, ADF&G staff reported that the SWHS survey estimates of charter harvest were corrected for 1996-98. The Council accepted the corrected estimates and the analysis submitted to the Secretary was revised.

**2001.** Subsequent drafts were resubmitted to NMFS on February 14 and September 26 in response to NMFS requests for revisions.

**2002.** The final draft was submitted on March 28. On September 6, the RA notified the Council that its preferred alternative could not be submitted for Secretarial review because the frameworked management options to reduce halibut charter harvests under the GHL likely would require additional public comment under the APA rulemaking process. NMFS identified a preferred alternative to implement a GHL that would set a ceiling level of 1,432,000 lb net weight in Area 2C and 3,650,000 lb net weight in Area 3A, and would require a letter of notification from NMFS to the Council when a GHL is reached or when abundance declined such that the GHL would be reduced.

**2003.** NMFS issued a final rule to implement a GHL in the two areas (68 FR 47256, August 8, 2003). The GHL established an amount of halibut that may be harvested annually in the charter fishery. This action was necessary to allow NMFS to manage more comprehensively the Pacific halibut stocks in waters off Alaska. It was intended to further the management and conservation goals of the Halibut Act.

**2004.** Charter halibut harvests were determined to have exceeded the GHLs in both Area 2C and 3A in the first year of the GHL Program.

**2005.** Upon receiving a report from ADF&G that the GHLs were exceeded in 2004, the Council initiated this analysis in October 2005 to identify management options to lower the charter halibut harvests in the two areas.

**2006.** Council selected and subsequently rescinded a preferred alternative of 5-fish per year in Area 2C.

**2007.** NMFS identified a preferred alternative of a two-fish bag limit, with one fish required to be less than 32 inches, for implementation in 2007.

**2007.** Council revised the suite of alternatives and scheduled selection of a new preferred alternative for Area 2C for implementation in 2008.



## APPENDIX II. Choice of a Hook and Release Mortality Rate for the Area 2C Charter Halibut Fishery, 2006

Scott Meyer, Alaska Department of Fish and Game  
March 8, 2007

An assumed value for the catch-and-release mortality rate was required to evaluate several of the management alternatives for the Area 2C recreational charter halibut fishery. Release mortality rates have not been estimated for the Alaska sport halibut fishery but have been estimated for many other species of marine fish, mostly on the east coast of the United States. Some factors that have been shown to have an effect on the estimate of the mortality rate include the type of hook used, where the hook is embedded in the fish, terminal gear (artificial or bait) used, length of time the fish is played, water temperature, handling time in and out of water, release method, species-specific physiology, and the term of the mortality assessment (Bartholomew and Bohnsack 2005, Muoneke and Childress 1994). The choice of an appropriate hooking mortality rate for the Area 2C charter fishery should integrate information on as many of these factors as possible.

Gear type is assumed to be a primary determinant in the choice of a release mortality rate. The majority of halibut are caught on circle hooks baited with herring, octopus, squid, cod, or salmon heads. Circle hooks are used widely in the charter fishery because they require little or no special skill on the part of the angler to hook a halibut. Several studies showed that mortality is highly dependent on the hooking location, and deeply hooked fish have much higher mortality rates (e.g., Aguilar 2003, Cooke and Suski 2004, Diodati and Richards 1996, Lukacovic and Uphoff 2002, Malchoff et al. 2002). Circle hooks are less likely to become lodged deep in the fish than J hooks. Most fish caught on circle hooks are hooked in the lip and suffer minor injuries with little bleeding (Aalbers et al. 2004, Aguilar 2003, Bacheler and Buckel 2004, Cooke and Suski 2004, Prince et al. 2002, Skomal et al. 2002, Zimmerman and Bochenek 2002). Circle hooks will, however, occasionally penetrate the eye of small halibut.

Even though circle hooks are the primary gear used, a variety of other hook types are used. Some charter operators set clients up with J hooks when targeting halibut, especially if the clients are more experienced or prefer to actively set the hook. Halibut are also caught to a lesser degree on leadhead jigs, or solid-body jigs (e.g. Diamond Jig®) with single J hooks or treble hooks. In addition, halibut are caught by anglers mooching for salmon with baited J hooks or trolling for salmon using baited J hooks or treble hooks or artificial lures with salmon-type J hooks. Because they are actively fished, rather than soaked like bait, jigs tend to lip-hook fish. Jigs sometimes penetrate blood vessels in the mouth or eyes of small halibut, and may also penetrate the gut cavity when hooked in the body of the fish.

### APPROACH

A hooking mortality rate was derived by integrating (1) mortality rates by hook type based on the literature, (2) assumed values for the proportional use of hook types by target category, and (3) ADF&G logbook data on numbers of halibut released by target category in 2006. Charter operators were required to record effort for each trip as bottomfish (*Bott*), salmon (*Salmon*), or both (*Bott+Salmon*). The hook types were categorized simply as circle hooks (*C*) and “other” (*O*). Logbook trips with no effort information recorded made up less than 1% of the released fish and were excluded from analysis. The overall mortality rate was calculated as a weighted mean of the mortality rate for each target category *t*:

$$M_{Overall} = \sum_t r_t M_t,$$

where  $r_t$  = the proportion of halibut released by target category ( $\sum r_t = 1$ ), and  
 $M_t$  = the mortality rate by target category.

The mortality rate for each target category was calculated as

$$M_t = (C_t M_C) + (O_t M_O),$$

where  $C_t$  = the assumed proportion of halibut released by circle hooks in each target category,  
 $M_C$  = the assumed mortality rate for circle hooks,  
 $O_t$  = the assumed proportion of halibut released by other hooks in each target category, and  
 $M_O$  = the assumed mortality rate for other hook types.

For the *Bott+Salmon* category, the proportions of halibut released from each hook type were calculated as weighted estimates assuming the same distribution of effort as for bottomfish and salmon alone. For example, the proportion of halibut released from circle hooks was calculated as

$$C_{Bott+Salmon} = (p_{Bott} C_{Bott}) + (p_{Salmon} C_{Salmon}), \text{ where}$$

$$p_{Bott} = n_{Bott} / (n_{Bott} + n_{Salmon}) \quad \text{and} \quad p_{Salmon} = n_{Salmon} / (n_{Bott} + n_{Salmon}).$$

## Assumed Values

The IPHC currently assumes an overall discard mortality rate of 16% for sublegal-size (under 32 inches) halibut released in the halibut longline fishery (Gilroy 2007). This rate was arrived at by assigning levels of injury to fish caught on longline gear and comparing their tag return rates relative to that of fish in excellent condition (Kaimmer and Trumble 1998 and Trumble et al. 2002). The IPHC assumes a mortality rate of 3.5% for halibut released in excellent condition, based on Peltonen (1969).

The 16% rate assumed for the commercial fishery is probably too high for the recreational fishery for the following reasons. Halibut released in the charter fishery are on the line for a matter of minutes or, in the case of large fish, tens of minutes. By comparison, longline-caught fish may be on the line for up to 10-12 hours. Sport-caught fish would be expected to have less lactic acid buildup, less exposure to sand fleas, and be better able to maintain position in strong currents and avoid predators following release. Hook strippers are not used in the charter fishery. Most fish are released outboard of the boat by the captain or crew, usually by twisting them off using a gaff. A mortality rate of 3.5% was chosen for halibut caught on circle hooks in the charter fishery. Since this rate was estimated in a study of halibut caught on J hooks using longline gear, it may be too high. It is, however, conservative in that it accommodates the fact that not all fish caught on circle hooks in the sport fishery are carefully released or in excellent condition. Small halibut in particular are more prone to circle hook injuries in the eyes.

A number of hooking mortality studies for other marine species was reviewed. These studies evaluated a variety of hook types, including J hooks and circle hooks with bait, and artificial lures with single or treble hooks. Studies evaluating J hooks and circle-hooks consistently found higher mortality rates for J hooks. Estimates for “other” hook types (other than circle hooks) were highly variable, ranging from 1.7% to 28%, but most were below 10% (Table 1). A mortality rate of 10% was adopted for “other” hook

types. Assumption of a lower rate may be justified, but the lack of information specific to this fishery justifies use of a conservative rate.

The proportion of halibut released from each hook type has not been documented for the Area 2C charter fishery. ADF&G staff contacted charter operators in Sitka, Ketchikan, Craig, Petersburg, and Juneau, and estimated that at least 90% of halibut released while bottomfishing were caught using circle hooks (R. Chadwick, M. Wood, D. Fleming, and S. Millard, pers. comm.). A Sitka charter operator estimated circle hook use at 95% in that fishery (R. Suarez, pers. comm.). Two charter operators estimated 80-90% of halibut were caught on circle hooks in the Craig area, even though one of them uses J hooks more often (M. Wood, pers. comm.). Therefore, for anglers targeting bottomfish, 90% of released halibut were assumed to have been caught on circle hooks, with the remaining 10% assigned to all other hook types. For trips with only salmon effort recorded, 100% of released halibut were assumed to have been caught on other hook types. For trips with effort in both target categories, these percentages were applied and weighted by the relative numbers of fish released in the bottomfish or salmon target categories to arrive at overall hook use rates of 79% for circle hooks and 21% for other hooks.

### **Overall Mortality Rate Estimate**

Integrating the release proportions, informed estimates of hook use, and assumed mortality rates results in an overall estimate of hooking mortality of 4.8% for the Area 2C charter fleet in 2006 (Table 2). This is similar to the range of 5-7% release mortality rate assumed for species not subject to barotrauma in the Oregon sport fishery (D. Bodenmiller, Oregon Dept. Fish and Wildl., pers. comm.).

Because the majority of released halibut were caught on bottomfish trips, the overall mortality rate is sensitive to the choice of the proportion of halibut released on circle hooks. The overall mortality rate is also more sensitive to these assumed proportions than to the assumed mortality rate for each hook type. For example, for every 1% relative increase in the assumed proportion of halibut caught on circle hooks when targeting bottomfish, the overall mortality rate decreases relatively by 1.063% (Table 3). The same degree of change occurs up or down, but in opposite directions. For example, a 10% relative decrease in the proportion of halibut released on circle hooks, from 90% to 81%, would result in a 10.63% relative increase in the mortality rate, for an overall mortality rate of 5.36% ( $= 4.847 \times 1.1063$ ). By comparison, relative changes in the assumed discard mortality rates for each hook type have a smaller effect on the overall rate, and in the same direction. For example, Table 3 shows that for every 1% relative change in the circle hook mortality rate, the overall mortality rate changes 0.572%.

The overall mortality rate was rounded to 5% and suggested as an interim option for analysis of management alternatives for Area 2C pending additional examination of the data. Logbook and creel survey data are being compared for consistency in the estimated proportion of halibut released in each target category. The department is also working on a more comprehensive estimation of recreational fishery release mortality for the charter and non-charter sectors in Areas 2C and 3A. The additional work may result in revisions to the 4.8% rate provided here, and mortality rates may vary by year and regulatory area due to differences in the proportions of released fish in each target category.

**Table 1. Studies looking at mortality using a variety of hook types.**

Species	Mortality Rate (%)			Reference
	Circle Hook	J Hook	Mixed Hook Types	
Pacific halibut		2-5		Peltonen 1969
Striped bass			5.06	Lukacovic 1999
Striped bass	0.8	9.1		Lukacovic 2000
Striped bass	1.9	8.7		Lukacovic 2001
Striped bass	0.8	7.4		Lukacovic 2002
Striped bass	3	15.5		Caruso 2000
Striped bass		9		Diodati and Richards 1996
Bluefin tuna	4	28		Skomal et al. 2002
Red drum	0	8.5-9.1		Aguilar 2003
Red drum			2.7	Thomas et al. 1997
Spotted seatrout			17.5	Thomas et al. 1997
White seabass			10	Aalbers et al. 2004
Snook			2.13	Taylor et al. 2001
Tautog			1.7	Lucy and Arendt 2002
Tautog			2.7	Simpson 1999
Black sea bass			4.7	Bugley and Shepherd 1991
Summer flounder			9.5	Malchoff et al. 2002
Lingcod			4.3	Albin and Karpov 1998
Yellow stripey			1.76	Diggles and Ernst 1997

**Table 2. Computation of overall release mortality rate for the Area 2C charter fishery, 2006.**

Target Category	No. Halibut Released	Proportion ( $r_t$ )	Proportion of Halibut Released on Circle Hooks ( $C_t$ )	Mortality Rate for Circle Hooks ( $M_c$ )	Proportion of Halibut Released on Other Hooks ( $O_t$ )	Mortality Rate for Other Hooks ( $O_c$ )	Mortality Rate ( $M_t$ )
Bottomfish	21,729	0.420	0.90	0.035	0.10	0.10	0.042
Salmon	2,939	0.057	0.00	0.035	1.00	0.10	0.100
Bott+Salmon	27,039	0.523	0.79	0.035	0.21	0.10	0.048
Total	51,707					Overall:	<b>0.048</b>

**Table 3. Sensitivity of the estimated overall release mortality rate to alternate assumptions regarding hook use and mortality rate for each hook type.**

Estimate	Overall Mortality Rate	Relative Change in Mortality Rate
Base <sup>a</sup>	4.847%	
Base with $C_t = 90.9\%$ (1% higher)	4.795%	-1.063%
Base with $M_c = 3.54\%$ (1% higher)	4.875%	+0.572%
Base with $O_c = 10.1\%$ (1% higher)	4.868%	+0.428%

<sup>a</sup> – The base case is the preferred estimate from Table 2.

## References

- Aalbers, S. A., G. M. Stutzer, and M. A. Drawbridge. 2004. The effects of catch-and-release angling on the growth and survival of juvenile white seabass captured on offset circle hooks and J-type hooks. *N. Amer. J. Fish. Mgmt.* 24:793-800.
- Aguilar, R. 2003. Short-term hooking mortality and movement of adult red drum (*Sciaenops ocellatus*) in the Neuse River, North Carolina. North Carolina State University, M.S. thesis.
- Albin, D. and K. A. Karpov. 1998. Mortality of lingcod, *Ophiodon elongatus*, related to capture by hook and line. *Marine Fisheries Review* 60(3): 29-34.
- Bachler, N. M and J. A. Buckel. 2004. Does hook type influence the catch rate, size, and injury of grouper in a North Carolina commercial fishery? *Fisheies research* 69:303-311.
- Bartholomew, A. and J. A. Bohnsack. 2005. A review of catch-and-release angling mortality with implications for no-take reserves. *Reviews in Fish Biology and Fisheries* 15:129-154.
- Bugley, K. and G. Shepherd. 1991. Effect of catch-and-release angling on the survival of black sea bass. *N. Amer. J. Fish. Mgmt.* 11:468-471.
- Caruso, P.G. 2000. A comparison of catch and release mortality and wounding for striped bass (*Morone saxatilis*), captured with two baited hook types. Completion Report for Job 12, Sportfisheries Research Project (F-57-R), Commonwealth of Massachusetts Division of Marine Fisheries. 16pp.
- Cooke, S. J. and C. D. Suski. 2004. Are circle hooks an effective tool for conserving marine and freshwater recreational catch-and-release fisheries? *Aquatic Conserv: Mar. Freshw. Ecosyst.* 14:299-326.
- Diggles, B. K. and I. Ernst. 1997. Hooking mortality of two species of shallow-water reef fish caught by recreational angling methods. *Marine & Freshwater Research* 48:479-483.
- Diodati, P. J. and R. Anne Richards 1996. Mortality of striped bass hooked and released in salt water. *Trans. Amer. Fish. Soc.* 125:300-307
- Gilroy, H. L. 2007. Wastage in the 2006 Pacific halibut fishery. *Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2006*: pages 55-58.
- Kaimmer, S. M. and R. J. Trumble. 1998. Injury, condition, and mortality of Pacific halibut following careful release by Pacific cod and sablefish longline fisheries. *Fisheries Research* 38:131-144.
- Lucy, J. A. and M. D. Arendt. 2002. Short-term hook release mortality in Chesapeake Bay's recreational tautog fishery. Pages 114-117 in J. A. Lucy and A. L. Studholme, editors. *Catch and release in marine recreational fisheries*. American Fisheries Society, Symposium 30, Bethesda.
- Lukacovic, R. 1999. Mortality rate of striped bass caught and released with artificial lures during spring on the Susquehanna Flats. *Fisheries Technical Memo No. 16*, Maryland Dept. Nat. Res., Fisheries Service, Annapolis.
- Lukacovic, R. 2000. Hooking mortality of deep and shallow hooked striped bass under different environmental conditions in Chesapeake Bay. In: Weinrich, D.R., P.G. Piavis, B.H. Pyle, A.A. Jarzynski, J.C. Walstrum, R.A. Sadzinski, E.J. Webb, H.W. Rickabaugh, E. Zlokovitz, J.P. Mower, R. Lukacovic, and K.A. Whiteford. *Stock assessment of selected resident and migratory recreational finfish species within Maryland's Chesapeake Bay*. Federal Aid Project F-54-R. Annual Report, Department of the Interior, Fish and Wildlife Service.
- Lukacovic, R. 2001. An evaluation of deep hooking rates and relative hooking efficiency of several styles of circular configured hooks. In: Weinrich, D.R., P.G. Piavis, B.H. Pyle, A.A. Jarzynski, J.C. Walstrum, R.A. Sadzinski, E.J. Webb, H.W. Rickabaugh, E. Zlokovitz, J.P. Mower, R. Lukacovic, and K.A. Whiteford. *Stock assessment of selected resident and migratory recreational finfish species within Maryland's Chesapeake Bay*. Federal Aid Project F-54-R. Annual Report, Department of the Interior, Fish and Wildlife Service.
- Lukacovic, R. 2002. Hooking efficiency of circle hooks compared to J-style bait hooks. In: Weinrich, D.R., P.G. Piavis, B.H. Pyle, A.A. Jarzynski, R.A. Sadzinski, E.J. Webb, H.W. Rickabaugh, M. Topolski, J.P. Mower, R. Lukacovic, and K.A. Whiteford. *Stock Assessment of selected resident and migratory recreational finfish species within Maryland's Chesapeake Bay*. Federal Aid Project F-54-R. Annual Report, Department of the Interior, Fish and Wildlife Service.
- Lukacovic, R. and J. H. Uphoff. 2002. Hook location, fish size, and season as factors influencing catch-and-release mortality of striped bass caught with bait in Chesapeake Bay. Pages 97-100 in J. A. Lucy and A. L. Studholme, editors. *Catch and release in marine recreational fisheries*. American Fisheries Society, Symposium 30, Bethesda.
- Malchoff, M. H., J. Gearhart, J. Lucy, and P. J. Sullivan. 2002. The influence of hook type, hook wound location, and other variables associated with post catch-and-release mortality in the U.S. summer flounder recreational fishery. Pages 101-

- 105 in J. A. Lucy and A. L. Studholme, editors. Catch and release in marine recreational fisheries. American Fisheries Society, Symposium 30, Bethesda.
- Muoneke, M. I. and W. M. Childress. 1994. Hooking mortality: a review for recreational fisheries. *Reviews in Fisheries Science* 2:123-156.
- Peltonen, G. J. 1969. Viability of tagged Pacific halibut. International Pacific Halibut Commission Report No. 52.
- Prince, E. D., M. Ortiz, and A. Venizelos. 2002. A comparison of circle hook and “J” hook performance in recreational catch-and-release fisheries for billfish. Pages 66-79 in J. A. Lucy and A. L. Studholme, editors. Catch and release in marine recreational fisheries. American Fisheries Society, Symposium 30, Bethesda.
- Simpson, D. 1999. A study of gear induced mortality in marine finfish. Job 4. Pages 121-125 in A study of marine recreational fisheries in Connecticut. Annual Report. Connecticut Department of Environmental Protection, Fed. Aid to Sportfish Restoration Project F54R, Old Lyme, CT. Cited in Lucy and Arendt 2002.
- Skomal, G. B., B. C. Chase, E. D. Prince. 2002. A comparison of circle hook and straight hook performance in recreational fisheries for juvenile Atlantic bluefin tuna. Pages 57-65 in J. A. Lucy and A. L. Studholme, editors. Catch and release in marine recreational fisheries. American Fisheries Society, Symposium 30, Bethesda.
- Taylor, R. G., J. A. Whittington, and D. E. Haymans. 2001. Catch-and-release mortality rates of common snook in Florida. *N. Amer. J. Fish. Mgmt.* 21:70-75.
- Thomas, R. G., C. Boudreaux, J. Lightner, E. Lear, and V. Hebert. 1997. Hook-release mortality of red drum *Sciaenops ocellatus* and spotted seatrout *Cynoscion nebulosus* from common angling methods. Abstrat from 1997 AFS Southern Division Meeting (<http://www.sdafs.org/meetings/97sdafs/sciaenid/thomas1.htm>).
- Trumble, R. J., S. M. Kaimmer, and G. H. Williams. 2002. A review of the methods used to estimate, reduce, and manage bycatch mortality of Pacific halibut in the commercial longline groundfish fisheries of the Northeast Pacific. Pages 88-96 in J. A. Lucy and A. L. Studholme, editors. Catch and release in marine recreational fisheries. American Fisheries Society, Symposium 30, Bethesda.
- S. R. Zimmerman and E. A. Bochenek. 2002. Evaluation of the effectiveness of circle hooks in New Jersey’s recreational summer flounder fishery. Pages 106-109 in J. A. Lucy and A. L. Studholme, editors. Catch and release in marine recreational fisheries. American Fisheries Society, Symposium 30, Bethesda.

### APPENDIX III. IPHC Set Line Survey Biomass Frequencies

Fork Length (In)	Average Net Weight (lbs)	Surveyed Population At Length or Below (%)	Surveyed Biomass At Length or Below (%)
20	2.5	0.2%	0.0%
22	3.4	1.5%	0.3%
24	4.4	6.7%	1.6%
26	5.7	16.2%	4.7%
28	7.2	28.8%	10.0%
30	9.0	42.4%	17.1%
32	11.0	54.1%	24.5%
34	13.3	63.8%	31.9%
36	16.0	71.2%	38.7%
38	18.9	76.8%	44.9%
40	22.3	81.0%	50.2%
42	26.0	84.2%	55.1%
44	30.2	87.2%	60.3%
46	34.8	89.9%	65.7%
48	39.8	92.2%	71.1%
50	45.3	94.1%	76.0%
52	51.4	95.6%	80.5%
54	58.0	96.9%	84.9%
56	65.1	97.9%	88.7%
58	72.8	98.5%	91.0%
60	81.2	98.9%	93.0%
62	90.1	99.2%	94.7%
64	99.8	99.5%	96.2%
66	110.1	99.6%	96.9%
68	121.1	99.8%	98.1%
70	132.9	99.9%	98.6%
72	145.5	100.0%	99.5%
74	158.8	100.0%	99.5%
76	173.0	100.0%	99.7%
78	188.0	100.0%	99.8%
80	203.9	100.0%	99.8%
81	220.7	100.0%	99.8%
83	238.5	100.0%	99.8%
85	257.2	100.0%	100.0%