

**DRAFT FOR NOAA FISHERIES SERVICE REVIEW**

**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**

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**Abstract:** This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) examines a change to the management of Pacific halibut guided sport (charter) fisheries in International Pacific Halibut Commission Regulatory Areas 2C in the Gulf of Alaska. The preferred alternative is a season-long two halibut daily bag limit, with a maximum size limit of 32 inches for one of the two halibut.

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## ABBREVIATIONS

ADF&G	Alaska Department of Fish and Game
BOF	Alaska Board of Fisheries
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
M	Million
Council	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

In January 2007, the International Pacific Halibut Commission (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 31, 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 currently under consideration by the Council 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 a level comparable to the IPHC's action while minimizing the economic impacts on the charter sector.

The analysis employs the best information available to inform the two basic questions posed above. The goal of any restrictive measures would be to reduce sport fishing mortality of halibut in the charter fishery sector in Area 2C to a level comparable to the level that would be achieved by the IPHC recommended regulations, but in a manner that produces smaller adverse impacts on the charter fishery, its sport fishing clients, the coastal communities that serve as home ports for this fishery, and on fisheries for other species. This analysis assesses the potential biological, social, and economic impacts of restricting charter harvest in Area 2C to a level comparable to that which would be achieved by the IPHC's January 2007 recommended regulation. Based on ADF&G logbook information, the IPHC's action was expected to reduce charter halibut harvest by about 397,000 to 432,000 pounds in Area 2C.

With this goal in mind, NMFS developed the following suite of alternatives to reduce harvest for anglers fishing from a charter vessel in regulatory Area 2C:

- Alternative 1: No action. Anglers could continue to harvest two halibut per day, four halibut in possession.
- Alternative 2: Anglers may harvest one halibut of any size, plus one of a total length at least as long as one of the following:
  - Option 1: 45 inches (114 cm)
  - Option 2: 50 inches (127 cm)
  - Option 3: 55 inches (140 cm)
  - Option 4: 60 inches (152 cm)
- Alternative 3: Anglers may harvest two halibut per day that are each at least 32 inches (81 cm) in total length.
- Alternative 4 (**Preferred**): Anglers may harvest two halibut per day, except that one must be of or less in total length than:
  - Option 1: 30 inches (76 cm)
  - Option 2 (**Preferred**): 32 inches (81 cm)
  - Option 2: 35 inches (90 cm)

Alternatives 1, 2, and 3 are similar to those selected by the Council at its December 2006 meeting to be included in a draft EA/RIR/IRFA. Alternative 4 was developed by NMFS based on input from the charter sector. Data elements from the Council analysis were brought into this analysis. However, the problem statement for the Council document 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 goal of this analysis is described in Chapter 1.

### *Environmental analysis*

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 significant 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 a wide range of changes to the guideline harvest level (GHL) policy, limited entry, and the development of a share-based allocation program to individual charter operators. 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 during 2006 and 2007 and in Area 3A during 2007. A delegation of authority to the State to manage halibut is under consideration.



*Regulatory Impact Review*

A regulatory impact review (RIR) was conducted to comply with Executive Order 12866. The four alternatives and their options were comprehensively evaluated with respect to the costs and benefits each engenders.

An important objective of this action is to reduce the Area 2C guided sport halibut harvest by an amount comparable to the reduction that would have been brought about by the IPHC’s January 2007 proposal for a one fish bag limit. Analysis in the RIR indicates that, ignoring the potential impacts on the demand for charter halibut fishing trips, and participation rates, the reduction in the bag limit from two to one fish would have reduced the 2006 guided sport harvest by an estimated 397,000 pounds to 432,000 pounds. This would have been a 19.5 percent to 21.2 percent reduction in the 2006 guided sport harvest. This would not have reduced the guided sport harvest to the guided sport GH of 1.432 million pounds. Other alternatives and options were evaluated with respect to their comparability to this reduction in guided harvest.

The results are shown in the following table:

**Summary of the RIR analysis and description of how the impacts of the four alternatives vary for different groups that may be affected by this action.**

	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>
<b>Description</b>	Two fish bag limit retained without change.	Two fish bag limit retained, but second fish is subject to a minimum size limit. Alternative minimum limits of 45, 50, 55, and 60 inches considered.	Two fish limit with 32 inch minimum size limit on each retained fish.	Two fish bag limit retained, but one fish is subject to a maximum size limit. Maximum limits of 30, 32, and 35 inches are under consideration.
<b>Does this alternative meet the objectives of this action</b>	Does not meet the objectives because it does not restrict further growth in guided sport harvests.	The 45 inch minimum size reduces guided harvests to an extent that is comparable to the IPHC action, but does it with less impact on charter operators. It therefore meets the objectives of this action. Other options reduce harvests more than is necessary, imposing more of a burden on guided operators, and they therefore do not fully meet the objectives of the action	Because of the uncertainty associated with the impact of this action it cannot be said to meet the objectives of the action.	These options reduce guided harvests to an extent comparable to the IPHC’s January proposal, but do so with less impact on the guided charter operations. They thus appear to be fully consistent with the objectives of this action.

<p><b>Charter operators</b></p>	<p>Charter harvests have been increasing and now exceed the GHL. If they continue to increase at the 6.8% rate seen since 1995, the GHL overage might rise to about 2.25 million pounds by 2015.</p> <p>This option has no adverse impacts on charter operators. Note that it is likely that, while aggregate revenues would tend to increase, new entry into this competitive industry would tend to drive long run profits towards zero.</p>	<p>With the 45 inch option, charter operator catch is expected to drop to an extent comparable to levels expected under the IPHC January action. They may also grow more slowly in the future. Other options are expected to produce less of an impact.</p> <p>This option may reduce short run profit levels or create short run losses for operators. As under Alternative 1, in the long run entry or exit by firms in this industry, in response to positive or negative profits should tend to drive profits to zero.</p> <p>Enforcement requirements may create offal discard costs, which may be passed on to clients.</p>	<p>NMFS is unable to determine whether this action will increase or decrease guideline charter halibut mortality for minimum size limits close to 32 inches, such as limits from 32 to 36 inches. Under the circumstances NMFS finds it difficult to project the direction of impacts on different affected groups.</p>	<p>Charter operator catch will drop to an extent comparable to that under Alternative 2. The discussion of Alternative 2 should be largely applicable here. This option may have a smaller adverse impact on guides operating in areas where locally depleted halibut stocks reduce the relative availability of larger halibut.</p> <p>This option may reduce short run profit levels or create short run losses for operators. As under Alternative 1, in the long run entry or exit by firms in this industry, in response to positive or negative profits should tend to drive profits to zero.</p> <p>Enforcement requirements may create offal discard costs, which may be passed on to clients.</p>
<p><b>Charter clients</b></p>	<p>This action would produce no change in current level of consumers' surplus, or in possible changes in that surplus through time. This fishery has been growing in recent years.</p>	<p>Consumers' surplus for this alternative is likely to lie below Alternative 1 levels, since this reduces the guided sport harvest. Clients may bear costs of offal discard.</p>	<p>As noted above, NMFS is unable to determine whether this alternative would reduce or increase guided sport harvests. Because of this uncertainty, NMFS is unable to evaluate the impacts on user groups.</p>	<p>Consumers' surplus for this alternative is likely to lie below Alternative 1 levels, since this reduces the guided sport harvest. Clients may bear costs of offal discard.</p>
<p><b>Commercial fishing operations</b></p>	<p>As guided sport harvest increases, the commercial share of the Total CEY is expected to decrease. If the charter harvest increased at the recent long-term rate of 6.8% a year through 2015, total gross ex-vessel revenue losses to commercial halibut longliners could be about \$8.5 million once the Total CEY had fully adjusted, according to one modeling exercise.</p>	<p>Under all options, expect a reallocation of halibut from guided sport charters to commercial halibut fishermen, as well as a decline in the potential growth rate of the chartered halibut fishery. Increased gross ex-vessel revenues for the commercial fishing industry compared to Alternative 1.</p>		<p>Under all options, expect a reallocation of halibut from guided sport charters to commercial halibut fishermen, as well as a decline in the potential growth rate of the chartered halibut fishery. Increased gross ex-vessel revenues for the commercial fishing industry compared to Alternative 1.</p>

<b>Seafood consumers</b>	As commercial production declines, consumers' surplus from halibut consumption is also expected to decline. If guided charter growth continued at observed long term rates through 2015, the surplus could decline to about \$1.8 million once the Total CEY had fully adjusted, according to one modeling exercise.	Under all options expect consumers' surplus losses under this alternative to be smaller than those under Alternative 1.		Under all options expect consumers' surplus losses under this alternative to be smaller than those under Alternative 1.
<b>Other resource users</b>	Persons associated with guided charters (as crew or suppliers) would tend to benefit, persons associated with commercial halibut fishing (as crew, suppliers, and customers) would tend to lose. In practice there are overlaps between these groups. Both industries are represented in local communities, and impacts would depend on which sector was more important locally.	Persons and communities relatively more involved with commercial halibut fishing would gain relative to Alternative 1, persons associated with charter operations would lose relative to Alternative 1. Enforcement requirements may create offal discard costs for harbors.		Persons and communities relatively more involved with commercial halibut fishing would gain relative to Alternative 1, persons associated with charter operations would lose relative to Alternative 1. Enforcement requirements may create offal discard costs for harbors.
<b>Enforcement and recordkeeping requirements</b>	This alternative does not require changes in enforcement or recordkeeping requirements.	This alternative does not require changes in enforcement or recordkeeping requirements. It does require guided charter operators to measure larger fish to ensure they meet the minimum size limits. Some operators have indicated that this may be a difficult for them. Requires operators to retain carcasses at point of landing. Potential for increase in offal discard costs.		This alternative does not require changes in enforcement or recordkeeping requirements. Under this alternative fishermen will be measuring smaller fish than under Alternative 2. This should be less difficult. Requires operators to retain carcasses at point of landing. Potential for increase in offal discard costs.

An initial regulatory flexibility analysis (IRFA) was prepared pursuant to the Regulatory Flexibility Act. The purpose of an IRFA is to examine the potential adverse impacts of an action on directly regulated small entities. This action directly regulates guided charter operations in the IPHC Area 2C (Southeast Alaska). There were 381 businesses operating 650 charter vessels active in Area 2C in 2005. All of these are believed to be small entities with annual gross revenues of less than \$6.5 million dollars. One lodge, operating charter boats is a possible exception to this, so the total may be overestimated.

The preferred alternative would retain a two halibut daily bag limit, but would set a 32 inch maximum size limit for one of these halibut. This action is expected to reduce the overall guided charter halibut harvest in Southeast Alaska, and may slow the growth of the guided charter fishery in this management area. These impacts may be caused by a direct reduction in the halibut harvest when a part of the harvest of fish in excess of 32 inches is ended. Additional adverse impacts may be associated with a reduction in overall demand for halibut charter fishing, and a reduction in participation rates.

The table below compares the preferred alternative to the other alternatives, and explains why the preferred alternative was chosen:

### Summary of expected effects of alternatives, Area 2C

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
<b>Alternative</b>	Two fish bag limit retained without change.	Two fish bag limit retained, but second fish is subject to a minimum size limit.	32 inch minimum size limit on retained fish.	Two fish bag limit retained, but one fish subject to a maximum size limit.
<b>Options</b>	No options considered	Alternative minimum limits of 45, 50, 55, and 60 inches for second retained fish	32 inch	30, 32, and 35 inch maximum for second retained fish
<b>Impact on charter operators</b>	Charter share of catch is expected to increase through time. If it continues to increase at the 6.8% rate seen since 1995, harvests might rise to 3.7 million pounds by 2015. This option has no adverse impacts on charter operators. Note that it is likely that, while aggregate revenues would tend to increase, new entry into this competitive industry would tend to drive long run profits towards zero.	<p>With the 45 inch option, charter operator catch will drop by somewhat more than the baseline, although the difference may be small compared to the uncertainties in this analysis. Higher minimum sizes reduce harvests by amounts that are not as comparable with the IPHC January action.</p> <p>This option may reduce short run profit levels or create short run losses for operators. As under Alternative 1, in the long run entry or exit by firms in this industry, in response to positive or negative profits should tend to drive profits to zero.</p> <p>Some charter operators have expressed concerns over difficulty in measuring larger fish. In areas with limited CPUE, or a preponderance of small fish this alternative may approximate a one fish bag limit.</p> <p>Operators may incur increased costs for disposing of halibut carcasses, due to enforcement requirements that carcasses be retained to point of landing. Guides may pass these costs on to clients, depending on</p>	NMFS is unable to determine whether this action will increase or decrease guideline charter halibut harvests for minimum size limits close to 32 inches. Under the circumstances NMFS finds it difficult to project the direction of impacts on different affected groups.	<p>With the 32 inch option, charter operator harvests appear to drop to the range of baseline estimates, and to be comparable with the levels associated with the IPHC January action. The 35 inch option falls just outside the lower end of the baseline, and given the uncertainty associated with this analysis, may also be comparable, although less so than the 32 inch limit. The 30 inch limit is outside the upper end of the baseline range and also appears to be less comparable than the 32 inch option.</p> <p>This option may reduce short run profit levels or create short run losses for operators. As under Alternative 1, in the long run entry or exit by firms in this industry, in response to positive or negative profits should tend to drive profits to zero.</p> <p>Charter operators should have less difficulty measuring the "second" fish than under Alternative 2. There may be fewer adverse impacts on operators in areas with low CPUE, or a preponderance of small fish, than Alternative 2.</p> <p>Operators may incur increased costs for</p>

		market conditions.		disposing of halibut carcasses, due to enforcement requirements that carcasses be retained to point of landing. Guides may pass these costs on to clients, depending on market conditions.
<b>Why chosen or not chosen</b>	This alternative would have no adverse impact on charter operation revenues or business. However, this alternative would not meet the objectives of this action to reduce guided charter harvests to levels comparable to those associated with the IPHC action of January 2007, while minimizing the impact on guided charter operations.	One option was associated with estimated harvest impacts that might be comparable to those of the preferred alternative. However, potential difficulties with measuring halibut for compliance with the rule, and potential adverse impacts on operations where halibut CPUE was low, or a preponderance of small fish are present, appear to be somewhat greater for this alternative than Alternative 4.	This alternative was not chosen because of the difficulty in determining the impact on guided charter discard and harvest. There was too much uncertainty to determine if the action would (1) reduce the harvest to levels comparable to the IPHC January action, or (2) what the impact on guided sport charter operators and related parties would be.	<b>PREFERRED ALTERNATIVE:</b> The 32 inch option is the preferred alternative. It appears to reduce guided charter harvests by levels comparable to the IPHC's January 2007 action, and to do so with lesser adverse impacts than the one fish bag limit, or Alternative 2. Thus, it most effectively achieves the stated objectives for the action, while simultaneously recognizing the potential adverse economic impacts that may accrue to directly regulated small entities, and making all practicable provisions to minimize these.

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## 1.0 INTRODUCTION

In January 2007, the International Pacific Halibut Commission (IPHC) recommended a reduction in the daily halibut (*Hippoglossus stenolepis*) bag limit for halibut in the guided charter fishery in Area 2C from two fish to one fish between June 15 and July 31, 2007.<sup>1</sup> The IPHC's action was a response to increases in harvests from the guided charter sector over the last 10 years. The IPHC had traditionally decreased the commercial harvest to account for other removals, including the guided charter harvest, resulting in a defacto reallocation of the halibut resource away from the directed commercial IFQ fishery.

In March 2007, the Secretary of State in consultation with the Secretary of Commerce rejected the IPHC's recommendation. The Secretaries noted that the State of Alaska had indicated that it would exercise its regulatory authority to prohibit the retention of halibut by Area 2C guided charter skippers and crew, and that the Secretary of Commerce had begun to develop regulations to reduce halibut mortality to levels comparable to those that would have been achieved if the proposed IPHC recommendation had been adopted in 2007.

This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) provides an analysis of alternatives for implementing the regulations alluded to in the Secretary of State's letter. The National Environmental Policy Act (NEPA), Executive Order 12866, and the Regulatory Flexibility Act require 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 1.1.
- Chapter 2.0 describes the alternatives considered for analysis.
- Chapter 3.0 describes the affected environment.
- Chapter 4.0 discusses the approach taken to evaluate the biological and environmental impacts of the alternatives as required by NEPA, as well as impacts on endangered species and marine mammals.
- Chapters 5.0 and 6.0 provide the NEPA analysis.
- Chapter 7.0, the regulatory impact review (RIR), describes potential economic impacts from the alternatives.
- Chapter 8.0, presents the initial regulatory flexibility analysis (IRFA), which evaluates the impacts on directly regulated small entities.

This analysis assesses the potential biological, social, and economic impacts of restricting charter harvest in Area 2C (Figure 1) to a level comparable to the level that would be achieved by the IPHC's January 2007 recommended regulations, but in a manner that produces smaller adverse economic impacts on the charter fishery, its sport fishing clients, the coastal communities that serve as home ports for this fishery, and fisheries for other species. The IPHC's action was expected to reduce charter halibut harvest by about 397,000 to 432,000 pounds in Area 2C (this range is estimated in Section 7.4 of the RIR)

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<sup>1</sup> The IPHC also made recommendations with respect to Area 3A. These are not discussed here, as the focus of this analysis is Area 2C.

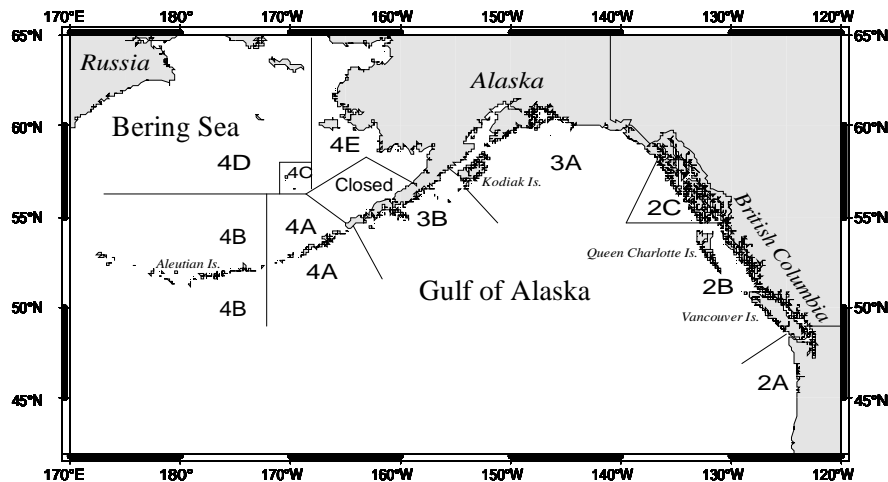


Figure 1 IPHC regulatory areas in the northern Pacific Ocean and Bering Sea.

## 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 pounds) 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 guided recreational fishery, and a small increase in subsistence harvest, it is believed that other removals have remained stable. However, the increase in growth for the guided recreational fishery has resulted in an increase in harvest. As the guided recreational fishery removals increase, its harvests reduce the pounds 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 guided recreational 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 guided recreational 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 guided recreational 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 guided recreational 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 guided recreational 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 guided recreational halibut fishery in IPHC Areas 2C and 3A. The GHLs equal 1,432,000 lb (649.5 mt) net weight in Area 2C, and 3,650,000 lb (1,655.6 mt) net weight in Area 3A. In 2004, both areas exceeded their respective GHLs and charter harvest has continued to grow beyond the GHLs since that year. Preliminary harvest estimates for the 2006 charter fishing season indicate the GHLs were exceeded by 47 percent (680,000 pounds) in Area 2C and 9 percent (300,000 pounds) in Area 3A. Area 3A may have been exceeded by the GHL an additional 469,00 lb

taken by skipper and crew, but the assignment of skipper and crew fish to the charter sector both historically and in the original GHL calculations is not clear. No

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 guided sport 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 pounds and only respond to a decline in stock abundance. Regulations at 50 CFR 300.65 define GHL 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 GHL would be reduced to 1,217,200 lb. If the total CEY declined by 25 to 34 percent, then the GHL would be reduced to 1,095,480 lb. If the total CEY continued to decline by at least 10 percent, the GHL would be reduced by an additional 10 percent until it reached a baseline level of 708,000 lb. The GHL would be increased by commensurate incremental percentage points to its initial level of 125 percent of the average 1995-1999 guided recreational harvest estimates.

The GHL 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 GHL. The GHLs have never been reduced; however, charter halibut harvest in Area 2C has continued to grow, exceeding the GHL for the first time in 2004 (Table1).

**Table 1. 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 pounds are net weight (headed and gutted)**

Year	Guided (million pounds)	Guided as a percent of GHL	Unguided (million pounds)	Total <sup>d</sup> (million pounds)
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 GHL 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 M lb.

<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.

### *2007 IPHC bag limit*

In 2007, IPHC staff determined that the total CEYs for Regulatory Areas 2B, 2C, and 3A were exceeded in 2006. Staff also indicated that a continued increase in sport harvest in Alaska (Areas 2C and 3A) was likely for 2007 and recommended taking action to restrict the sport harvest in these areas to achieve the IPHC's conservation mandate. In a letter dated December 14, 2006, the Council requested that, if the IPHC took action to reduce the charter halibut harvest for 2007, it consider a suite of alternatives with the potential to reduce the charter harvest while doing the least damage to the charter fishery, and that the regulation sunset upon the effective date of any corresponding halibut charter regulations adopted by the Council or ADF&G. In the letter, the Council also identified the following suite of alternatives for the charter recreational sector in Area 2C that it will be considering for action in 2008:

1. One trip per vessel per day;
2. No retention of halibut catch by skipper and crew;
3. Annual catch limit for June, July, August, or entire season;
4. Trophy size limit for second fish of either 45, 50, 55, or 60 inches;
5. Season closure date of August 15<sup>th</sup>, August 30<sup>th</sup>, or September 15<sup>th</sup>;
6. Day of the week closure (pick a specific day);
7. Minimum size limit of 32 inches

In making its determination for a one fish bag limit, IPHC staff provided a short justification, citing concerns about the potential for increased release mortality associated with a minimum size requirement as anglers "cycle" through fish trying to increase the poundage of fish caught. Staff also indicated that the trophy limit may increase the overall poundage of fish caught in the fishery because more fish may be discarded as anglers attempt to catch a "trophy." Options 1, 5, and 7 were discounted because they were perceived by staff as being disruptive to the current fishery. Option 2 has been implemented by ADF&G, but staff believed it was difficult to make conclusions about this option. Finally, the Council had already discussed Option 3 which had significant financial and operational burdens.

Based on the results from the staff analysis, the IPHC, with the support of its advisory bodies, passed a regulation for a one-fish halibut bag limit for the sport guided charter fishing in Area 2C from June 15 to July 31, 2007 and for Area 3A from June 15 – 30, 2007. These bag limit regulations would be effective until the U.S. Government implemented domestic regulations to achieve halibut mortality reductions consistent with those that would be achieved by the IPHC's recommendation. The IPHC indicated "some reluctance but believes the action to be necessary, given the magnitude by which the charter/guided catches exceeded the GHL limits and the belief that such over harvesting puts at risk the achievement of IPHC management goals for the halibut stock."

In a letter dated March 1, 2007, the United States Secretary of State, with concurrence from the Secretary of Commerce, indicated she did not accept the IPHC's recommendation for the bag limit reduction in Areas 2C and 3A. In rejecting the IPHC's recommendation, the Secretaries considered management measures taken by ADF&G to reduce charter halibut harvest through a prohibition on the retention of fish by guides and crew. In addition, the Secretary of Commerce indicated in a letter to the Secretary of State (February 23, 2007) that regulations reducing charter halibut harvest are more appropriately handled through the development and implementation of regulations by domestic fisheries management agencies. As part of this domestic management, the Secretary of Commerce initiated a process for the development of regulations to reduce halibut mortality to levels comparable to the IPHC's recommendation for Area 2C.

Emergency orders were issued by ADF&G on January 27, 2007 to prohibit a sport fishing guide and sport fishing crew member on a charter vessel in Areas 3A and 2C from retaining fish while clients are onboard

the vessel. The emergency orders (number 2-R-03-02-07 for 3A and 1-R-02-07 for 2C) are effective May 1, 2007, through December 31, 2007. The prohibition of guide and crew harvest in Area 3A is expected to reduce the harvest of halibut by 7.7 percent to 10.6 percent, which is comparable to the GHL overage of 8 percent to 9 percent estimated by ADF&G for 2006. This reduction in charter halibut harvest will likely be sufficient to maintain charter halibut harvest in Area 3A at levels comparable to the GHL. Proposed regulations were not developed for Area 3A because the GHL overage could be addressed by ADF&G's action to prohibit the retention of halibut by charter guides and crew.

Halibut harvest by the guided charter fishery in Area 2C exceeded the GHL by a much larger amount than area 3A (although, by a smaller poundage). The emergency order issued by ADF&G for Area 2C was not expected to reduce charter halibut harvest below the overage of 42 percent estimated for 2006. As a result, the Secretary of Commerce determined it was necessary for NMFS to analyze a suite of alternatives that would achieve a reduction in halibut harvest in Area 2C that was approximate to the IPHC's recommendation while minimizing potential negative economic impacts on the charter vessel fishery.

## **1.2 Purpose and Need**

In January 2007, the IPHC adopted recommended regulations which include a daily one-halibut bag limit for any person sport fishing for halibut from a charter vessel in Area 2C from June 15 through July 31. The IPHC intended to have this restriction on guided sport fishing apply unless the U.S. Government implemented regulations that would have a comparable effect in reducing the fishing mortality expected from the charter vessel sector before June 15, 2007.

The Council also is developing a management program for the charter vessel sector that would maintain that sector's harvest of halibut to the GHL. The GHL policy was adopted by the Council and published by NMFS in 2003. It represents a non-binding amount of halibut that the Council does not want the charter vessel sector to exceed. Since 2004, however, the GHL has been exceeded in Area 2C. The amount by which the GHL was exceeded in this area in 2006 has been estimated by ADF&G at about 680,000 pounds. The IPHC- recommended bag limit reduction, however, would reduce this excess harvest by an estimated 397,000 lb - 432,000 lbs in Area 2C. The Council currently anticipates completing its proposed regulations to restrict the charter vessel harvest of halibut in 2008, including a moratorium on new entry into the charter vessel sector in 2009.

Assuming that Council-developed regulations would be approved and effective beginning in 2008, the immediate problem is whether the sport fishing harvest of halibut in the charter vessel sector in Area 2C should be restricted in 2007, and if so, whether the restriction should be the bag limit reduction recommended by the IPHC or a different restriction that would have an equivalent effect on charter removals. Insufficient time exists to rely on the normal Council process of developing fishery management measures before June 15, 2007. Regulatory action to remedy this problem would require NMFS to develop regulations independent of the Council process but relying primarily on State and Council data and analyses. Presumably, the chosen restriction would be temporary; effective only until Council-developed regulations could be made effective, potentially in 2008 or 2009. Any regulations derived from this action, however, would remain effective until superseded or removed.

The goal of the analysis is to assess the best information available to inform the two basic questions posed above. The goal of any restrictive measures would be to reduce sport fishing mortality of halibut in the charter fishery sector in Area 2C to a level comparable to the level that would be achieved by the IPHC-recommended regulations, yet in a manner that produces smaller adverse impacts on the charter fishery, its sport fishing clients, the coastal communities that serve as home ports for this fishery, and on fisheries for other species.

### **1.3 Action area**

The action considered in the analysis would occur in IPHC regulatory Area 2C. These alternatives are permanent and would be in place for the entire fishing season.

### **1.4 Relationship of this action to Federal law**

While NEPA and the 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

### **1.5 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)

## **2.0 DESCRIPTION OF THE ALTERNATIVES**

Four alternatives for anglers fishing for halibut from a charter vessel are considered:

- Alternative 1: No action. Anglers could continue to harvest two halibut per day, four halibut in possession.
- Alternative 2: Anglers may harvest one halibut of any size, plus one of a total length at least as long as one of the following:
  - Option 1: 45 inches (114 cm)
  - Option 2: 50 inches (127 cm)
  - Option 3: 55 inches (140 cm)
  - Option 4: 60 inches (152 cm)

- Alternative 3: Anglers may harvest two halibut per day that are each at least 32 inches (81 cm) in total length.
- Alternative 4 (**Preferred**): Anglers may harvest two halibut per day, except that one must be of or less in total length than:
  - Option 1: 30 inches (76 cm)
  - Option 2 (**Preferred**): 32 inches (81 cm)
  - Option 2: 35 inches (90 cm)

Alternatives 1, 2, and 3 are similar to those selected by the Council at its December 2006 meeting to be included in a draft EA/RIR/IRFA. Alternative 4 was developed by NMFS based on input from ADF&G and the charter sector.

It is important to note that the Council's problem statement is focused on reducing guided sport halibut harvest in Area 2C to the GHL. The purpose and need for NMFS' current action (described in Section 1.2) is to reduce guided sport harvests to a level comparable to that associated with the IPHC's January recommendation. The IPHC's action sought to reduce the guided sport harvest, but did not take action that would achieve the GHL. Thus, the current action may achieve a different guided sport harvest reduction than the action currently under consideration by the Council.

NMFS has considered an alternative to change the guided sport angler daily halibut bag limit from two fish to one fish. This was the January recommendation of the IPHC. However, this alternative was considered but rejected for further analysis. The estimated impact of this action on harvests has been estimated in Section 7.4 of the RIR. The four alternatives are evaluated using the halibut harvest reduction target as state in the purpose and need (Section 1.2). The impact of this action was also evaluated by IPHC and ADF&G staff during the IPHC's deliberations.

Comments received from charter guides at the Council meeting in December, the IPHC meeting in January, and since the IPHC meeting, have indicated that the change from a two fish to a one fish halibut bag limit in Area 2C from June 15 to July 31 would have an adverse impact on bookings that had already, or were in the process of being, made for the 2007 season. Moreover, in the longer term, the change was seen as having an adverse impact on the demand for guided charter services during that period. Guides felt that the ability to offer a chance to catch more than one halibut was very important for their business. Evidence from analysis of guided halibut fishing in Southcentral Alaska, while not directly transferable to Southeast Alaska, was broadly consistent with the comments obtained from guides (Criddle, et al., 2003). The purpose and need described in Section 1.2 addresses the need to identify alternatives that achieve comparable impacts to the one halibut bag limit, while minimizing adverse impacts on the guided sport industry.

### **3.0 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>.

#### 4.0 POTENTIAL ENVIRONMENTAL IMPACTS

The approach to reducing guided charter halibut harvest in Area 2C is limited in scope and will not likely affect all environmental components within that Area. Table 2 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 2 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	N	N	N	<u>Y</u>	N	N	N	<u>Y</u>	<u>Y</u>
Alt 3	N	N	N	<u>Y</u>	N	N	N	<u>Y</u>	<u>Y</u>
Alt 4	N	N	N	<u>Y</u>	N	N	N	<u>Y</u>	<u>Y</u>

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 guided sport 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 chapter 7.0.

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 for these



components 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.

## **5.0 POTENTIAL IMPACTS ON RESOURCE COMPONENTS**

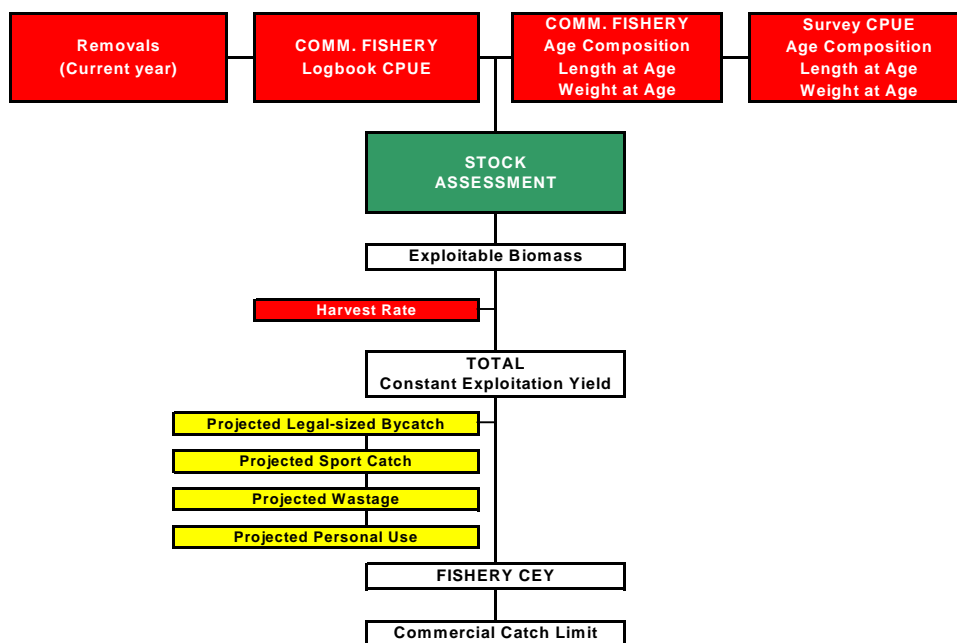
### **5.1 The Pacific halibut stock**

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 fixed 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 guided and unguided sport 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 guided sport 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.

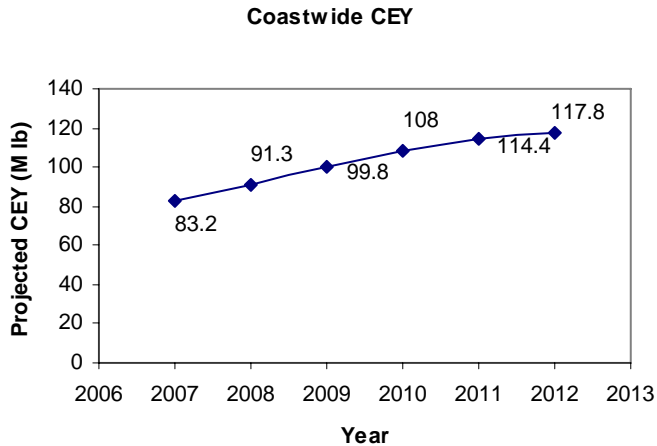
After the harvest deductions are made, the remainder comprises the Fishery CEY. The commercial catch limit is set based on the Fishery CEY. In setting the commercial catch limits, the IPHC considers area-specific harvest policy objectives and also applies its Slow Up/Fast Down<sup>3</sup> policy in setting 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 guided sport harvest affect the commercial catch limits with a lag, and not immediately on a pound for pound basis.



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

In 2006, the IPHC changed the structure of its stock assessment model because of new scientific information that modified previous model assumptions about migration between regulatory areas. Clark and Hare (2007) reported in 2006 that the IPHC made a fundamental change in how the area-specific exploitable biomass benchmarks are determined. 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.

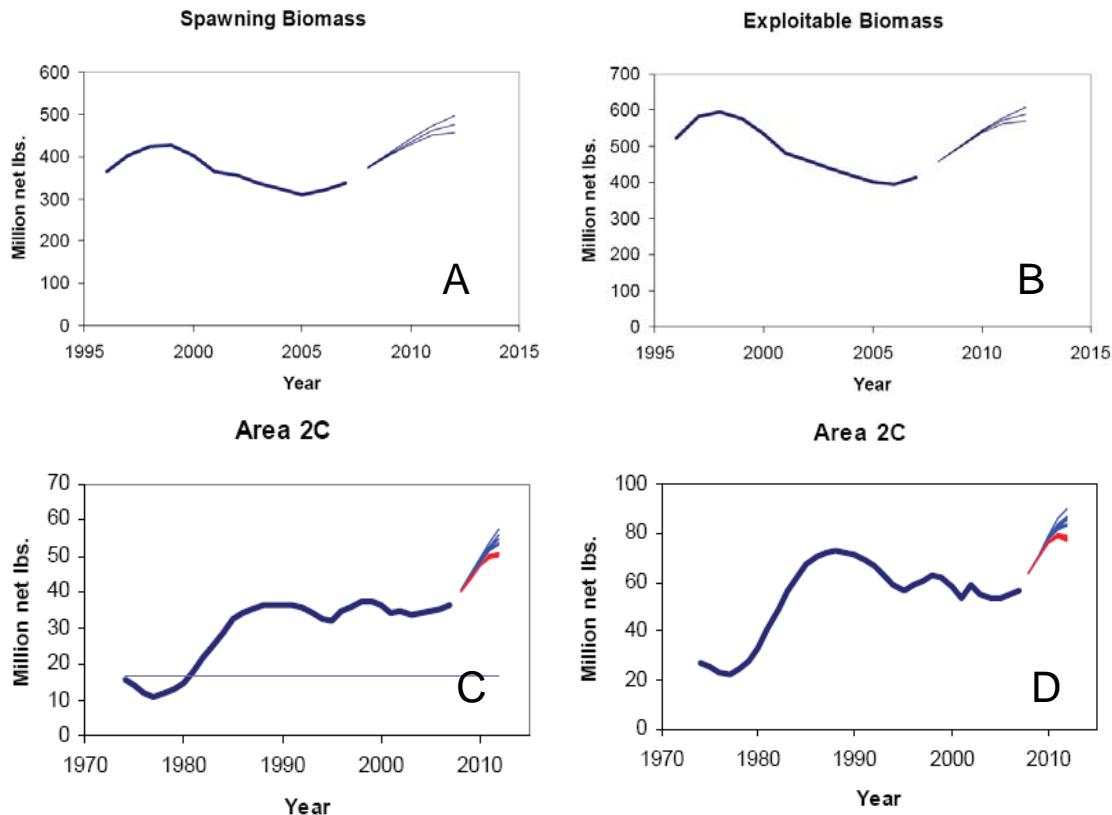


**Figure 3 Coastwide CEY projection through 2012 (IPHC 2007).**

For Area 2C, the coastwide model predicted a harvest limit of 7.81 M lb whereas the closed area model predicted an allowable harvest level of 9.12 M lb. The IPHC recommended a 2007 harvest level of 8.51 M lb and discussed forming a committee 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 (Figure 3, obtained from IPHC 2007). 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:

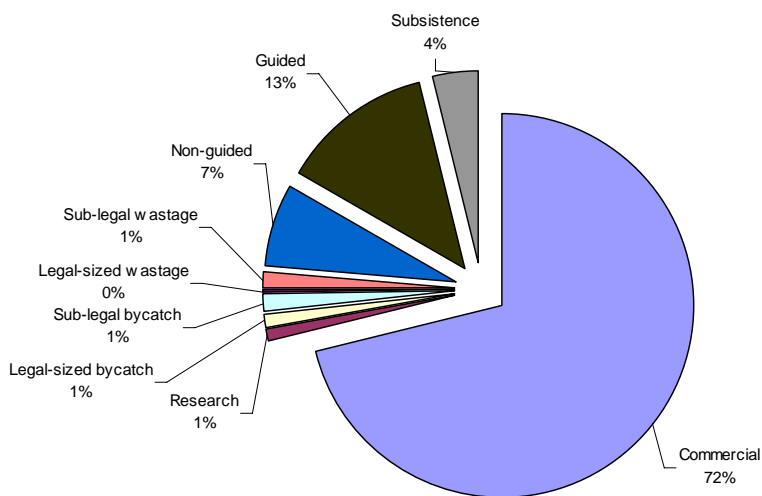
*“At this juncture it is uncertain what future harvest rates will be applied to the different regulatory areas. Further, the closed areas assessments do not portray the same biomass distribution as the coastwide assessment. We do believe, however, that the closed area assessments provide a generally 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 guided sport sector (charter) 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 M lb annually. Bycatch mortality accounts for halibut that die from being caught in other fisheries. The 2006 bycatch mortality estimate of 0.16 M lb 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 M lb. The bycatch categories in Table 3 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 3** Five year summary of removals by category for IPHC Area 2C.

Year	Commercial			Research Fish (m lbs)	Bycatch mortality		Wastage		Non-guided sport Removals (m lbs)	Guided sport Removals (m lbs)	Subsistence Removals (m lbs)
	Quota (m lbs)	Removals (m lbs)	Gross ex-vessel revenues		Legal (m lbs)	Sub-legal (m lbs)	Legal (m lbs)	Sub-legal (m lbs)			
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 pounds 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 M lb, which indicates the halibut resource

is very robust (IPHC 2005). In Area 2C, the fishery CEY has ranged from 8.5 M lb to 10.93 M lb during the last five year.

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 guided sport 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 pound for pound 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 guided sport harvest has increased at a rapid rate, whereas other removals have remained relatively constant. The relationship between the guided sport 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 1,950,00 lb) and account for approximately 13 percent of the average halibut removals during the last five years.

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 listed 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.

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The Every 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 A. 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, Alternatives 2, 3, and 4 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 is likely to have a higher amount of release mortality than the other alternatives because it provides the most restrictive measure in terms of an angler's ability to harvest two fish. Anglers would need to cycle through fish to catch one of 45 inches or greater. The number of fish an angler cycles through may increase in concert with an increasing minimum size requirement. Alternative 3 would likely have a similar harvest level as status quo because of the high availability of halibut above 32 inches and the penchant for some anglers to maximize the poundage harvested for both fish. Alternative 4 would have a similar level of mortality to status quo because anglers would likely continue to maximize the size of one of the fish. 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 currently, or historically, explicitly include sportfishing release mortality when determining the Fishery CEY nor is the incidental mortality in the sportfishery included as part of the GHM 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, the preferred alternative is expected to maintain discard rates that are similar to the historical two-fish bag limit. The IPHC recommendation of a one-fish bag limit may have resulted 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 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.

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, although current gear restrictions may be used to post facto assign a user category to a landing. 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”). 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 M lb (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.

## 5.2 Groundfish

In the guided 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., Alaska Department of Fish and Game Division of Sport Fish). 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 abundances.

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 preferred alternative 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 4). A harvest increase in the sport sector resulting from the alternatives would likely be small given the existing regulatory constraints.

**Table 4 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

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.

### **5.3 Impacts on 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 5 identifies the species listed as endangered and threatened under the ESA.

**Table 5 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).

## 5.4 Impacts on 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 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

<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)).

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.

## 5.5 Impacts on 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.

## 5.6 Impacts on 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.

## **5.7 Impacts on the 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 preferred alternatives, on small entities, in accordance with the provisions of the RFA.

## **6.0 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/RIR/IRFA are designed to limit halibut harvests in the charter fishery. 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 a wide range of changes to the GHM policy, limited entry, and the development of a share-based allocation program to individual charter operators. ADF&G is currently reviewing possible change to State regulations affecting all State guide operations to limit the lines being fished on a charter vessel to the number of paying clients (already in effect in Southeast Alaska) and prohibiting retention of halibut by skippers and crew while charter fishing. The State of Alaska is also considering more sweeping limitations on the charter sector and is exploring opportunities for delegation of authority to the State to manage halibut.

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 will be delayed to a future action. A future Council action may supersede the preferred alternative in this analysis; however the nature of future Council action 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.

## **7.0 REGULATORY IMPACT REVIEW**

### **7.1 Introduction**

In January 2007, the IPHC recommended a daily one-halibut bag limit for any person sport fishing from a guided charter vessel in Area 2C from June 15 through July 31. In March, the Secretary of State, with concurrence from the Secretary of Commerce, rejected the IPHC's recommendation for the bag limit reduction in Area 2C.

In a letter to the Secretary of State on February 23, the Secretary of Commerce indicated that regulations reducing charter halibut harvest were more appropriately handled through the development and implementation of regulations by domestic fisheries management agencies. As part of this domestic management, the Secretary of Commerce has initiated development of alternative regulations to reduce halibut mortality to levels comparable to those that would have resulted from the IPHC's recommendation for Area 2C.

The background to this action is described in more detail in Chapter 1, and below in Section 7.4 of this RIR.

This Regulatory Impact Review (RIR) evaluates the costs and benefits of alternative measures to constrain the guided charter harvests to levels that are comparable to those that would have been brought about by the IPHC's proposed regulations, while minimizing the burden on affected parties. The detailed problem statement for this action is in the Section 1.2, the "Statement of Purpose and Need." This RIR addresses the requirements for economic analysis of agency actions set out in Presidential Executive Order 12866.

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



E.O. 12866 requires that the Office of Management and Budget (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 M 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.

### 7.3 Description of the Fishery

Area 2C halibut are taken in guided and unguided sport fisheries, by targeted commercial halibut fishermen, by subsistence and personal-use fishermen, and as bycatch in groundfish and salmon fisheries. Table 3 in the EA reports estimated removals for each of these user groups by year for the period 2002 to 2006. Figure 6 in the EA shows each user group’s percentage share of removals for the five year period. During this period, the commercial harvest accounted for 72 percent of removals, the guided sport harvest was next in size, accounting for about 13 percent of removals, the non-guided sport fishery was third, accounting for about 7 percent of removals, and subsistence was fourth with 4 percent of removals. These four user groups between them accounted for 96% of halibut removals in Area 2C.

#### *Description of the guided charter halibut fishery*

The number of vessels active in the 2006 charter halibut fishery totaled 696 in Area 2C (Table 9). Each vessel carries a skipper and some carry a mate; therefore, an upper estimate of the number of crew is 1,392. The number of businesses active in the 2005 charter halibut fishery totaled 381 (Table 6). The number of clients in 2006 totaled 92,394 (Table 9).

**Table 6 Number of businesses and vessels that submitted ADF&G Saltwater Charter Vessel Logbooks with bottom fish effort in 1998–2005**

	1998	1999	2000	2001	2002	2003	2004	2005
Area 2C Businesses	370	387	412	386	351	353	365	381
Area 2C Vessels	569	591	634	627	567	590	624	650

Note: Count of distinct CFEC numbers from the ADF&G Active Trips data for each year in which bottom fish effort was indicated for each respective area without regard to actual halibut landing. 2005 vessel count reported as 654 in one source.

Baseline data for this analysis come from the ADF&G’s Logbook program and the Statewide Harvest Survey (SWHS) program. This analysis is somewhat different from recent analyses of GHL management options in that ADF&G’s logbooks directly record halibut catch, harvest, and effort for the first time in a half-decade. This change allows for improved estimation of effects, but also means that earlier estimates for some measures before 2006 are not directly comparable to these 2006 estimates. Estimating the effect of measures on years before 2006 would have required using two estimation methods and time did not allow this approach. In addition, the analysis draws on 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 7 shows the estimated Pacific halibut harvest (number of fish, average net weight, and total net weight) by charter anglers by area and year. 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 Areas 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 an estimated 142.1 percent of the 1.432 million pound GHL, which became effective in 2004.

**Table 7 IPHC Area 2C Charter Halibut Harvest, 1995-2006**

	Charter-Harvested Halibut	Average Net Weight (lbs) per Halibut	Total Charter Halibut Harvest (M lbs net weight)	Rate of Change from Previous Year
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*	101,425	19.7	2.028	3.9%
2006**	107,238	19.0	2.035	4.3%
5-Year Average***	85,271	19.7	1.683	N/A

Note: 2006 harvest numbers, including average weight and total fish harvested are provisional in nature and represent the best available estimates at the time of the analysis. Weights are headed and gutted net weights.  
Source: ADF&G, Statewide Harvest Survey (SWHS) Data 1995-2006; 2006 logbook data. Column with rate of change from previous year added by Northern Economics, Inc. \*2006 data from the SWHS; \*\*2006 data from 2006 logbook data extrapolated from August 15; \*\*\*calculated using 2006 SWHS data.

An improvement attributable to the updated 2006 logbooks is the ability of ADF&G to directly count the annual number of halibut caught annually by anglers while on charter trips. The inclusion of angler license numbers in logbooks makes this direct accounting method possible. Prior documents such as Council (2006) relied on estimates based on SWHS data. The majority of fish (55 percent) are taken by anglers who catch 2, or fewer fish per year (See Table 8).

**Table 8 Charter Harvest Level Estimates per Angler in Area 2C, 1996-2004**

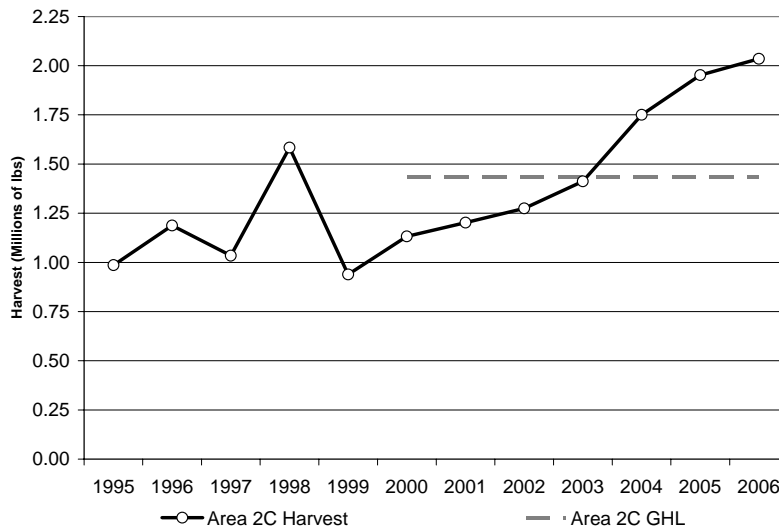
Pacific Halibut Harvested per Angler per Year	Percentage of Harvest due to $n^{th}$ fish in annual take	Percentage of Anglers harvesting $n$ or more fish over the entire year
0		54.86%
1	30.70%	45.14%
2	25.03%	36.80%
3	15.67%	23.03%
4	12.16%	17.88%
5	7.11%	10.46%
6	5.00%	7.35%
7	1.95%	2.87%
8	1.30%	1.92%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

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

## 7.4 Problem Statement

### *Growth of the guided charter fishery*

Guided charter halibut harvests in Area 2C have shown an annualized growth rate of 6.8 percent over the past 11 years. While the harvest of the charter industry rose and fell from year to year between 1995 and 1999, this industry has seen continual upward growth since that time. Annualized growth since 1999 averaged 11.7 percent per year. Figure 6 shows the growth of charter halibut harvests relative to the GHL of 1.432 million pounds. The GHL itself was established at 125% of the 1995-1999 average catch by the guided charter sector.



**Figure 6 Charter Fleet Halibut Harvests Year, net weight**

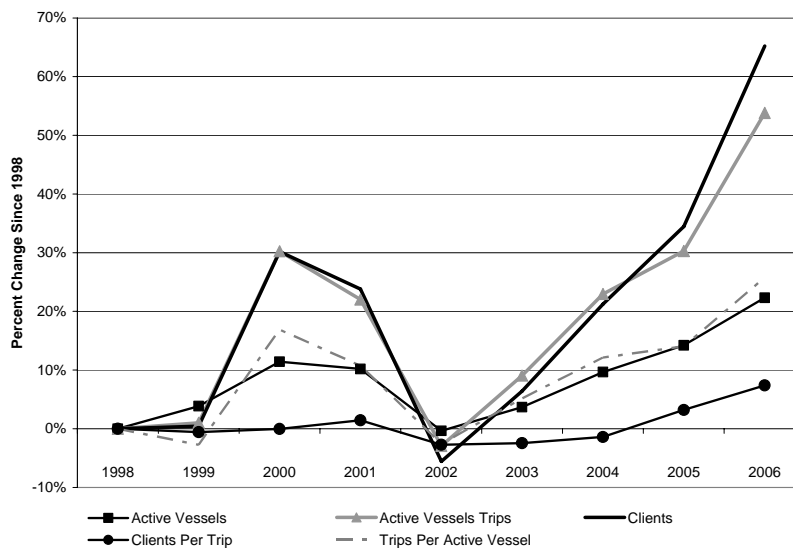
Source: ADF&G, Statewide Harvest Survey Data 1995-2006, 2007.

As shown below in Table 9 and Figure 7, The number of active vessels, the total number of trips by 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.

**Table 9 Effort Measures, 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.

*Adverse impact on commercial fishing operations*

The Area 2C commercial halibut longline fishery operates under the catch limit adopted by IPHC, which is a “hard cap” on total commercial removals from the fishery. As discussed in Section 5.1.1, IPHC estimates the exploitable biomass for Area 2C, and applies a fixed harvest rate (22.5 percent in 2007) to the exploitable biomass, to identify a Total Constant Exploitation Yield (Total CEY) for all user groups. The Fishery CEY is then determined by subtracting uncontrolled removals, such as bycatch, wastage, personal use and subsistence, and guided and unguided sport harvests, from the Total CEY. Wastage removals represent the mortality of legal-sized halibut due to lost or abandoned gear. Bycatch mortality accounts for halibut that die from being caught in other fisheries. The subtractions to the Total CEY are not necessarily made on a pound for pound basis within the year the projections of other removals are made, but increases in other removals will lead to decreases in the Total CEY through time. The Fishery CEY, the fish available to the commercial fishery, therefore depends in part on the size of the guided sport harvest. Guided sport harvests are not limited directly, as the commercial harvests are, but

indirectly through effort control measures, such as the existing two fish bag limit. The harvest limit itself is based on the CEY.

As shown in Figure 6, the guided sport harvest has been the second largest source of halibut removals (after the commercial longline fishery) in recent years in Area 2C. As shown in Figures 8 and 9 and Table 9, it has been growing rapidly. Estimated growth in the guided sport fishery translates, with lags, into reductions in the harvests of the commercial longline fishermen and of their revenues. Commercial halibut fishermen can sell their QS holdings and retain the proceeds from the sale. Since the reallocation will reduce the market value of QS, it will also reduce the effective net *wealth*<sup>5</sup> of QS holders. Where QS holders have used QS as collateral for QS purchase, the value of their loan collateral will be reduced.

As shown in Figure 6 and Table 3, harvests that are deducted from the Total CEY, before it is apportioned to the commercial fishery, by user groups other than those of the guided sport charter clients, are smaller, and they have been growing less rapidly or have been stable. Thus, the concern is centered on the harvests in the guided sport charter fishery.

### *The Regulatory Response*

The evolution of the management response to this issue is reviewed in detail in Chapter 1. In 2000, the Council adopted GHGs for IPHC Areas 2C and 3A to address allocation issues between the guided sport sector and other users of the halibut resource in those areas. The GHG for Area 2C is 1.432 MLbs. These were adopted by the Secretary of Commerce in 2003 effective in 2004. The GHGs were not hard caps. No management measures were adopted to constrain guided sport harvests to stay within the GHGs. The GHGs did provide a guideline with respect to which guided sport harvests could be compared.

In December 2006, the Council reviewed preliminary 2006 guided charter halibut harvest estimates from the ADF&G Sport Fish Division. The data indicated that the GHGs had been substantially exceeded in Area 2C (see Figure 8). In response to the new information, the Council initiated an analysis that included a proposed action to reduce halibut charter harvests to the GHGs.

The Council requested an initial review draft analysis be prepared for the March/April 2007 meeting. If the Council approves that analysis for public review and comment at that time, the Council could take action as early as June 2007 (or, of course, any time thereafter). If the Council took action in June 2007, NMFS would not be able to implement regulatory changes in time to make the measures effective for the 2007 season. Management measures might be in place by the 2008 guided halibut charter season.

In January, 2007, the IPHC adopted management measures to constrain the guided sport harvest in Area 2C. The IPHC voted to change its bag limit for guided sport fishermen from two to one halibut per person, per day for June 15 to July 31. This measure involved an indirect control that was meant to reduce guided sport charter harvests. The potential impact of the IPHC action, if it had been in place in 2006, is estimated in the following section.

In February 2007, the Secretary of State rejected the IPHC recommendation, and the Secretary of Commerce undertook proposed and final rulemaking to adopt an alternative measure. The statement of purpose and need for this measure is provided in Chapter 1 of this analysis. Key elements included a need to adopt measures that would bring a reduction in the IPHC Area 2C guided sport harvest that was comparable to that which would have been achieved by the IPHC, and to do so in a way that would

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<sup>5</sup> “Wealth” implies valuable personal possessions or resources. But, because QS are *access privileges* that are temporary and revocable, they impart no private property right, and strictly speaking, do not constitute private wealth.

produce smaller adverse impacts on the charter fishery, its sport fishing clients, the coastal communities that serve as home ports for this fishery, and on fisheries for other species.

*The impact of the IPHC action*<sup>6</sup>

The problem statement noted that the object of this action was to achieve a harvest reduction comparable to that associated with the IPHC's action in January 2007. Before evaluating the alternatives, it is therefore necessary to estimate the impact the IPHC action might have had on guided sport harvests.

The IPHC recommended modifying the existing two fish bag limit in the charter halibut fishery to a one fish bag limit for the six week period. Figure 8 shows how the estimated distribution of "first" and "second" fish within anglers' bag limits varied over the course of the 2006 fishing season. As shown by the figure, total harvest peaked in July with strong harvests in June and August. This monthly pattern may reflect the presence of cruise ship passengers in Southeast Alaska, and associated demand for halibut charters. 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 64.1 percent.

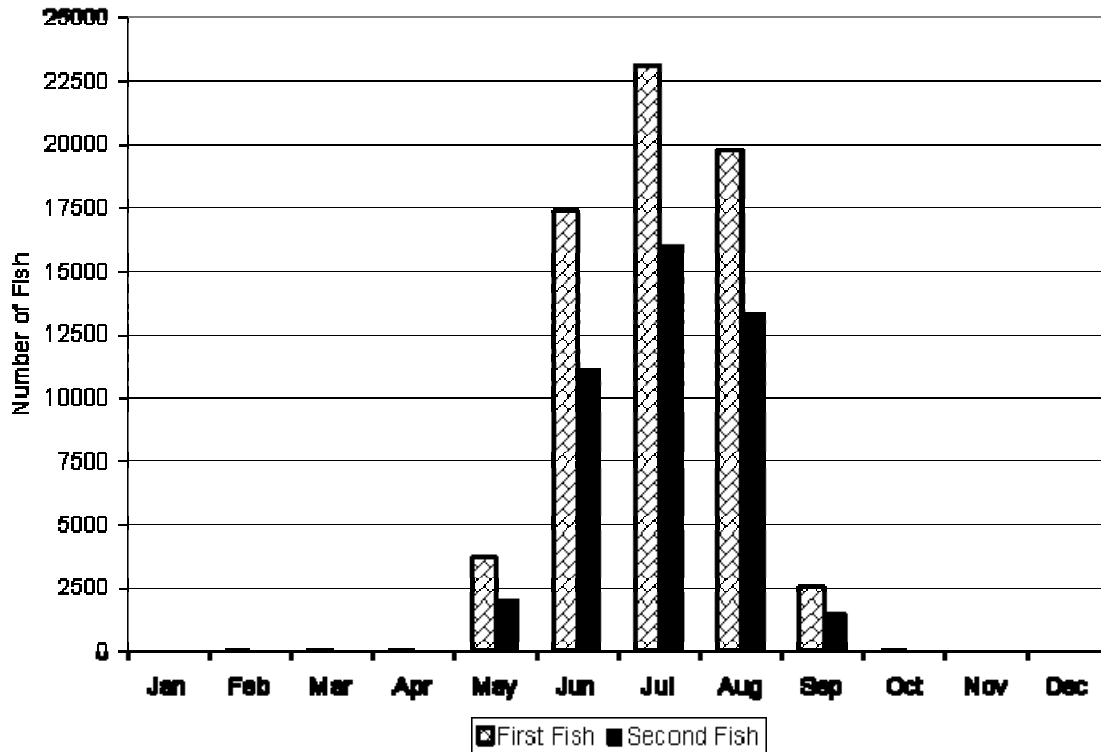
Logbook data indicates that, in 2006, charter anglers harvested an estimated 107,238 halibut between February and October. As noted above, the vast majority of the harvest occurred during the three month period between the beginning of June and the end of August. Most of the remaining harvest is taken in May and September. Overall, the second fish in an anglers' bag limits accounted for 39.8 percent of total harvest in numbers or 0.81Mlbs (see Table 10 "Second" Fish as Portion of Area 2C Charter Angler Harvests, 2006

)<sup>7</sup>. As previously noted, 2006 harvest data is provisional and we expect these numbers to change slightly as ADF&G finalizes their estimates.

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<sup>6</sup> The analysis in this section draws heavily on an analysis carried out by Northern Economics Inc, under contract to the Council, and is used with the Council's permission.

<sup>7</sup> In the absence of information on the relative sizes of "first" and "second" fish, this analysis assumes that both categories have the same average size.



**Figure 8** Distribution of Area 2C Harvest Halibut by Number of Fish, 2006.  
Source: Alaska Department of Fish and Game Logbook Data, 2006.

**Table 10** "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 (headed and gutted)
	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	10.0	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
<b>Total</b>	<b>64,537</b>	<b>42,701</b>	<b>107,238</b>	<b>39.7</b>	<b>0.81</b>

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

The estimated potential reduction in guided sport harvest, associated with the IPHC recommendation to adopt a one fish halibut bag limit, is shown below in Table 11. Reductions were calculated by assuming that all "second fish" during a designated time period would be returned to the water. So, for example, in

June 2006 there were 10,780 second fish. These were about 10.1% of the year's retained harvest of 107,238 fish. Assuming that first and second fish have the same average size, release of the 10,780 fish would have meant that 10.1% of the 2.035 million pounds caught in 2006 were now released. That is 205,500 pounds.

Estimates for the June 15 to July 31 period were prepared in two ways. First it was assumed that the June harvest was equally divided between the first two weeks and the final two weeks of June (the 50/50 assumption). However, it appears from Figure 8, that harvests are rising through the summer to peak sometime in July. If this is so, the harvest may be somewhat larger in the second half of June. Therefore, an alternative set of June estimates were prepared assuming that 33 percent of the halibut were taken in the first half of June, and 67 percent in the second half (the 33/67 assumption).

Depending on the choice of assumptions about the June harvest, the action would have meant an estimated reduction in the 2006 2C guided sport harvest of 397,000 pounds to 432,000 pounds, if it had been in effect during the 2006 season. The resulting guided sport harvest would have been 1.638 million to 1.603 million pounds, or 114.4 percent to 111.9 percent of the 1.432 million pound GHL.

**Table 11 Estimated 2006 impact of the IPHC action**

	"Second fish" caught during the month (number fish)	Percentage reduction in total annual harvest	Reduction in harvest in 2006 (million pounds)	Estimated 2006 guided sport harvest (million pounds)	Remaining harvest as a percent of GHL in 2006
Jun15-Jul31 (50/50)	20,943	19.5%	0.397	1.638	114.4%
June 15-Jul 31 (33/67)	22,776	21.2	0.432	1.603	111.9
<b>For comparison:</b>					
June	10,780	10.1%	0.205	1.830	127.8%
July	15,553	14.5%	0.295	1.740	121.5%
August	12,893	12.0%	0.245	1.790	125.0%
Season	42,701	39.8%	0.810	1.225	85.5%

Note: Total retained harvest is estimated to be 107,238 halibut, average weight is 18.98 pounds, GHL is 1.432 million pounds. Weights are headed and gutted net weights.  
Source: ADF&G logbook data from 2006. Alternative estimates of the reduction in harvest, based on SWHS 2006 harvest projections (2.028 million pounds), were prepared as a sensitivity test. The alternative estimates were very similar to those in the table. The June 15-July 31 harvest reductions are 0.395 and 0.430.

The calculations assume that guides and anglers would not change their behavior in response to the regulatory action. However, it is likely that anglers will change their behavior during charter trips because of the lowered bag limits. Anglers that are fishing primarily for "halibut for the home freezer" will face greater pressure to ensure that their single halibut is larger than the average size they would otherwise be 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 is 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 a larger fish. While anglers are likely to pursue larger fish because of the lower bag limit, there is currently no way to quantify that effect. Key questions that remain unanswered include:



- What is the size composition of discarded sport catch in Area 2C?
- 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?

The one-fish bag limit effectively reduces the attractiveness of the guided charter fishing experience, especially for the meat-fisherman, and can be expected to shift the demand curve inward, so that fewer guided charter trips are demanded at any given price. This may exacerbate the impact of the elimination of the second fish and lead to even greater reductions in guided charter halibut harvests. Research on guided sport fishing in Southcentral Alaska, discussed below, suggests that the impact of changes in catch per unit of effort on demand can be substantial. To the extent that these results are transferable to Southeast Alaska, and to the extent that the reduction in the bag limit is seen by anglers to be similar to a change in catch per unit of effort, these results suggest that a “participation rate reduction” effect could be substantial.

## 7.5 Alternatives

Four alternatives for angler fishing from a charter vessel are being considered:

- Alternative 1: No action. Anglers could continue to harvest two halibut per day, four halibut in possession.
- Alternative 2: Anglers may harvest one halibut of any size, plus one of a total length at least as long as one of the following:
  - Option 1: 45 inches (114 cm)
  - Option 2: 50 inches (127 cm)
  - Option 3: 55 inches (140 cm)
  - Option 4: 60 inches (152 cm)
- Alternative 3: Anglers may harvest two halibut per day that are each at least 32 inches (81 cm) in total length.
- Alternative 4 (**Preferred**): Anglers may harvest two halibut per day, except that one must be of or less in total length than:
  - Option 1: 30 inches (76 cm)
  - Option 2 (**Preferred**): 32 inches (81 cm)
  - Option 2: 35 inches (90 cm)

## 7.6 Analysis

The following sections discuss each of the four alternatives and associated options. The final section provides a summary.

### 7.6.1 Alternative 1: two fish bag limit (status quo)<sup>8</sup>

Research into the demand for guided sport fishing charters in Southeast Alaska, and the connection between demand and halibut mortality, is limited. Even if a model were available for Southeast Alaska<sup>9</sup>, demand prediction would require prediction of exogenous variables, like per capita income, and the prices of substitute experiences. These other variables could only be predicted very imprecisely. For these reasons, future guided sport harvests are hard to predict.

If the guided sport harvest continues to grow, as it has in recent years, there will be an effective shift in halibut allocations from commercial halibut fishermen to the clients of the commercial guides. This could impact a range of parties:

- Commercial guided charter operations;
- Clients of these operations;
- Commercial halibut fishermen;
- Seafood consumers (e.g., retail buyers, customers in restaurants, or institutions);
- Other parties, including persons and firms that sell to or are customers of guided charter and commercial halibut fishermen; persons residing and firms operating in communities in which these charter and/or commercial halibut firms are based, and persons or firms active in related fisheries.

This section discusses a ten-year projection of changes in commercial halibut sector gross revenue and consumers' surplus losses, assuming the guided charter harvest continues to grow at the average annual rate observed since 1995, and given 2006 ex-vessel prices. The purpose of this projection is not prediction, but to provide an indication of the potential magnitudes of guided sport growth impacts.

It is more difficult to estimate revenue impacts for guided charter operations, and consumers' surplus changes for their clients; therefore these issues are discussed qualitatively. The prices guided operations may charge, and their revenues, will depend indirectly, although some assert importantly, on the relative availability of halibut to catch. Insufficient information is available to make predictions of how these prices and revenues will change. Insufficient information, and an absence of appropriate models, also precludes quantitative estimates of changes in the consumers' surplus received by guided sport charter clients. Qualitative and quantitative summaries of impacts to all parties are described in Table 12 at the end of this section. The next three paragraphs discuss the available quantitative information about commercial halibut revenues, and seafood consumers' surpluses.

Qualitative and quantitative summaries of impacts to all parties are described in Table 12 at the end of this section. The next three paragraphs discuss the available quantitative information about commercial halibut revenues, and seafood consumers' surpluses.

Projections of the potential change in commercial fishery revenues associated increases in the guided charter harvest in excess of the GHF have been made. The following assumptions have been used:

- 2007 estimates of total CEY, legal-sized bycatch, subsistence catch, unguided sport catch, and commercial wastage remain constant across time between 2006 and 2015.

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<sup>8</sup> The analysis in this section draws heavily on an analysis carried out by Northern Economics Inc, under contract to the Council, and is used with the Council's permission.

<sup>9</sup> A recent study on Southcentral Alaska is available, and is discussed in a later section. This, however, provides relatively limited insights into Southeast Alaska.

- Ex-vessel prices remain constant in real terms at \$3.80 per pound in Area 2C (\$US 2006).
- Guided charter harvests grow from 2006 ADF&G estimates at their long-term growth rate calculated from 1995-2006 data. Under this assumption Area 2C exhibits a yearly growth rate of 6.8 percent.<sup>10</sup>

As noted at the start of this section, the growth in future guided charter production is hard to predict. Growing incomes may increase the demand for the charter halibut fishing experience. On the other hand, other events may slow or reverse growth. These could include macroeconomic changes (e.g., economic recession, tightening of national or regional fuel supplies), changes in halibut availability and catch per unit of effort, and changes in management regulations. The growth projection in this analysis is not a prediction. It is simply a projection of the annual growth rate over the period from 1995 to 2006 over the period through 2015.

Using these assumptions, an Area 2C GHL overage would grow from 603,000 pounds in 2006 to 2.250 million pounds in 2015. An increase in the GHL overage would not translate into a pound for pound reduction in commercial harvests in any one year. However, over time, all other things held equal, a year's increase in the GHL overage would be reflected in a lower future Fishery CEY. If everything else was held equal, and enough time had passed to reflect the overage in the Fishery CEY, and the full overage was eventually reflected in the CEY, the 2006 overage of 603,000 pounds would have a gross ex-vessel value of \$2.3 million, and the 2.25 million pound overage would have a gross ex-vessel value of \$8.6 million (in 2006 dollars). (Council, 2007b page 60) Too much weight should not be put on any specific number given the uncertainties in this calculation, however, the analysis suggests that, as time passes, increasing guided charter harvests could have a substantial impact on commercial longline gross revenues. This would be a large change compared to 2006 ex-vessel gross revenues of about \$39 million, as estimated in Table 3.

A gross value change estimate will overstate the welfare impact on commercial fishing operations to some extent because it doesn't take account of costs. Moreover, the reduction in the quantity of halibut produced should have an offsetting effect on the price of halibut. However, this effect is likely to be small with respect to the commercial fishermen in Area 2C who will be faced with lower harvests. First, simulation results based on Hermann and Criddle (2006) suggest that the price of halibut changes less than proportionately to changes in quantity. (Criddle, pers. comm.) Second, the price change and associated offsetting total revenue increase, would be shared with fishermen in other regions who supply this market. It may also be the case that halibut from alternative sources (e.g., Canada, North Atlantic, Russia, at some future time, commercial aquaculture) may influence the price responsiveness to this change in 2C catch share.

This reallocation could affect benefits to consumers through changes in product availability and price. The concept of "consumers' surplus" is a standard measure of the welfare impacts of a policy change on consumers, and can be used as a measure of potential consumer losses from reductions in the supply of commercially caught halibut. It measures the difference between the total value consumers place on having access to a given amount of a good, and the amount they actually pay for it. If guided harvests grew through time at the 6.8 percent rate, the impact on the consumers' surplus for persons consuming halibut at home, in restaurants, or in other contexts, could be significant. Herrmann and Criddle (2006) have analyzed markets for halibut. In one exercise, a simple linear ex-vessel demand equation, based on their work, suggests that consumers' surplus losses once the 2007 GHL overage was fully reflected in the CEY would be about \$367,000, rising to about \$1.8 million once the 2015 GHL overage was fully reflected in the CEY (after adjustment to 2006 dollars). (Council, 2007b, page 76) This is a rough approximation. For one thing, given the construction of the model, this exercise only approximates what

<sup>10</sup> Calculated using a long-term growth rate formula of  $g=(Y_{t+n}/Y_t)^{1/n}-1$ .

the actual effects would be if ex-vessel and wholesale market conditions held similar to conditions that were present in 2002. These estimates must be used with care; their primary value is to suggest that consumers' surplus losses could be a significant component of the overall welfare costs of any reallocation. Note that these consumers' surplus reductions would be offset to an unknown (but perhaps significant) extent by consumers' surplus gains, attributable to expansion of the charter fishing (and affiliate) economic activities.

As noted above, with the dearth of information available on the guided sport fishing business, and the dimensions of demand for its product, it is not currently possible to make corresponding quantitative estimates of the change in revenues and profits accruing to charter guide businesses, or of the consumers' surplus accruing to their clients. However, the increases in the demand for the guided charter experience that may be presumed to be behind a projected upward trend in guided charter harvests, suggests that guided charter revenues, and/or the consumers' surplus of their clients may be increasing through time, as commercial revenues and the consumers' surplus for seafood consumers decline. The guided charter business may operate in a competitive market, in which case profit increases may be associated with new entry which would moderate any gains. Furthermore, under the status quo, there is no effective barrier to new entry, and because this sector fishes on a "common pool" resource, in the long run, rents would be dissipated and sector profits would tend to zero. If that proves to be the case, the consumers' surplus of their clients may provide the principal benefit, from a national accounting stance, of retaining the status quo alternative.

Alternatives that depend on halibut size limits would require operators to retain whole halibut, or carcasses from which fillets were removed, until all halibut catch is offloaded from the charter vessel from which they were caught. This requirement would increase the number of carcasses brought back to the dock; especially in ports where operators typically fillet their halibut at-sea. These carcasses will need to be properly disposed of at the port of landing or taken offsite.

According to ADF&G staff, some harbors (including Sitka) currently do not allow the dumping of fish carcasses in the harbor, and there is no infrastructure (e.g., floating dumpsters, grinders) to deal with the fish waste. Because of the harbor regulation, charter operators transport the fish carcasses out to sea where they can be dumped. The ADF&G creel survey currently requires by emergency order that salmon, rockfish, and lingcod be landed whole during the period the creel census is operational. The addition of the halibut retention requirement regulation would result in additional fish waste to be discarded. Operators in ports that currently prohibit discards would be required to transport halibut in addition to rockfish, salmon, and lingcod offal. The cost of transporting halibut carcasses would be borne mainly by the charter fleet, who would seek to pass those costs on to their clientele, to the extent allowed by the marketplace.

Some ports currently do not have a prohibition against discards. These ports range from urban ports in Juneau to remote areas such as Gustavus. The regulatory requirement may increase the amount of fish offal discarded at the dock. Individual harbors would need to determine if a fish offal policy is warranted, including its associated costs. If discarding of offal in the harbor is prohibited, the costs will be borne by the charter operator, and to the extent possible, his clients. If the harbor provides services, at no direct cost to the user, such as the removal of offal, the costs may be spread out beyond the operator.

Potential impacts to key user groups are summarized in Table 12:

**Table 12 Summary of Economic Impacts of Alternative 1**

Affected group	Impact
Objectives of this action	This alternative does not meet the objective of the action to bring about a reduction in Area 2C guided sport harvests that is comparable to the reduction that would have been achieved by the action taken by the IPHC in January 2007.
Commercial guides	<p>As noted above, the actual growth rate of guided halibut harvest in coming years cannot be predicted. The estimate in the text assumes that growth in coming years will be similar to the long-term growth observed since 1995. If growth continues, the numbers of guides, and, in the short run, the return to guiding should also grow. However, in the longer term, returns to guides may not increase much, or at all, because of the competitive nature of this market. If any supernormal returns are generated, they will, absent artificial constraints, be dissipated by new entry into the business.</p> <p>The relative impacts on the numbers of operators and their returns from the business depend on the cost structures of existing and potential guides, and the shapes of the long run supply curves. The supply curve for guides serving tour ship passengers through trip brokers may be relatively flat. Entry and exit is easy in this business. The skills to do this work may be widespread in Southeast Alaska, and the job is an attractive one to many. It is likely, therefore, that this can be described as a competitive industry, in which an increase in demand will result in new operations, and in which profits may be small. In the medium to long term, if increases in returns to guides are relatively limited, it may be that from a national accounting stance, most of the welfare benefits would accrue to guided charter clients.</p> <p>The market to serve fishermen staying in lodges may be less competitive, although supply might be expanded at relatively low cost by charter operators who develop bed and breakfast operations from their homes, or who enter cooperative arrangements with existing local motels and hotels.</p> <p>Guides may bear increased costs associated with bringing carcasses to port for enforcement purposes, and subsequent carcass disposal. If market conditions permit, they may pass these costs on to clients.</p>
Customers of guides	Guided clients would receive increased consumers' surplus as the guided fishery expanded. Insufficient information is available to estimate the size of this benefit. May bear increased costs of offal discard.
Commercial fishermen	<p>If the guided charter fishery grows, the reduction in gross revenues to Area 2C commercial longline fishermen could be substantial. Once the CEY had fully adjusted to the 2006 GHF overage, commercial longline gross ex-vessel revenues might be reduced on the order by about \$2.3 million. As time passed, these revenue reductions could rise higher. If the guided harvest grew at recent long term rates through 2015, and the CEY fully adjusted in subsequent years, the gross ex-vessel revenue loss to commercial halibut longliners might be about \$8.5 million, in the absence of other regulatory action. Insufficient information is available to translate these gross revenue changes into changes in net returns. Price increases to offset the harvest reductions are expected to be small in Area 2C. Prices paid commercial halibut fishermen in other halibut producing regions may tend to rise by small amounts as a result of the reallocation in Area 2C, depending on worldwide supplies of close substitutes.</p> <p>The commercial fishery in Area 2C is conducted under an individual quota program. Fishermen must acquire QS to participate in this fishery. Offer prices for Area 2C IFQ have recently ranged from \$13/pound to \$21/pound, depending on the type of quota (Pacific Fishing, page 27, February 2007). A quota purchase may cost tens of thousands of dollars. Fishermen often obtain loans to purchase enough QS for a profitable and sustainable fishing operation. The effective reallocation of halibut from the commercial</p>

	<p>fishermen to the guided sport fishery could have the effective of reducing the annual income that can be generated with a QS, reducing the revenue stream to pay off loans, thereby reducing the price of the QS, and reducing the value of the collateral backing up those loans. As above, the size of any such impact will depend upon price responsiveness in halibut markets.</p>
Seafood consumers	<p>Consumers' surplus losses may be considerable. As a result of the decrease in commercial production, consumers' surplus losses from reduced halibut consumption may increase from current levels of about \$400,000 to about \$1.8 million in 2015 (once CEYs have fully adjusted to changes in guided harvests. These estimates only approximate what the actual effects would be if ex-vessel and wholesale market conditions hold similar to conditions that were present in 2002. These estimates do not take into account the effects of substitute sources of supply, which could, in whole or part, offset these consumers' surplus losses.</p> <p>Furthermore, charterboat clients are "fish consumers", as well. As such, consumers' surplus <i>losses</i> from decreases in commercial halibut production, must be "netted" against consumers' surplus <i>gains</i> accruing to those additional clients of charter halibut fishing operations.</p>
Other affected parties	<p>Crew members on guided charter and commercial fishing operations would be affected, as would firms supplying the two sectors, and operating as customers for the commercial fishing operations. Workers and firms supplying and buying from commercial fishing operations would be adversely impacted, workers and firms supplying guided charter operations would be benefited.</p> <p>These impacts would have ramifications for the communities of Southeast Alaska within which these firms are based. Both industries have substantial roots in these communities, and it is not possible to identify the net employment, income, or welfare impacts.</p> <p>Guided sport GHL overages may affect other fisheries as well. There is no regulatory connection between guided sport and sport, personal use, and subsistence harvests. However, guided sport pressure can contribute to areas of localized halibut depletion, reducing the catch per unit of effort, and harvests by other sport and subsistence fishermen. The same argument has been made concerning the impact of commercial halibut fishing activity in a given area. It is unclear the extent to which either charge is warranted, given the available data.</p> <p>Increased disposal of offal in some harbors.</p>

### 7.6.2 Alternative 2: Two fish bag limit: One fish any size, and one "large" fish<sup>11</sup>

Under Alternative 2, anglers would remain subject to a two fish bag limit, however one of the two fish would have to be above a stated minimum size. Thus the rule might state that an angler could take two fish a day, at least one of which must be greater than 45 inches in length. Four minimum size limit options are considered: 45 inches, 50 inches, 55 inches, or 60 inches. This alternative would apply for the entire season.

As the minimum size limit increases, fewer fish in excess of the limit will be available for harvest. When the limit gets high enough, the expected catch per unit of effort for fish over the limit will get very small, and retention under this alternative may approximate a one fish bag limit over the entire season (compared to the six week one fish bag limit recommended by the IPHC).

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<sup>11</sup> The analysis in this section draws heavily on an analysis carried out by Northern Economics Inc, under contract to the Council, and is used with the Council's permission.

As noted below, this approach may be able to approximate the guided sport harvest reductions associated with the six week one fish bag limit, but without the adverse effect of *a priori* removing the possibility of that second “big” fish from the client’s experience. Anecdotal experience suggests that virtually every recreational fisherman embarks on a day’s fishing with the sincere belief that his or her luck, as reflected in expected catch, will be above average. Clearly, this cannot be the case. Yet, the “possibility” conveys real utility (i.e., economic value). Administratively remove that possibility, and one reduces the value of the experience at the outset.

The reduction in guided sport harvests was determined by multiplying the proportion of fish taken as second fish (to which the restriction applies) by the proportion of harvest weight associated with fish that would have been under the size restriction. The result of this multiplication was assumed to equal the proportion of all harvest weight from fish that were both (a) second fish and that (b) were under the size limit. This would be the proportion by which the harvest was reduced. All calculations were made with 2006 data. For example,

- the proportion of fish taken as second fish was about 39.7 percent, and
- the proportion of harvest weight from fish that would have been under the 45 inch limit was about 53.8 percent.
- The result was that the harvest would be reduced by an estimated 39.7%\*53.8% or about 21.4 percent.
- Since the harvest was 2.035 million pounds, the reduction would equal about 434,600 pounds.

All calculations (which are summarized in Table 14 below) were made using preliminary data from 2006. The estimated percentage changes and volumes are not predictions of the future changes, but are estimates of what would have happened in 2006, if the rules had been in place that year.

The literature on sport fishing in Alaska indicates that anglers are sensitive to trip attributes such as species availability, catch rates, trip cost, and bag limits. While there are no published studies which discuss the effect of changing bag limits on the Area 2C halibut fishery, there are several papers which discuss the effect of trip attributes on Southcentral (Area 3A) anglers fishing specifically for halibut.

Criddle et al. (2003) and Hamel et al. (2003) report results from a 1997 University of Alaska Fairbanks (UAF) study of saltwater sportfishing trips in Lower and Central Cook Inlet. They use data from this study to estimate how changing catch rates would affect angler participation in fishing trips. They estimate that a 30 percent reduction in catch rates would reduce participation by 25.1 percent while a 50 percent reduction would reduce participation by approximately 50 percent. These results show that the experience, not just the act of taking halibut home, is important to anglers. Table 13 illustrates the potential impact of changes in catch rates on participation.

**Table 13 Estimated Changes in Participation 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: NEI and Criddle et al. (2003), Table 4, page 306.

The minimum size limit may tend to reduce angler participation rates in the Area 2C guided sport charter fishery, although it is likely that it will do so to a lesser extent than the one fish bag limit proposed by the

IPHC. Guides are selling an experience, not fish. The experience includes “the opportunity” to fish for various species, sightseeing, companionship, food, vessel accommodations, adventure, and perhaps shoreside lodge, bed & breakfast, or hotel accommodations. The halibut catch per unit of effort, and the size of the halibut caught, are only two of the many characteristics of a charter trip. If the catch per unit of effort drops, and remains lower thereafter, it is likely that the demand curve will shift, so that fewer trips are demanded at any give price.

How much will the demand curve shift because of the imposition of the minimum size limit on the second fish? The analysis is unable to answer beyond saying that demand will likely be reduced. An angler interested mainly in the fishing experience, and less in catching large amounts of halibut, might view the charter experience as relatively unchanged because the option wouldn’t affect the amount of time one could spend fishing. These anglers could continue fishing after harvesting their first fish as they pursued their “trophy” fish. At one extreme, there will be no demand reduction.

Table 14 shows the expected effects of the sub-options with hypothetical participation effects of various sizes included in the reduction estimates. Without accounting for mortality, or any increase in the average size of the harvested fish, the analysis estimates that with no reduction in participation rates, a 45” minimum size limit would have reduced the charter harvest to approximately 111.8 percent of the GHL. Minimum size limits of 50”, 60”, and 65” would have resulted in harvest equivalent to 106 percent, 99.9 percent, and 94.3 percent of the GHL, respectively.

Models which would allow us to project the reductions in angler participation rates associated with changes in retention rates and levels are not available. It is therefore not possible to estimate precisely how changes in angler participation may affect overall guided sport harvests. As noted, there is evidence from Southcentral Alaska of significant impacts of changing catch rates there. However, the angler populations in the two regions are believed to be different, and it is not clear if the Southcentral results are appropriate in Southeast. Clients in Southcentral and Southeast likely have different characteristics, owing in large part to the preponderance of cruise ship clients in Southeast. Moreover, it is not clear if the nature of the change under consideration here (a change in retention) translates into the type of change considered there (a change in harvest rate). The current alternative does impose a restriction on angler behavior, and may be expected to some extent to make angling a less attractive activity. That may shift the demand curve inwards, and reduce participation rates. Table 14 includes lines that project the impacts on harvests if demand is not shifted (the 100% participation lines), if participation rates are reduced by 10% (the 90% participation line), and if participation is reduced by 20% (the 80% participation line). These are not predictions; they are only meant to show potential magnitudes under hypothetical circumstances.



**Table 14 Expected Effect of a season long two fish bag limit with a minimum size limit on one of the fish, taking account changes in participation rate.**

Participation rate (relative to 2006)	45" Min	50" Min	55" Min	60" Min
<b>Estimated in 2006 guided sport harvest (Million pounds) for different participation rates (percent of 2006)</b>				
100%	0.434	0.517	0.604	0.685
90%	0.597	0.670	0.749	0.822
80%	0.756	0.822	0.892	0.957
<b>Estimated 2006 guided sport harvest (Million pounds) for different participation rates (percent of 2006)</b>				
100%	1.601	1.518	1.431	1.350
90%	1.438	1.365	1.286	1.213
80%	1.279	1.213	1.143	1.078
<b>Estimated 2006 guided sport harvest as a percent of the GHL for different participation rates (percent of 2006)</b>				
100%	111.8%	106.0%	99.9%	94.3%
90%	100.4%	95.3%	89.8%	84.7%
80%	89.3%	84.7%	79.8%	75.3%
<p>Note: weights are headed and gutted net weights.            Source: Guided sport harvests as percent of GHL are NEI Estimates based on ADF&amp;G Logbook Data, 2006; guided harvest reductions and guided harvests are NMFS projections based on the NEI estimates.            Alternative estimates of the reduction in harvest, based on SWHS 2006 Harvest projections (2.028 million pounds), were prepared as a sensitivity test. The alternative estimates were very similar to those in the table. The harvest reduction for the 45" min (ignoring demand impacts) was 0.433, for the 50" min it was 0.515, for the 55" min it was 0.602, and for the 60" min it was 0.682.</p>				

The analysis in Table 14 addresses a season long two fish bag limit. Given the requirements of the regulatory process, this action will not be effective before June 1 in 2007, although it should be in place for the full season in subsequent years. Therefore, the small amount of “second” fish harvested prior to June 1, accounting for 1.8% of the fish harvested in 2006 (see Table 10), would not be affected by this action. Therefore, to a small extent, the estimates in Table 14 overstate the results of the action in 2007.

The projection of the reduction in guided halibut harvest associated with the IPHC one fish bag limit recommendation, of about 397,000 to 432,000 pounds (see Table 11), was based on an analysis that did not incorporate potential demand related reductions in participation rates. Thus, the corresponding estimates for the trophy fish alternative in Table 14 are the reductions associated with the rows showing 100 percent of 2006 participation. These suggest that the 45 inch size limit comes closest to approximating the reductions associated with the one fish bag limit. Note also that the impact of demand reductions are more likely for the one-fish bag limit than with the “two fish bag limit and trophy fish” approach, for the reasons cited above concerning the value of the “opportunity” to take that second (larger) fish.

IPHC staff considered this alternative in January 2007, but staff were unwilling to recommend it to the IPHC, because of concerns that a substantial number of fish would be caught and released as fishermen pursued a larger “trophy” sized fish, and because of uncertainty over the potential for increased discard mortality associated with this activity (IPHC, 2007).

Other considerations that have been mentioned as contributing to the uncertainty about the impact include:

- While some anglers currently catch and release repeatedly, as part of their personal preferences, the pursuit of the larger second fish could extend to affect other participants in the charter

experience as charter providers seek to keep all clients happy while clients truly interested in harvesting a second fish pursue their quarry.

- The establishment of the upper limit means that anglers who otherwise might have stopped fishing with a 42-inch fish will be forced to throw those fish back and may choose to keep fishing. In this scenario the savings of throwing back the 42-inch fish will be reduced by increased harvest mortality if the angler keeps fishing and succeeds in replacing the 42-inch fish with a fish above the minimum size limit.

It is unclear whether this alternative will result in increased or decreased discard mortality. Discard mortality could decrease as lower participation rates lower the number of fish hooked and released. Lower participation rates are most likely to occur with a higher minimum size limit on the second fish, because the chances of harvesting a second fish are inversely correlated with the size limit. On the other hand, if the regime does not reduce participation rates, but instead 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 is not enough data on angler behavior while fishing for halibut aboard a charter vessel to reliably estimate how this option will affect discard mortality, but there is enough uncertainty that IPHC staff were unwilling to endorse this alternative in January 2007, without a better understanding of incremental mortality.

Interviews with the charter industry revealed mixed opinions about this option. It is preferred to the one fish bag limit, but a number of industry participant expressed concerns about the logistics of measuring a large halibut during capture to ensure it met the minimum size requirement. A number of operators said that the reduction in participation rates would not be as great under this alternative, and that it would create fewer difficulties with 2007 bookings because the two fish bag limit would be retained (although this issue may be moot by the time this regulation can be implemented). Some said that the halibut savings might be greater than projected above, in multi-species trips, because salmon angling usually takes place after fishing for halibut is completed and many anglers will prefer to shift to fishing salmon rather than continue to fish for halibut they may have to discard.

Some guides have indicated that effectively measuring these animals prior to killing them is difficult. Faced with 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. 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. 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 in order to facilitate enforcement of this option.

The potential impacts of Alternative 2 are summarized in Table 15:

**Table 15 Impacts of Alternative 2 on Commercial fishermen and charter guides, their customers, and other parties**

Type of impact	Impact
Consistency with the objectives of this action	The two fish bag limit with the 45 inch minimum size for one of the fish appears to be comparable in impact on guided charter harvests to the action taken by the IPHC in January 2007, but to impose a smaller burden on guided charter operations. Larger minimum sizes appear to produce harvest reductions that exceed the levels that the IPHC appeared to target in January, and create potentially serious operational burdens for charter operators (e.g., accurately measuring 'large' fish before killing them and bringing them aboard).
Commercial guides	This alternative may reduce the revenues to charter sport fishing guides compared to the status quo. The level of harvests appears to be reduced by about 434,000 pounds, for the smallest of the minimum sizes (45 inches) and by larger amounts for the larger minimum sizes. It is also likely that the long term rate of growth in harvests will be reduced below the levels they would otherwise reach. This alternative may affect charter operators in different parts of Southeast differently. In some areas, where halibut stocks have been depleted, it may be very unlikely that clients will harvest fish over 45 inches in length. Under these circumstances, the minimum size limit may approximate a one fish bag limit. The impact may be smaller elsewhere. Some guides have expressed concerns about whether or not it will be possible to easily measure the larger sized fish.
Customers of guides	This alternative may reduce the consumers' surplus received by guided sport fishery clients. It is not possible to predict the size of these potential losses. It is possible that some clients would try to minimize consumers' surplus losses by substituting other methods of halibut fishing experiences (including Area 2C unguided or bareboat charter activity, or fishing for halibut in other areas, such as 3A) or fishing for other species.
Commercial fishermen	Compared to the status quo, this action may reduce the level of reallocations from the commercial longline fishery to the guided sport fishery. As noted above, it may also reduce the rate of growth amount at which the guided sport fishery exceeds the GHL. This would reduce gross revenue losses to the commercial longline fishery.
Seafood consumers	This action could reduce the potential consumers' surplus losses compared to the status quo.
Other affected parties	<p>This action would benefit persons, firms, and communities relatively more dependent on commercial halibut fishing than on chartered guiding operations.</p> <p>The reduced impact of the guided sport fishery on the halibut stocks may be a benefit to unguided sport fishermen and to subsistence fishermen.</p> <p>Chartered guides might shift their allocation of time towards fishing for substitute species, such as salmon, ling cod, or rockfish, compared to the status quo, and this could increase the harvests of these species.</p>

### 7.6.3 Alternative 3: Two fish bag limit: 32 inch size limit<sup>12</sup>

Alternative 3 retains the two fish bag limit, and imposes a 32 inch minimum size limit on both halibut. Analysis indicates that there is a good chance that a 32 inch minimum size limit may increase total guided harvest weight rather than reduce total guided harvest weight.

ADF&G data indicate that halibut below 32 inches account for 48 percent of the Area 2C retained charter catch by number and 23 percent by weight (see **Error! Reference source not found.**).<sup>13</sup> With a 2006 guided charter harvest of 2.035 million pounds, a 23 percent reduction in harvest would equal 468,000 pounds.

**Table 16 Percentages of Area 2C Harvest Falling Below a 32 Inch Minimum Size Limit by Recreational Sector, 2006**

Fishery Component	Area 2C	
	Number of Fish	Weight (lb)
Charter	48%	23%
Non-charter	61%	30%
Overall	53%	26%

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

While these data appear to show that there would be large savings from a minimum size limit, evidence from other halibut fisheries and data from the Area 2C fishery indicate that a minimum size limit set at 32 inches could result in an increase in the total weight of the guided charter harvest. The IPHC staff report to the Council describing the IPHC's annual meetings in 2007, notes that fisheries managers previously used minimum size limits in Area 2A and the result was an increase in total biomass harvested. While the retained catch of very small fish and the total number of fish fell, the overall average weight of harvested fish increased enough to result in a total increase in harvested biomass (IPHC 2007).

The key to the issue is that, while a fisherman can no longer take fish under 32 inches, they can still take fish over 32 inches, and it may not take many substitutions of larger fish for smaller fish to offset the reduction in smaller fish. If the average larger fish is three times the weight of the average smaller fish (and as noted below, this ratio is plausible), and if only one in three of the smaller fish is replaced by a larger fish, there would be no reduction in guided charter halibut harvests. If the average larger fish was more than three times the weight, or if fishermen were able to replace somewhat more than one of every three smaller fish with a larger one, this provision could lead to an increase in guided sport harvests.

ADF&G data from 2006 indicate that this scenario could happen with a 32 inch minimum size limit in Area 2C. As shown in Table 17, in 2006 anglers harvested an estimated 51,474 halibut below the size limit and these fish averaged 9.1 pounds. As noted above, the total weight of harvested halibut below the size limit was roughly 468,000 pounds. Anglers harvested slightly more fish above the size limit, but the total and average weights of these fish was more than three times those for halibut below the size limit. In 2006 charter anglers harvested approximately 55,800 halibut above the size limit. These averaged 28.1 pounds. The total weight of these halibut was 1.57 million pounds.

<sup>12</sup> The analysis in this section draws heavily on an analysis carried out by Northern Economics Inc, under contract to the Council, and is used with the Council's permission.

<sup>13</sup> As shown in Table 16, these proportions are lower than those in the non-guided (non-charter) recreational sector. Within the non-guided sector, halibut below 32 inches account for 61 percent of the harvest by number and 30 percent by weight. This difference may reflect the greater range of the charter sector's boats, which are likely to be larger than many non-guided recreational boats, and the charter captain's knowledge of halibut habitat.

**Table 17 Estimated Potential for Increasing Harvest Weight through a Minimum Size Limit, 2006**

	Number of Fish	Total Weight	Average Weight
Below 32" Limit	51,474	468,050	9.1
Above 32" Limit	55,764	1,566,950	28.1
Replacement Catch Needed To Replace Below Limit Fish	16,657	468,050	28.1
Replacement Catch Ratio	32.36%	1:3.1	

Note: weight is headed and gutted net weight

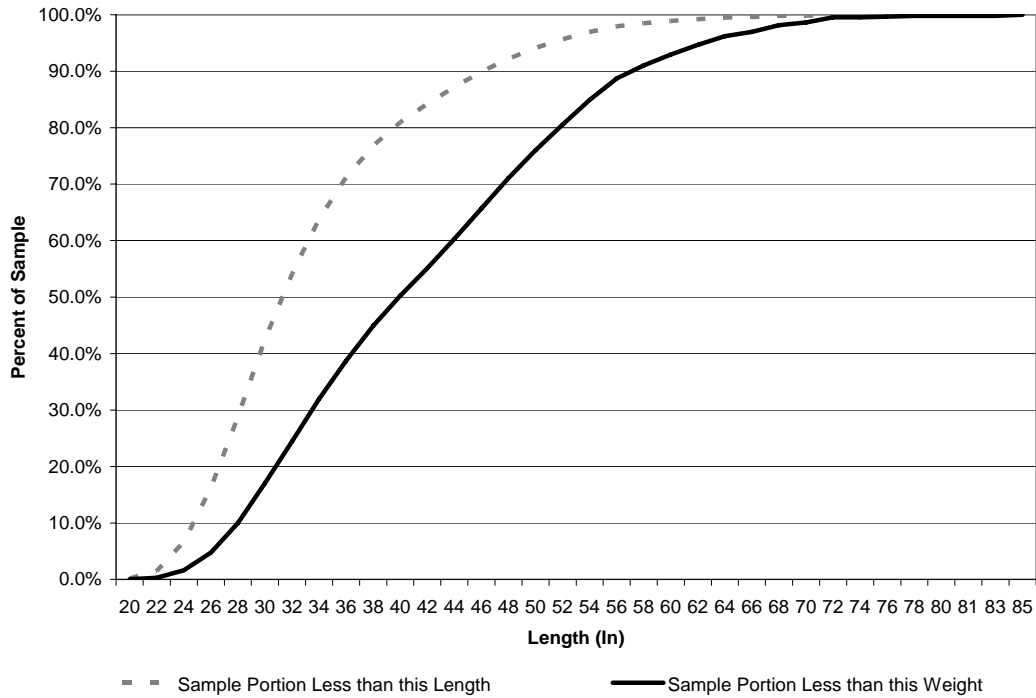
Source: Northern Economics, Inc based on Alaska Department of Fish and Game Port Sampling and Logbook Data, 2007.

Assuming that anglers could not replace halibut below the limit, the option would save approximately 23 percent of current biomass harvest. However, at least some anglers are likely to replace those smaller halibut with halibut above the limit. If, for every three fish under 32 inches that was saved (weighing an average of 9.1 pounds, for a total saving of 27.3 pounds) anglers substituted only one fish above 32 inches (a harvest averaging 28.1 pounds) the action would not have reduced the guided sport harvest, and would actually have increased it.<sup>14</sup>

The analysis of the impacts of halibut size limits in Alternatives 2, 3, and 4 was carried out using ADF&G logbook and SWHS data on retained harvests for the sport fishery. IPHC survey data is designed to collect information for the IPHC's annual stock assessment. The size distribution of fish caught in this survey is comparable to the ADF&G creel survey data, and is used here to provide an additional illustration of the issues associated with the minimum size limit. As shown in Figure 11, a 32 inch limit would protect approximately 50 percent of the number of fish from harvest, but only a quarter of the surveyed biomass.<sup>15</sup> The bulk of the surveyed biomass lies to the right of the 32 inch limit. While the 32 inch limit would suffice for protecting 50 percent of the population by number from harvest a 38 inch to 40 inch limit would be needed to protect 50 percent of the biomass from harvest.

<sup>14</sup> This issue would not occur in the same way if the rule required fish to be under 32 inches rather than over 32 inches (this is the approach in Alternative 4). If a fisherman had to give up a fish over 32 inches, it would only be possible to substitute a fish under 32 inches. So it would not be possible to totally offset the reduction in large fish weight with weight associated with smaller fish and increase total weight harvested.

<sup>15</sup> The IPHC setline survey uses larger hooks than the charter industry standard and fishes in deeper waters. Hence, it may underestimate the number of small fish.



**Figure 9 IPHC Setline Survey Data Cumulative Frequencies, 2007.**  
 Source: Council, 2007b (from IPHC).

The average weight of replacement halibut will not have to reach the average weight of harvested halibut above 32 inches if the frequency of success is greater than one in three. For example, if slightly more than one in two halibut below the 32 inch limit were replaced with a 34 inch fish, then the total weight of halibut harvested would likely increase (see Table 18).

**Table 18 Required Replacement Success Rates at Various Average Lengths and Weights**

Average Length of Replacement Fish (in)	Average Round Weight for fish of this length (lbs.)	Number of fish of this length needed to replace an average fish under 32 inches
34	17.3	0.53
36	20.7	0.44
38	24.7	0.37
40	29.3	0.31
42	34.3	0.26
44	39.9	0.23
46	46.0	0.20

Potential impacts of Alternative 3 are summarized in Table 19:

**Table 19 Impacts of Alternative 3 on Commercial fishermen and charter guides, their customers, and other parties**

Affected group	Impact
Objectives of this action	NMFS is unable to determine whether this alternative will increase or decrease the weight of guideline charter halibut catches for minimum size limits close to 32 inches. Under reasonable assumptions, because a large reduction in numbers of small (under 32 inch) fish can be offset or more than offset by relatively small numbers of larger (over 32 inch fish) this alternative may lead to an increase in the overall weight of guided sport harvests, even if it leads to a reduction in the number of fish harvested. Because of the uncertainty, and the apparent significant possibility that the alternative may actually increase these harvests, NMFS does not believe that this action helps achieve the objectives of the action as described in the problem statement.
Commercial guides	
Customers of guides	
Commercial fishermen	
Seafood consumers	
Other affected parties	

#### 7.6.4 Alternative 4: Two fish bag limit with a maximum size on one fish<sup>16</sup>

Under Alternative 4, guided charter clients would be subject to a bag limit of two fish, one of which would have to be smaller than a given maximum overall length. Options considered were maximum lengths of 30, 32, and 35 inches.

Detailed information on the sizes of fish kept and released in sequence by individual anglers was not available to analyze angler behavior. Therefore, four possible scenarios were considered: (1) the first fish in the bag limit are all under 32 inches in length and the second fish in the bag limit are of any size, (2) the first fish are of any size and the second fish are all under 32 inches, (3) the first fish in the bag limit are all under 32 inches and the second fish are all over 32 inches, or (4) the first fish are all over 32 inches and the second fish are all under 32 inches. In reality all four scenarios are possible for any individual angler, but the lack of data on individual angler catches and the prevalence of "party-fishing" require that these scenarios be applied to the entire fleet.

Scenario 2 was chosen over the others for analysis because it seemed the most likely. Scenarios 1 and 3 are unlikely because large halibut can be caught at any time and most anglers would not release a large halibut if they hadn't retained a fish yet. Conversely, not all of the first fish retained would be over 32 inches in length (Scenario 4) because many anglers retain the first fish of acceptable size to ensure they harvested something. Scenario 4 also doesn't make sense in that it results in a harvest estimate that exceeds the observed 2006 harvest which was conducted under a two fish bag limit without any size limits on either fish. Therefore, Scenario 2 was assumed, applying the overall average weight to the first fish retained and the average weight of fish under 32 inches to the second fish retained.<sup>17</sup>

<sup>16</sup> The discussion of this alternative is based on estimates of the impact on guided sport charter harvests prepared by ADF&G staff in March 2007.

<sup>17</sup> This approach differs from that used in the evaluation of minimum size limits in Alternative 2. The approach used there could have been used here. If the second fish retained made up 39.7 percent of the harvest,

Only fish under the maximum size threshold (e.g., 30, 32, or 35 inches) are retained as the second fish. Numbers of fish and harvest biomass were extrapolated from logbook data through August 15, 2006.

The calculations for the 32 inch option are described for illustrative purposes.<sup>18</sup> Under these circumstances, given the proposed 32 inch maximum on the second fish, guided sport anglers would have caught an estimated 1.61 million pounds of halibut in 2006:

- Their “first fish” would have been 60.3% of the 2006 retained catch of 107,238 halibut, and those fish would have had an average weight of 18.98 pounds, for a total “first fish” weight of 1.227 million pounds.
- Their “second fish” would have been 39.7% of the retained catch of 107,238 halibut, and those fish would have had an average weight of 9 pounds, for a “second fish,” retained catch weight of 0.383 million pounds.
- The total harvest would thus be 1.227+0.383 = 1.610 million pounds. This would be a 425,000 pound reduction in the 2006 harvest, and would be 112.4 percent of the guideline harvest level.<sup>19</sup>

It is possible that the approach under consideration here may underestimate the reduction in the number of fish taken by the guided sport harvest fishermen. In this approach, all second fish were multiplied by a smaller mean weight, which assumes that all second fish will be caught, and that they will all have the lower mean weight. However, some people will not want to harvest a small fish, or be able to catch a second fish at all.

Table 20 summarizes the results for this alternative. This alternative does restrict anglers somewhat, and may induce changes in angler rates of participation in the halibut fishery. These may create a secondary reduction in halibut harvests (this issue was discussed at greater length in the analysis of Alternative 2). Table 20 provides an indication of the potential impact of participation changes. The lines labeled “100%” show the impact as calculated above, and showing no participation rate impacts. The lines labeled “90%” and “80%” reflect participation reductions to 90 percent and 80 percent of 2006 levels.

**Table 20 Impacts of the two fish bag limit with a maximum size limit on one fish**

Participation rate (relative to 2006)	30" Max	32" Max	35" Max
<b>Estimated reduction in 2006 guided sport harvest (Million pounds) for different participation rates (percent of 2006)</b>			
100%	0.446	0.425	0.391
90%	0.605	0.586	0.586
80%	0.764	0.747	0.747
<b>Estimated 2006 guided sport harvest (Million pounds) for different participation rates (percent of 2006)</b>			

and 77 percent of the harvest was over 32 inches, then 39.7%\*77% of the harvest would be removed, or 623,000 pounds. This is probably not a realistic approach because it assumes that no more second fish will be caught than the proportion that were under 32 inches in 2006. However, smaller fish are relatively plentiful, and since it is likely that more will be caught, 623,000 pounds of harvest reduction is unlikely to be achieved. Conversely, this approach works somewhat better for the trophy fish, since the proportions of the harvests above 45, 50, 55, and 60 inches are so much smaller. While there may still be some highgrading, fishermen won't be as successful catching fish over 45 inches as they will be at catching fish under 32 inches.

<sup>18</sup> The calculations are based on numbers and harvest biomass extrapolated from logbook data through August 15, 2006, and on proportions of fish larger than and smaller than appropriate lengths from SWHS. Data are summarized in Table 20.

<sup>19</sup> As noted in Table 10, guided charter anglers caught and retained an estimated 107,238 halibut in 2006; 60.3 percent of these were “first fish,” and 39.7 percent were “second fish.” Fish under 32 inches had an estimated average weight of 9 pounds, while fish over 32 inches had an estimated average weight of 28.1 pounds.



100%	1.589	1.610	1.644
90%	1.430	1.449	1.449
80%	1.271	1.288	1.288
<b>Estimated 2006 guided sport harvest as a percent of the GHL for different participation rates (percent of 2006)</b>			
100%	111.0%	112.4%	114.8%
90%	99.9%	101.2%	101.2%
80%	88.8%	89.9%	89.9%
<b>Parameters used in the calculations</b>			
Total landings (million pounds)	2.035	2.035	2.035
Number of fish	107,238	107,238	107,238
Average weight of overall harvest (pounds)	18.98	18.98	18.98
Proportion under the size limit (weight)	0.1657	0.2275	0.3129
Proportion under the size limit (number of fish)	0.3720	0.4772	0.6075
Average weight under the size limit (pounds)	8.5	9.0	9.8
Average weight over the size limit (pounds)	25.2	28.0	33.2
Proportion of harvest that is first fish (number)	0.603	0.603	0.603
Proportion of harvest that is second fish (number)	0.397	0.397	0.397
<p>Note: weights in headed and gutted net weight.  Source: ADF&amp;G logbook data from 2006 for harvest projections. Proportions of fish greater and smaller than size limits from SWHS. Alternative estimates of the reduction in harvest, based on SWHS 2006 harvest projections (2.028 million pounds), were prepared as a sensitivity test. The alternative estimates were very similar to those in the table. The harvest reduction for the 30" max (ignoring demand impacts) was 0.447, for the 32" max it was 0.432, and 0.515, for the 35" max it was 0.390.</p>			

The analysis in Table 20 addresses a season long two fish bag limit. Given the requirements of the regulatory process, this action will not be effective before June 1 in 2007, although it should be in place for the full season in subsequent years. Therefore, the small amount of "second" fish harvested prior to June 1, accounting for 1.8% of the fish harvested in 2006 (see Table 10), would not be affected by this action. Therefore, to a small extent, the estimates in Table 20 overstate the results of the action in 2007.

The incidence of large and small fish in the catch will vary by area in Southeast Alaska. In some areas, such as the waters around Juneau, larger fish may be relatively rare. In this case, a minimum size limit of 45 inches or higher may effectively become a one fish bag limit for many anglers. The 30-35 inch maximum retention limit would not have this differential effect on anglers and demand for guided charters, in areas with relatively small numbers of large halibut.

If the first fish an angler keeps is under 32 inches, they may still high-grade to get a second fish over 32 inches, but probably no more than they currently do. If the first fish is over 32 inches, then their second fish has to be under 32 inches, and they'll be low-grading. They probably won't have to go through as many halibut to get to a small fish, which might also benefit rockfish stocks by reducing discard mortality for that species group.

One disadvantage of this approach is that the size frequency from IPHC longline survey may no longer be an adequate proxy for the sport harvest size frequency if the proportion of small fish increases. IPHC staff may be able to use an age-length key, combined with the sport harvest length composition data, to estimate the age composition of the sport harvest for the stock assessment.

As discussed under Alternative 2, alternatives associated with maximum or minimum length restrictions would require operators to retain whole halibut, or carcasses from which fillets were removed, until all halibut catch is offloaded from the charter vessel from which they are caught. Offal would then need to

be properly disposed of in port or landing or taken offsite. Operators in ports that currently prohibit discards may be required to transport the carcasses to sea for dumping. These costs would be incurred by charter operators, or passed on to their clients if market conditions permit. Ports without a prohibition of discards would need to determine if a fish offal policy is warranted. If so, costs may be placed on charter operators if discard is prohibited, or may be spread more widely if the harbor provides discard services.

The impacts of Alternative 4 are summarized in Table 21.

**Table 21 Impacts of Alternative 4 on commercial fishermen and charter guides, their customers, and other parties**

Type of impact	Impact
Consistency with the objectives of this action	The 32 inch maximum length "second fish" provision appears to limit halibut harvests to levels that are comparable to those that would have been generated under the IPHC proposal. It appears to impose a smaller burden on guided charter operations.
Commercial guides	This alternative should reduce guided sport harvests compared to the status quo alternative. Many of the remarks associated with the discussion of Alternative 2 in Table 15, would apply to this alternative. This alternative may be a better one for guides operating in areas where harvests of large fish are uncommon. In those areas, Alternative 2 may come very close to a one fish bag limit, whereas, under this alternative, operations in those areas may retain a better prospect of offering their clients harvests of two fish. Moreover, where Alternative 2 may require the measurement of large fish, which some guides have said could be difficult and stressful for the fish, this approach would require measurement of smaller fish, which should be easier, with less risk to crew and clients. Guides would bear increased costs (compared to status quo) associated with bringing carcasses to port for enforcement purposes, and subsequent carcass disposal. Costs may be passed on to clients.
Customers of guides	This alternative would reduce guided harvests and may adversely impact consumers' surplus for clients compared to the status quo. It is possible that some clients would try to minimize consumers' surplus losses by substituting other methods of halibut fishing experiences (including Area 2C unguided or bareboat charter activity, or fishing for halibut in other areas, such as 3A) or fishing for other species. More study would be required to determine whether or not this would happen. Guides may pass on costs of offal disposal if market conditions permit.
Commercial fishermen	This action would reduce the expected reallocation of halibut from commercial fishermen to sport guides in future years, compared to the estimates of the reallocation provided under the status quo. Commercial fishing gross revenues would be reduced to a lesser extent. The impact should be comparable to that under Alternative 2. The discussion in Table 15 applies here. This would be better for commercial fishermen than the status quo.
Seafood consumers	This action would reduce the potential consumers' surplus losses compared to the status quo. The impact should be comparable to that under the Alternative 2, and the discussion in Table 15 applies here.
Other affected parties	<p>This action would benefit persons, firms, and communities relatively more dependent on commercial halibut fishing than on chartered guiding operations.</p> <p>While chartered guides might shift their allocation of time towards fishing for substitute species, such as salmon, ling cod, or rockfish, compared to the status quo, and this could increase the harvests of these species, the impact may be less than under Alternative 2.</p> <p>Increased sport offal discards in some harbors. Costs potentially shared by guides or other community members.</p>

## 7.6.5 Recordkeeping and Enforcement

Alternative 2 would require one halibut to be (depending on the option selected) at least 45, 50, 55, or 60 inches in length, as measured head to tail. Under Alternative 3, both halibut would need to be 32 inches or greater as measured from head to tail. Enforcement of this type of regulation would require on-the-water or dockside measure of harvested halibut by enforcement officers. It would not require any additional reporting requirements for charter operators or charter anglers. However, Alternative 2 would require operators to position fish greater than 43 lb, 60 lb, 82 lb, or 109 lb in such a way that they could be measured. This means that operators would be required to bring their halibut to the side of the vessel or onboard the vessel for measurement.

The capture, measuring, and release of fish this large are not unprecedented in federally managed recreational fisheries. For example, certain shark and marlin species on the Atlantic Coast have minimum size requirements that are comparable to the release sizes considered under Alternative 2. The 2004 Atlantic shark regulations require a 55" minimum size limit applied to the allowable harvest of one shark per vessel per day (with some exceptions). In addition, the regulations require that sharks shall not be removed from the water prior to release. Although a size limit on halibut would impose a burden on operators (more so at the 80 and 109 pound class), similar minimum size regulations have been implemented in other areas of the country.

One difficulty associated with enforcing a bag limit or minimum size requirement is that in situations with multiple anglers, NOAA OLE has difficulty attributing an individual fish to a specific person. These situations require NOAA OLE to attribute fish to a specific person through interviews or investigation, determine a violation based on the harvest for a group of anglers, or observe a person harvesting a fish at sea.

The enforcement of a bag limit requires on-the-water or dockside enforcement to observe a person with an illegal halibut. For these reasons, the bag limit would require regular visits by enforcement officers to areas where halibut are landed. These include remote areas such as lodges as well as urbanized areas such as Sitka or Juneau. In the case of a closed time period, enforcement officers would need to check offloading sites throughout the closure period, including boarding vessels to detect illegally harvested halibut.

As discussed under Alternatives 2 and 4, alternatives associated with maximum or minimum length restrictions would require operators to retain whole halibut, or carcasses from which fillets were removed, until all halibut catch is offloaded from the charter vessel from which they are caught. Offal would then need to be properly disposed of in port or landing or taken offsite. Operators in ports that currently prohibit discards may be required to transport the carcasses to sea for dumping. These costs would be incurred by charter operators, or passed on to their clients if market conditions permit. Ports without a prohibition of discards would need to determine if a fish offal policy is warranted. If so, costs may be placed on charter operators if discard is prohibited, or may be spread more widely if the harbor provides discard services.

Enforcement is a key measure of any fishery harvest management program. In 2003, NOAA Fisheries Service, USCG, Alaska Department of Public Safety (ADPS), and ADF&G all reported that they do not have enforcement programs specifically directed at the recreational charter fishery (Council 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 measures 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 measures 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 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.

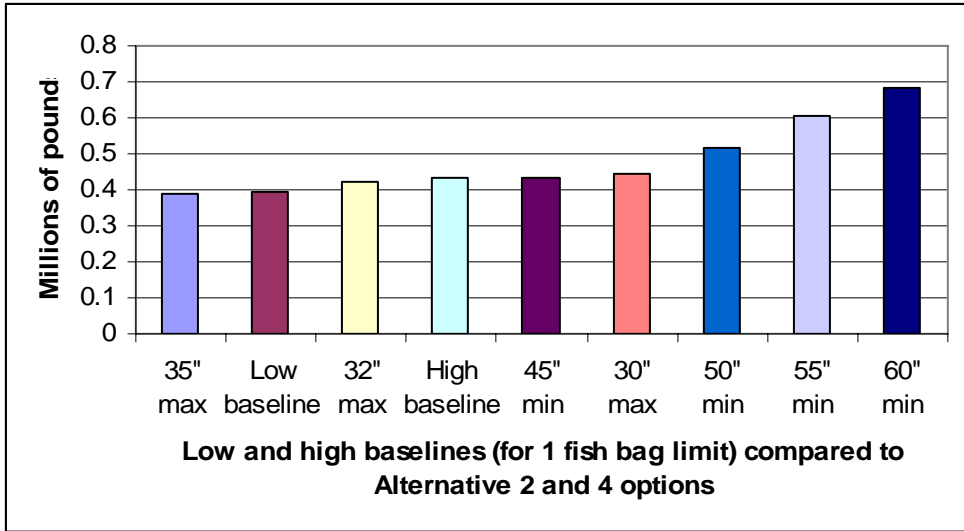
c. Charter operators are required to have a current Coast Guard license to operate. One of the conditions of the license requires the operator to comply with all Federal regulations. Charter operators potentially risk losing their Coast Guard license if they violate Federal fisheries regulations. It 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 measures than might otherwise be expected.

These attributes would encourage compliance and may temper the overall costs associated with enforcing Alternative 2. However, given the current low priority level associated with enforcing the charter halibut bag limit, an increase in enforcement resources or re-prioritization of resources would likely increase compliance with the alternatives. Greater compliance with the proposed action (including the 2-fish bag limit under status quo) would likely be obtained if enforcement resources were increased. This magnitude of increase would require an additional \$600,000 in enforcement funds and four enforcement officers. This increase would allow enforcement officers to inspect a greater proportion of the approximately 20,000 trips taken annually by charter operators in area 2C.

The attributes associated with the charter fisheries, along with an enforcement priority for recreational fisheries, may provide a level of compliance sufficient to ensure the preferred alternative has the desired effect in controlling the charter fishery halibut removals in 2C.

## **7.6.6 Summary and Conclusions**

Figure 10 provides a summary comparison of the projected impacts of the alternatives on guided harvests with the projected impacts of the IPHC's January 2007 season long one fish bag limit proposal.



**Figure 10 Comparison of Estimated 2006 Area 2C guided sport charter harvest reductions associated with Alternatives 2 and 4 with estimated impacts of IPHC action in January 2007**

The projected impacts of the IPHC January 2007 action were estimated in Section 7.4. Low and high baseline projections correspond to different assumptions about the distribution of June 2006 harvests. The low baseline assumes that June harvests were the same in the first and last two weeks of the month. The high baseline reflects the assumption that June harvests were higher (two-thirds of the June harvests) in the second half of the month. Options associated with minimum length restrictions are Alternative 2 options. Options associated with maximum length restrictions are Alternative 4 options. NMFS found it impossible to determine whether Alternative 3 (32 inch minimum on both fish) would have increased or decreased harvests, and has not reported results in Figure 10.

Table 22 summarizes the impacts of the four alternatives. It describes the extent to which they meet the objectives of the action, summarizes information from earlier sections on the costs and benefits of the alternatives to (a) commercial guides, (b) guided anglers, (c) commercial fishermen, (d) seafood consumers, and (e) other parties.

**Table 22 Summary of the RIR analysis and description of how the impacts of the four alternatives vary for different groups that may be affected by this action.**

	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>
<b>Description</b>	Two fish bag limit retained without change.	Two fish bag limit retained, but second fish is subject to a minimum size limit. Alternative minimum limits of 45, 50, 55, and 60 inches considered.	Two fish limit with 32 inch minimum size limit on each retained fish.	Two fish bag limit retained, but one fish is subject to a maximum size limit. Maximum limits of 30, 32, and 35 inches are under consideration.
<b>Does this alternative meet the objectives of this action</b>	Does not meet the objectives because it does not restrict further growth in guided sport harvests.	The 45 inch minimum size reduces guided harvests to an extent that is comparable to the IPHC action, but does it with less impact on charter operators. It therefore meets the objectives of this action. Other options reduce harvests more than is necessary, imposing more of a burden on guided operators, and they therefore do not fully meet the objectives of the action	Because of the uncertainty associated with the impact of this action it cannot be said to meet the objectives of the action.	These options reduce guided harvests to an extent comparable to the IPHC's January proposal, but do so with less impact on the guided charter operations. They thus appear to be fully consistent with the objectives of this action.
<b>Charter operators</b>	Charter harvests have been increasing and now exceed the GHL. If they continue to increase at the 6.8% rate seen since 1995, the GHL overage might rise to about 2.25 million pounds by 2015.  This option has no adverse impacts on charter operators. Note that it is likely that, while aggregate revenues would tend to increase, new entry into this competitive industry would tend to drive long run profits towards zero.	With the 45 inch option, charter operator catch is expected to drop to an extent comparable to levels expected under the IPHC January action. They may also grow more slowly in the future. Other options are expected to produce less of an impact.  This option may reduce short run profit levels or create short run losses for operators. As under Alternative 1, in the long run entry or exit by firms in this industry, in response to positive or negative profits should tend to drive profits to zero.  Enforcement requirements may create offal discard costs, which may be passed on to clients.	NMFS is unable to determine whether this action will increase or decrease guideline charter halibut mortality for minimum size limits close to 32 inches, such as limits from 32 to 36 inches. Under the circumstances NMFS finds it difficult to project the direction of impacts on different affected groups.	Charter operator catch will drop to an extent comparable to that under Alternative 2. The discussion of Alternative 2 should be largely applicable here. This option may have a smaller adverse impact on guides operating in areas where locally depleted halibut stocks reduce the relative availability of larger halibut.  This option may reduce short run profit levels or create short run losses for operators. As under Alternative 1, in the long run entry or exit by firms in this industry, in response to positive or negative profits should tend to drive profits to zero.  Enforcement requirements may create offal discard costs, which may be passed on to clients.

<b>Charter clients</b>	This action would produce no change in current level of consumers' surplus, or in possible changes in that surplus through time. This fishery has been growing in recent years.	Consumers' surplus for this alternative is likely to lie below Alternative 1 levels, since this reduces the guided sport harvest. Clients may bear costs of offal discard.	As noted above, NMFS is unable to determine whether this alternative would reduce or increase guided sport harvests. Because of this uncertainty, NMFS is unable to evaluate the impacts on user groups.	Consumers' surplus for this alternative is likely to lie below Alternative 1 levels, since this reduces the guided sport harvest. Clients may bear costs of offal discard.
<b>Commercial fishing operations</b>	As guided sport harvest increases, the commercial share of the Total CEY is expected to decrease. If the charter harvest increased at the recent long-term rate of 6.8% a year through 2015, total gross ex-vessel revenue losses to commercial halibut longliners could be about \$8.5 million once the Total CEY had fully adjusted, according to one modeling exercise.	Under all options, expect a reallocation of halibut from guided sport charters to commercial halibut fishermen, as well as a decline in the potential growth rate of the chartered halibut fishery. Increased gross ex-vessel revenues for the commercial fishing industry compared to Alternative 1.		Under all options, expect a reallocation of halibut from guided sport charters to commercial halibut fishermen, as well as a decline in the potential growth rate of the chartered halibut fishery. Increased gross ex-vessel revenues for the commercial fishing industry compared to Alternative 1.
<b>Seafood consumers</b>	As commercial production declines, consumers' surplus from halibut consumption is also expected to decline. If guided charter growth continued at observed long term rates through 2015, the surplus could decline to about \$1.8 million once the Total CEY had fully adjusted, according to one modeling exercise.	Under all options expect consumers' surplus losses under this alternative to be smaller than those under Alternative 1.		Under all options expect consumers' surplus losses under this alternative to be smaller than those under Alternative 1.
<b>Other resource users</b>	Persons associated with guided charters (as crew or suppliers) would tend to benefit, persons associated with commercial halibut fishing (as crew, suppliers, and customers) would tend to lose. In practice there are overlaps between these groups. Both industries are represented in local communities, and impacts would depend on which sector was more important locally.	Persons and communities relatively more involved with commercial halibut fishing would gain relative to Alternative 1, persons associated with charter operations would lose relative to Alternative 1. Enforcement requirements may create offal discard costs for harbors.		Persons and communities relatively more involved with commercial halibut fishing would gain relative to Alternative 1, persons associated with charter operations would lose relative to Alternative 1. Enforcement requirements may create offal discard costs for harbors.

<b>Enforcement and recordkeeping requirements</b>	This alternative does not require changes in enforcement or recordkeeping requirements.	This alternative does not require changes in enforcement or recordkeeping requirements. It does require guided charter operators to measure larger fish to ensure they meet the minimum size limits. Some operators have indicated that this may be a difficult for them. Requires operators to retain carcasses at point of landing. Potential for increase in offal discard costs.	This alternative does not require changes in enforcement or recordkeeping requirements.	This alternative does not require changes in enforcement or recordkeeping requirements. Under this alternative fishermen will be measuring smaller fish than under Alternative 2. This should be less difficult. Requires operators to retain carcasses at point of landing. Potential for increase in offal discard costs.
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## 8.0 REGULATORY FLEXIBILITY ACT

### 8.1 Introduction

In January 2007, the IPHC modified its two fish bag limit for clients of guided charter operations in its Regulatory Area 2C, to one fish per client for June 15 to July 31. The IPHC’s action was a response to increasing guided charter harvests that in recent years had exceeded a non-binding guideline harvest level (GHL) for the guided charter operations that had been established by the Council. In March 2007, the Secretary of State, with the concurrence of the Secretary of Commerce, rejected the IPHC’s one fish bag limit in Area 2C, noting the potential problems this would pose for guided charter operations.

This Initial Regulatory Flexibility Analysis (IRFA) evaluates the impacts on small entities of a suite of alternative measures to impose constraints on the guided charter harvests that are comparable to those the IPHC sought, while minimizing the burden on charter operators, their clients, on the communities in which the operations are based, and on related fisheries. This IRFA addresses the requirements of the Regulatory Flexibility Act (as described below).

### 8.2 The purpose of an IRFA

The Regulatory Flexibility Act (RFA), first enacted in 1980, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a Federal regulation. Major goals of the RFA are: (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action.

On March 29, 1996, President Clinton signed the Small Business Regulatory Enforcement Fairness Act. Among other things, the new law amended the RFA to allow judicial review of an agency’s compliance with the RFA. The 1996 amendments also updated the requirements for a final regulatory flexibility analysis, including a description of the steps an agency must take to minimize the significant economic



impact on small entities. Finally, the 1996 amendments expanded the authority of the Chief Counsel for Advocacy of the Small Business Administration (SBA) to file *amicus* briefs in court proceedings involving an agency's alleged violation of the RFA.

In determining the scope, or 'universe', of the entities to be considered in an IRFA, the National Marine Fisheries Service (NMFS) generally includes only those entities that can reasonably be expected to be directly regulated by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (e.g., user group, gear type, geographic area), that segment would be considered the universe for the purpose of this analysis. NMFS interprets the intent of the RFA to address negative economic impacts, not beneficial impacts, and thus such a focus exists in analyses that are designed to address RFA compliance.

Data on cost structure, affiliation, and operational procedures and strategies in the fishing sectors subject to the proposed regulatory action are insufficient, at present, to permit preparation of a "factual basis" upon which to certify that the preferred alternative does not have the potential to result in significant adverse economic impacts on a substantial number of small entities (as those terms are defined under RFA). Because, based on all available information, it is not possible to 'certify' this outcome, should the proposed action be adopted, a formal IRFA has been prepared and is included in this package for Secretarial review.

### **8.3 What is required in an IRFA?**

Under 5 U.S.C., Section 603(b) and (c) of the RFA, each IRFA is required to contain:

- A description of the reasons why action by the agency is being considered;
- A succinct statement of the objectives of, and legal basis for, the proposed rule;
- A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply;
- A description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
- An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap or conflict with the proposed rule;
- A description of any significant alternatives to the proposed rule which accomplish the stated objectives (*of the proposed action*), consistent with applicable statutes, and which would minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives, such as:
  1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
  2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
  3. The use of performance rather than design standards; and
  4. an exemption from coverage of the rule, or any part thereof, for such small entities.

### **8.4 What is a small entity?**

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

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

The SBA has established size criteria for all major industry sectors in the United States, including fish harvesting and fish processing businesses. A business involved in fish harvesting is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual receipts not in excess of \$4.0 million, for all its affiliated operations worldwide. A seafood processor is a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. A business involved in both the harvesting and processing of seafood products is a small business if it meets the \$4.0 million criterion for fish harvesting operations. Finally, a wholesale business servicing the fishing industry is a small business if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. 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 M. The SBA definition of a small business applies to a firm’s parent company and all affiliates as a single entity.

The SBA has established “principles of affiliation” to determine whether a business concern is “independently owned and operated.” In general, business concerns are affiliates of each other when one concern controls or has the power to control the other, or a third party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question. The SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic and foreign affiliates, regardless of whether the affiliates are organized for profit, in determining the concern’s size. However, business concerns owned and controlled by Indian Tribes, Alaska Regional or Village Corporations organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601), Native Hawaiian Organizations, or Community Development Corporations authorized by 42 U.S.C. 9805 are not considered affiliates of such entities, or with other concerns owned by these entities solely because of their common ownership.

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

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

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

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

## **8.5 What is this action?**

This action tightens regulatory constraints on the number and/or size of halibut that may be retained by clients of commercial guided sport fishing operations in Southeast Alaska (IPHC Area 2C).

The preferred alternative would retain a two fish bag limit for halibut, but would require that one of the fish be less than 32 inches in size.

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

As described more fully in Chapter 1, beginning in 2004 and in each subsequent year, halibut guided charter harvests have exceeded a GHF of 1.432 million pounds per year that became effective in 2004. A preliminary estimate of the 2006 guided sport halibut harvest is 2.035 million pounds. Although the GHF was not promulgated as a hard cap, it was intended as an expression of the acceptable level of halibut removals by this sector. The increasing guided sport charter harvest amounts comes at the expense of reduced harvest allocations for the Area 2C commercial halibut fishery, which operates under an individual fishing quota (IFQ) program.

In January 2007, the IPHC addressed this issue by implementing a one fish bag limit in the halibut charter fishery from June 15 to July 31. In March 2007, the Secretary of State rejected the IPHC’s recommendation, because of concerns about the potential for unnecessary adverse impacts on guided charter operations. NMFS undertook an analysis of the expected economic and operational impacts of adopting a one fish bag limit and of alternatives to that approach, which appeared to produce guided harvest reductions that were comparable to those from the IPHC action.

## **8.7 Objectives and Legal Basis of the Proposed Action**

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 Areas 2C by an amount comparable to that associated with the IPHC action in January, but in a manner that produces smaller adverse impacts on the charter fishery, its sport fishing clients, the coastal communities that serve as home ports for this fishery, and on fisheries for other species.

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 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.

## **8.8 Number and Description of the Small Entities Directly Regulated by this Action**

Federal courts and Congress have indicated that a RFA analysis should be limited to small entities subject to the regulation.<sup>20</sup> As such, small entities to which the rule will not apply are not considered in this analysis.

The proposed alternatives would apply to businesses providing services in the guided halibut sport fishery in IPHC Regulatory Area 2C. There do not appear to be any entities that are directly regulated by the proposed action that would qualify as either “small nonprofit” entities, nor “small government jurisdictions.”

As shown in Table 6 above, 381 Area 2C guided charter businesses reported trips with “bottom fish” fishing effort in 2005 in IPHC Area 2C. Targeted halibut charter fishing trips are not reported separately, but instead are included under this general target heading. Nonetheless, the vast majority of “bottom fish” trips are believed to be primarily charters targeting halibut. These businesses operated about 650 charter vessels that indicated bottom fish effort in Area 2C. Prior analyses, such as the 2003 GHF analysis and the 1997 GHF (conducted by University of Alaska, Anchorage Institute for Social and Economic Research [ISER] and Council staff) indicate a substantial amount of entry and exit from the charter sector in Area 2C. These analyses concluded at the time that all of the operations are likely “small entities” based upon SBA criteria, since they were expected to have average annual gross revenues of less than the annual limit of \$6.5 million.

The largest of the 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 M per year, but that it was also possible that all of the entities involved in charter halibut harvest grossed less than that amount. Data are insufficient to permit this analysis to verify these estimates.

The estimation of the number of small entities is likely to be over inclusive because of the limited information on vessel ownership, affiliations and operator revenues. However, it is highly likely that nearly all entities directly regulated by the proposed action qualify as small businesses.

## **8.9 Adverse Economic Impacts on Directly Regulated Small Entities**

The entities directly regulated by this action are guided sport charter operations active in IPHC Area 2C. The existing bag limit for the clients of these operations would be modified so that only one of the two fish permitted to be retained could be greater than 32 inches in overall length.

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<sup>20</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).

The potential impacts of this action on these operations were described in Section 7.6 of the RIR. This could be expected to reduce the halibut harvest, in terms of “pounds” retained, for these operations, and could reduce the demand for their services, although the extent of this outcome is uncertain. This is expected to reduce overall harvests in the guided sport fishery, and may reduce the growth of the charter sector. In the short run, this might reduce the market price for charter halibut trips, and, by implication, reduce profit below normal competitive levels; in the medium to longer term, firms are likely to exit the business, so that the prices and profits of the remaining operations may tend to recover towards previous levels, although at a new equilibrium that cannot be estimated at present. Very little systematic information is available on charter boat operations or on how charter boat clients and operators may respond to the “second fish” size limit. The demand for charter boat trips depends on a number of factors affecting the nature of the experience, and the halibut CPUE is only one of these. It is not possible, at present, to predict quantitatively the impact on gross or net revenues, or on entry or exit from the industry.

NMFS is unable to estimate the profits for these operations. Moreover, this action will impose a burden on the charter boat operators to measure some halibut before landing them. This may be difficult for fish of this large size and weight. Guides will be required to retain carcasses to point of landing. This may lead to increased costs depending on the carcass discard policies of the ports from which they operate. Some ports may prohibit discard of the carcasses in port, necessitating transport and dumping at sea. Guides may pass some or all of these costs to clients, depending on market conditions.

## **8.10 Recordkeeping and Reporting Requirements**

NMFS has not identified any new recordkeeping or reporting requirements associated with this action.

## **8.11 Federal rules that may duplicate, overlap or conflict with proposed action**

NOAA Fisheries is unaware of any duplicative, overlapping, or conflicting federal rules.

## **8.12 Description of Significant Alternatives**

As noted above, an IRFA should supply a description of any significant alternatives to the proposed rule which accomplish the stated objectives (*of the proposed action*), consistent with applicable statutes, and which would minimize any significant economic impact of the proposed rule on small entities.

Three alternatives to the preferred alternative were considered. These are summarized in Table 23 below. The alternatives and their options are described, as well as their impacts on the directly regulated small entities, and the reasons why they were not adopted. On the basis of the best available information, the “preferred alternative” imposes the minimum adverse economic impact on directly regulated small entities, while achieving the objectives of the regulatory action, among all the alternatives available to the agency. The preferred alternative incorporates several provisions specifically intended to reduce the potential economic and operational burden on small entities, relative to the other alternatives considered (e.g., avoids requiring operators to incur the physical risk of measuring large halibut; recognizes the significance of successfully filling the legal bag limit for clients, even in areas where smaller fish predominate, but not requiring the second fish to be a large in order to be retained).

**Table 23 Summary of expected effects of alternatives, Area 2C**

	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>
<b>Alternative</b>	Two fish bag limit retained without change.	Two fish bag limit retained, but second fish is subject to a minimum size limit.	32 inch minimum size limit on retained fish.	Two fish bag limit retained, but one fish subject to a maximum size limit.
<b>Options</b>	No options considered	Alternative minimum limits of 45, 50, 55, and 60 inches for second retained fish	32 inch	30, 32, and 35 inch maximum for second retained fish
<b>Impact on charter operators</b>	Charter share of catch is expected to increase through time. If it continues to increase at the 6.8% rate seen since 1995, harvests might rise to 3.7 million pounds by 2015. This option has no adverse impacts on charter operators. Note that it is likely that, while aggregate revenues would tend to increase, new entry into this competitive industry would tend to drive long run profits towards zero.	<p>With the 45 inch option, charter operator catch will drop by somewhat more than the baseline, although the difference may be small compared to the uncertainties in this analysis. Higher minimum sizes reduce harvests by amounts that are not as comparable with the IPHC January action.</p> <p>This option may reduce short run profit levels or create short run losses for operators. As under Alternative 1, in the long run entry or exit by firms in this industry, in response to positive or negative profits should tend to drive profits to zero.</p> <p>Some charter operators have expressed concerns over difficulty in measuring larger fish. In areas with limited CPUE, or a preponderance of small fish this alternative may approximate a one fish bag limit.</p> <p>Operators may incur increased costs for disposing of halibut carcasses, due to enforcement requirements that carcasses be retained to point of landing. Guides may pass these costs on to clients, depending on market conditions.</p>	NMFS is unable to determine whether this action will increase or decrease guideline charter halibut harvests for minimum size limits close to 32 inches. Under the circumstances NMFS finds it difficult to project the direction of impacts on different affected groups.	<p>With the 32 inch option, charter operator harvests appear to drop to the range of baseline estimates, and to be comparable with the levels associated with the IPHC January action. The 35 inch option falls just outside the lower end of the baseline, and given the uncertainty associated with this analysis, may also be comparable, although less so than the 32 inch limit. The 30 inch limit is outside the upper end of the baseline range and also appears to be less comparable than the 32 inch option.</p> <p>This option may reduce short run profit levels or create short run losses for operators. As under Alternative 1, in the long run entry or exit by firms in this industry, in response to positive or negative profits should tend to drive profits to zero.</p> <p>Charter operators should have less difficulty measuring the "second" fish than under Alternative 2. There may be fewer adverse impacts on operators in areas with low CPUE, or a preponderance of small fish, than Alternative 2.</p> <p>Operators may incur increased costs for disposing of halibut carcasses, due to enforcement requirements that carcasses be retained to point of landing.</p>

				Guides may pass these costs on to clients, depending on market conditions.
<b>Why chosen or not chosen</b>	This alternative would have no adverse impact on charter operation revenues or business. However, this alternative would not meet the objectives of this action to reduce guided charter harvests to levels comparable to those associated with the IPHC action of January 2007, while minimizing the impact on guided charter operations.	One option was associated with estimated harvest impacts that might be comparable to those of the preferred alternative. However, potential difficulties with measuring halibut for compliance with the rule, and potential adverse impacts on operations where halibut CPUE was low, or a preponderance of small fish are present, appear to be somewhat greater for this alternative than Alternative 4.	This alternative was not chosen because of the difficulty in determining the impact on guided charter discard and harvest. There was too much uncertainty to determine if the action would (1) reduce the harvest to levels comparable to the IPHC January action, or (2) what the impact on guided sport charter operators and related parties would be.	<u>PREFERRED ALTERNATIVE</u> : The 32 inch option is the preferred alternative. It appears to reduce guided charter harvests by levels comparable to the IPHC's January 2007 action, and to do so with lesser adverse impacts than the one fish bag limit, or Alternative 2. Thus, it most effectively achieves the stated objectives for the action, while simultaneously recognizing the potential adverse economic impacts that may accrue to directly regulated small entities, and making all practicable provisions to minimize these.

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## APPENDIX A

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

Scott Meyer, Alaska Department of Fish and Game  
March 7, 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  $r_i$  = the proportion of halibut released by target category ( $\sum r_i = 1$ ), and  
 $M_i$  = the mortality rate by target category.

The mortality rate for each target category was calculated as

$$M_i = (C_i M_c) + (O_i M_o),$$

where  $C_i$  = the assumed proportion of halibut released by circle hooks in each target category,  
 $M_c$  = the assumed mortality rate for circle hooks,  
 $O_i$  = 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 were 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 effort targeted on bottomfish and salmon.

**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.



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