**DRAFT FOR INITIAL REVIEW**

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

**Date**: March 12, 2007

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**Abstract**: This analysis 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 Council is considering two alternatives. In addition to the no action alternative, the Council is considering the following eight options under Alternative 2 to reduce halibut harvests to the GHL of 1.432 Mlb in Area 2C: (1) No more than one trip per vessel per day; (2) No harvest by skipper and crew; (3) Annual limits of four fish or five fish per angler; (4) Reduced bag limits of one fish per day in July, July, August, or for the entire season; (5) A one-fish bag limit with the option to harvest a second fish larger than 45 inches, 50 inches, 55 inches, or 60 inches; (6) Closing the season after August 15th, September 1st, or September 15th; (7) Closing one or more days during the week to halibut fishing; (8) A minimum size limit of 32 inches.

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

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

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## ABBREVIATIONS

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

## EXECUTIVE SUMMARY

This analysis assesses the potential biological, social, and economic impacts of implementing regulations to control harvests in the charter halibut fisheries in International Pacific Halibut Commission (IPHC) Area 2C. The proposed action was initiated in October 2005, when the Council reviewed Alaska Department of Fish and Game (ADF&G) data that indicated that the 2004 guideline harvest level (GHL) in both areas had been exceeded. In response, the Council developed an analysis of alternatives for implementing management options to reduce harvests below the GHLs, as identified in the Council's GHL policy. The Council selected a 5-fish annual limit as its preferred alternative for Area 2C in April 2006. The Council subsequently rescinded its preferred alternative, upon request by NMFS because of high implementation and enforcement costs. At that same time, ADF&G data for 2005 and 2006 indicated that the GHL had been exceeded by increasing levels in those two years. The Council added several management options to Alternative 2, which resulted in this revised analysis.

The purpose of the proposed action is to reduce charter halibut harvests in Area 2C to the GHL. The GHL is intended to stop the reallocation from the commercial to charter sector. In addition to the no action alternative, the Council is considering the following eight options under Alternative 2 to reduce halibut harvests to the GHL of 1.432 Mlb in Area 2C.

- Option 1- No more than one trip per vessel per day;
- Option 2- No harvest by skipper and crew;
- Option 3-Annual limits of four fish or five fish per angler;
- Option 4-Reduced bag limits of one fish per day in July, July, August, or for the entire season;
- Option 5- A one-fish bag limit with the option to harvest a second fish larger than 45 inches, 50 inches, 55 inches, or 60 inches;
- Option 6-Closing the season after August 15$^{th}$, September 1$^{st}$, or September 15$^{th}$;
- Option 7- Closing one or more days during the week to halibut fishing;
- Option 8- A minimum size limit of 32 inches.

### Expected Effect of Each Option or Sub-Option

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

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

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

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

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| One Trip per Day | Lower Bound | 0.038 | 1.8 | 2.6 | 139.5 |
| | Upper Bound | 0.049 | 2.4 | 3.4 | 138.7 |

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

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

Effective May 26, 2006, ADF&G banned harvest by skipper and crew while paying clients are on a charter vessel. The analysis expects ADF&G to renew the emergency order (EO) this year. Data from 2006 indicate that the prohibition saved between 3.8 and 4.2 percent of the harvest (Table 2). This range is consistent with previous estimates (NPFMC, 2006). The analysis expects that continuation of the prohibition, either under an EO or as a change in federal regulation, would reduce future harvests by approximately 4 percent. This estimate is included in the modeled effects under the no action alternative.

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

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest |
|---|---|---|---|
| No Harvest By Skipper and Crew | Lower bound | 0.078 | 3.8% |
| | Upper Bound | 0.086 | 4.2% |

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

## Option 3 – Effect of an Annual Limit

Option 3, an annual limit of either four or five fish, would have reduced harvest in 2006 by 0.190 (five-fish limit) and 0.335 Mlb (four-fish limit). These amounts are equal to between 9.3 percent and 16.3 percent of the 2006 harvest, respectively. With these options, the GHL overage would have stood at between 128.7 percent and 118.7 percent, respectively instead of the estimated 142.1 percent (Table 3). While key informant interviewees reported that this option would disproportionately affect operators of lodges and multi-day packages, lodge operators indicated that this option is preferable to other options. The four-fish limit is the only option, aside from a change in the bag limit, which results in a more than a 20 percent decline in the GHL overage. NMFS has expressed concerns about the enforcement costs of this option. However, the analysis notes that the 2006 logbooks have lowered enforcement costs because they track angler harvest by sport fishing license number.

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

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Annual Limit | Four Fish | 0.335 | 16.4 | 23.4 | 118.7 |
| | Five Fish | 0.190 | 9.3 | 13.3 | 128.8 |

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

### Option 4 – Effect of Lower Bag Limits

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

The analysis estimates that:

- A reduction in bag limit in June 2006 would have reduced total season harvest between 0.204 and 0.297 Mlb, which is equivalent to between 10.0 percent and 14.6 percent of the total 2006 harvest. As noted above, key informant interviews indicated that, between demand transfer and demand reduction, the base estimate of 10 percent may be the best estimate.

- A reduction in bag limit in July 2006 would have reduced total season harvest between 0.295and 0.430 Mlb, which is equivalent to between 14.5 percent and 21.1 percent of the total 2006 harvest. As noted above, key informant interviews indicated that the base estimate of 14.5 percent might be the best estimate.

- A reduction in bag limit in August 2006 would have reduced total season harvest between 0.244 and 0.356 Mlb, which is equivalent to between 12.0 percent and 17.5 percent of the total 2006 harvest. As noted above, key informant interviews indicated that the base estimate of 12 percent might be the best estimate.

- The full season bag limit reduction would have reduced total season harvest between 0.808 and 1.178 Mlb, which is equivalent to a 39.7 and 57.9 percent reduction in the harvest. This level of reduction would have reduced the GHL overage from 142.1 percent of the GHL to between 59.9 percent and 85.7 percent of the GHL.

These results do not include changes in discard mortality, because discard mortality is not included in IPHC calculations for the charter fleet. However, the full discussion of this analysis in Section 2.6 discusses this effect on these estimates. Additionally, these estimates do no include a shift towards higher average weight. As discussed in Section 2.6, there is not enough information about angler behavior to make reliable estimates of this type of shift.

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

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

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| June One-fish bag limit | No Demand Decline | 0.204 | 10.0 | 14.2 | 127.9 |
| | 30% Demand Decline | 0.297 | 14.6 | 20.7 | 121.4 |
| July One-fish bag limit | No Demand Decline | 0.295 | 14.5 | 20.6 | 121.5 |
| | 30% Demand Decline | 0.430 | 21.1 | 30.0 | 112.1 |
| August One-fish bag limit | No Demand Decline | 0.244 | 12.0 | 17.1 | 125.1 |
| | 30% Demand Decline | 0.356 | 17.5 | 24.9 | 117.3 |
| Full Season One-fish bag limit | No Demand Decline | 0.808 | 39.7 | 56.4 | 85.7 |
| | 30% Demand Decline | 1.178 | 57.9 | 82.2 | 59.9 |

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

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

Option 5 would establish a one-fish bag limit, with an option to harvest a second fish above a minimum length. The option includes four sub-options of establishing a 45 inch, 50 inch, 55 inch, or 60 inch minimum length for the second fish. As with Option 4, it may reduce angler demand for charter trips. However, key informant interviewees indicated that this option would likely lead to a much smaller reduction in demand than a full-season bag limit reduction. They estimated demand reductions could be about 10 percent (Table 5). This summary presents the no demand decline and 10 percent demand decline scenarios as high and low estimates of the potential effects of these options. The analysis estimates that:

- A 45 inch minimum length on the second fish would have reduced 2006 harvest in Area 2C between 0.434 and 0.597 Mlb. These amounts are equivalent to a 21.3 and 29.3 percent decline in 2006 harvest. The GHL overage would have declined from 142.1 percent of the GHL to between 100.4 percent and 111.8 percent of the GHL.

- A 50 inch minimum length on the second fish would have reduced 2006 harvest in Area 2C between 0.516 and 0.671 Mlb. These amounts are equivalent to a 25.4 and 33.0 percent decline in 2006 harvest. The GHL overage would have declined from 142.1 percent of the GHL to between 95.3 percent and 106.0 percent of the GHL.

- A 55 inch minimum length on the second fish would have reduced 2006 harvest in Area 2C between 0.604 and 0.749 Mlb. These amounts are equivalent to a 29.7 and 36.8 percent decline in 2006 harvest. The GHL overage would have declined from 142.1 percent of the GHL to between 89.8 percent and 99.9 percent of the GHL.

- A 60 inch minimum length on the second fish would have reduced 2006 harvest in Area 2C between 0.684 and 0.822 Mlb. These amounts are equivalent to a 33.6 and 40.4 percent decline in 2006 harvest. The GHL overage would have declined from 142.1 percent of the GHL to between 84.7 percent and 94.3 percent of the GHL.

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

**Table 5. Summary Effect of Size Limits for a Second fish**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Option For A Second Fish-45" | No Demand Decline | 0.434 | 21.3 | 30.3 | 111.8 |
| | 10% Demand Decline | 0.597 | 29.3 | 41.7 | 100.4 |
| Option For A Second Fish-50" | No Demand Decline | 0.516 | 25.4 | 36.1 | 106.0 |
| | 10% Demand Decline | 0.671 | 33.0 | 46.9 | 95.3 |
| Option For A Second Fish-55" | No Demand Decline | 0.604 | 29.7 | 42.2 | 99.9 |
| | 10% Demand Decline | 0.749 | 36.8 | 52.3 | 89.8 |
| Option For A Second Fish-60" | No Demand Decline | 0.684 | 33.6 | 47.8 | 94.3 |
| | 10% Demand Decline | 0.822 | 40.4 | 57.4 | 84.7 |

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

## Option 6 – Effect of Season Closure Dates

Option 6 establishes a season ending date of August 15th, August 31st, or September 15th. Based on key informant interviews, the economic effects of this option and its efficacy are highly correlated. The earlier the closing date, the more effective the option is at lowering harvest and the higher the likelihood that businesses will not be able to make the minimum number of client days at sea they need to stay open. The analysis found that:

- An ending date of August 15th would have reduced expected harvest by 0.334 Mlb or 16.4 percent of the 2006 harvest (Table 6). This date would have reduced the GHL overage from 142.1 percent to 118.8 percent.
- An ending date of August 31st would have reduced expected harvest by 0.076 Mlb or 3.7 percent of the 2006 harvest. This date would have reduced the GHL overage from 142.1 percent to 136.8 percent.
- An ending date of September 15th would have reduced expected harvest by 0.015 Mlb or 0.7 percent of the 2006 harvest. This date would have reduced the GHL overage from 142.1 percent to 14.1 percent.

These estimates do not account for some anglers who may fish before the closure date. These estimates should be viewed as the short-term effect of the options, with an increasing reduction in long-term efficacy the longer this option is in place. These estimates essentially assume that the closure date was announced mid-season and no anglers were able to adapt to the change. There are no empirical data that would allow the analysis to estimate how quickly anglers would adapt.

**Table 6. Summary Effect of a Season Closure Date**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Season Closure | Aug 15th | 0.334 | 16.4 | 23.3 | 118.8 |
| | Aug 31st | 0.076 | 3.7 | 5.3 | 136.8 |
| | Sept 15th | 0.015 | 0.7 | 1.0 | 141.1 |

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

## Option 7 – Effect of the Day of the Week Closures

Option 7 provides an option to close a day of the week to halibut charter fishing. As noted in Section 2.6, the difference in effort and harvest between days is very small, so the analysis provides the estimated effect of closing a generic day. The analysis estimates that a one-day closure would reduce harvest by 0.087 Mlb or 4.3 percent of total 2006 harvest (Table 7). This estimates accounts for the fact that most anglers would be able to find replacement seats on vessels during other days of the week. This reduction would have reduced the GHL overage from 142.1 percent of the GHL to 136.0 percent of the GHL. A two-day closure is more effective, because a lower percentage of displaced anglers would find replacement seats. The analysis estimates that a two-day closure would have lowered 2006 harvest by 0.291 Mlb or 14.3 percent.

**Table 7. Summary Effect of a Day of the Week Closure**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Weekday Closure | One Day-Best Estimate | 0.087 | 4.3 | 6.1 | 136.0 |
| | Two Days-Best Estimate | 0.291 | 14.3 | 20.3 | 121.8 |

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

Key informant interviews indicated that the economic effects of this option would disproportionately fall on operators with the highest investment in fixed assets whose business model consists of going out every day or nearly every day. Part-time operators would be less affected if they had flexibility to move their operating days around the closure. Additionally, the analysis shows that communities where cruise ships only call on one or two days per week could disproportionate effects if the closure date coincided with cruise visits.

## Option 8 – Effect of Minimum Size Limits

Empirical evidence from other halibut fisheries (e.g., Area 2A) indicate that minimum size limits in the past resulted in increases in total harvest weight (IPHC 2007), rather than expected declines. The analysis in Section 2.6 shows that if one-in-three fish saved by the minimum size limit is replaced by an average sized fish from above the minimum size limit, then the total harvest weight will increase. The analysis shows that replacement fish do not have to be extraordinarily large fish. Simply replacing better than one in three 9-10 lb fish with a 27-30 lb fish will result in an increase in total harvest weight (Table 8). While IPHC survey data show that this type of replacement is possible, several key informant interviewees indicated that this type of replacement would have been difficult in 2006 because the commercial and charter fleets were clustered closer to shore because of high fuel costs.

**Table 8. Summary Effect of Minimum Size Limits**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Minimum Size Limit of 32” | No Sub Option | Unclear | Unclear | Unclear | Unclear |

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

Key informant interviewees indicated that in certain sub-areas, anglers would have difficulty replacing fish below the limit with fish above the limit. Operators in Sitka and Ketchikan indicated that replacing these fish would be nearly impossible during a standard trip. Thus, certain sub-areas may experience reductions in harvest weight.

For these reasons, it is not possible to accurately predict the effect of this option. While empirical data suggest the possibility of increased total harvest weight for the entire area, key informant interviewees indicate that some savings would likely be seen in the certain sub-areas. Hence, the overall effect of the option is very unclear. For quick reference, Table 9 shows the estimated affect all of the options as if they had been in place in 2006.

**Table 9. Effect of Options of Charter Industry Halibut Harvest (2006) in Area 2C**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| One Trip per Day | Lower Bound | 0.038 | 1.8 | 2.6 | 139.5 |
| | Upper Bound | 0.049 | 2.4 | 3.4 | 138.7 |
| Annual Limit | Four Fish | 0.335 | 16.4 | 23.4 | 118.7 |
| | Five Fish | 0.190 | 9.3 | 13.3 | 128.8 |
| No Harvest by Skipper and Crew | Lower bound | 0.078 | 3.8 | N/A | N/A |
| | Upper Bound | 0.086 | 4.2 | N/A | N/A |
| June One-fish bag limit | No Demand Decline | 0.204 | 20.4 | 14.2 | 127.9 |
| | 30% Demand Decline | 0.297 | 14.6 | 20.7 | 121.4 |
| July One-fish bag limit | No Demand Decline | 0.295 | 14.5 | 20.6 | 121.5 |
| | 30% Demand Decline | 0.430 | 21.1 | 30.0 | 112.1 |
| August One-fish bag limit | No Demand Decline | 0.244 | 12.0 | 17.1 | 125.1 |
| | 30% Demand Decline | 0.356 | 17.5 | 24.9 | 117.3 |
| Full Season One-fish bag limit | No Demand Decline | 0.808 | 39.7 | 56.4 | 85.7 |
| | 30% Demand Decline | 1.178 | 57.9 | 82.2 | 59.9 |
| Option For A Second Fish-45" | No Demand Decline | 0.434 | 21.3 | 30.3 | 111.8 |
| | 10% Demand Decline | 0.597 | 29.3 | 41.7 | 100.4 |
| Option For A Second Fish-50" | No Demand Decline | 0.516 | 25.4 | 36.1 | 106.0 |
| | 10% Demand Decline | 0.671 | 33.0 | 46.9 | 95.3 |
| Option For A Second Fish-55" | No Demand Decline | 0.604 | 29.7 | 42.2 | 99.9 |
| | 10% Demand Decline | 0.749 | 36.8 | 52.3 | 89.8 |
| Option For A Second Fish-60" | No Demand Decline | 0.684 | 33.6 | 47.8 | 94.3 |
| | 10% Demand Decline | 0.822 | 40.4 | 57.4 | 84.7 |
| Season Closure | Aug 15th | 0.334 | 16.4 | 23.3 | 118.8 |
| | Aug 31st | 0.076 | 3.7 | 5.3 | 136.8 |
| | Sept 15th | 0.015 | 0.7 | 1.0 | 141.1 |
| Weekday Closure | One Day-Best Estimate | 0.087 | 4.3 | 6.1 | 136.0 |
| | Two Days-Best Estimate | 0.291 | 14.3 | 20.3 | 121.8 |
| Minimum Size Limit of 32” | No Sub Option | Unclear | Unclear | Unclear | Unclear |

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

Table 10 shows all of the sub-options (including accompanying high and low ranges discussed above) ordered by their effect on the GHL. For example, a full-season, one-fish bag limit with the upper estimate of demand reduction (30 percent) would have reduced 2006 harvest by 82.2 percent of the GHL. This number means that harvest as a portion of the GHL would fall by 82.2 points from 142.1 percent to 59.9 percent of the GHL.

**Table 10. Effect of Options Ordered by Reduction in the GHL**

| Management Option | Sub-Option or Additional Information | Expected GHL Reduction (Percentage Points) | 2006 Harvest as Portion of the GHL with this Option |
|---|---|---|---|
| Full Season One-fish bag limit | 30% Demand Decline | 82.2 | 59.9 |
| Option For A Second Fish-60" Minimum Size | 10% Demand Decline | 57.4 | 84.7 |
| Full Season One-fish bag limit | No Demand Decline | 56.4 | 85.7 |
| Option For A Second Fish-55" Minimum Size | 10% Demand Decline | 52.3 | 89.8 |
| Option For A Second Fish-60" Minimum Size | No Demand Decline | 47.8 | 94.3 |
| Option For A Second Fish-50" Minimum Size | 10% Demand Decline | 46.9 | 95.2 |
| Option For A Second Fish-55" Minimum Size | No Demand Decline | 42.2 | 99.9 |
| Option For A Second Fish-45" Minimum Size | 10% Demand Decline | 41.7 | 100.4 |
| Option For A Second Fish-50" Minimum Size | No Demand Decline | 36.1 | 106.0 |
| Option For A Second Fish-45" Minimum Size | No Demand Decline | 30.3 | 111.8 |
| July One-fish bag limit | 30% Demand Decline | 30.0 | 112.1 |
| August One-fish bag limit | 30% Demand Decline | 24.9 | 117.2 |
| Annual Limit | Four Fish | 23.4 | 118.7 |
| Season Closure | Aug 15th | 23.3 | 118.8 |
| June One-fish bag limit | 30% Demand Decline | 20.7 | 121.4 |
| July One-fish bag limit | No Demand Decline | 20.6 | 121.5 |
| Weekday Closure | Two Days-Best Estimate | 20.3 | 121.8 |
| August One-fish bag limit | No Demand Decline | 17.1 | 125.0 |
| June One-fish bag limit | No Demand Decline | 14.2 | 127.9 |
| Annual Limit | Five Fish | 13.3 | 128.8 |
| Weekday Closure | One Day-Best Estimate | 6.1 | 136.0 |
| No Harvest by Skipper and Crew | Upper Bound | 6.0 | 136.1 |
| No Harvest by Skipper and Crew | Lower Bound | 5.4 | 136.7 |
| Season Closure | Aug 31st | 5.3 | 136.8 |
| One Trip per Day | Upper Bound | 3.4 | 138.7 |
| One Trip per Day | Lower Bound | 2.6 | 139.5 |
| Season Closure | Sept 15th | 1.0 | 141.1 |
| Minimum Size Limit | No Sub Option | Unclear | Unclear |

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

One important feature of Table 10 is that it clearly shows that the only stand-alone options that bring harvest down close to the GHL are the bag limit reduction options (including the option for a second fish above a minimum size). The most effective single option other than a bag limit reduction is the annual limit of four fish. This option is also one of the more acceptable options to operators, although NMFS has recommended against its implementation due to its costs.

Another important feature is that Table 10 shows which options have high and low estimates that bracket the GHL. For example, a 50” minimum size limit on the second fish would likely have results in harvest equivalent to between 95.2 percent and 106.0 percent of the GHL.

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

**Table 11. Qualitative Summary of Effects by Option**

| Option | Expected Size and Durability of Reductions | Effects on Industry | Effect on State Managed Fisheries |
|---|---|---|---|
| One Trip per Vessel per Day | 1.8 to 2.4% reduction in harvest. Anglers will likely adapt rapidly. | Relatively minor effects on the charter industry excepting those businesses that focus on multiple trips per day. Minor benefits for the commercial industry. | State managers expect a concurrent minor reduction in the harvest of some associated species. |
| No Retention by Skipper and Crew | 3.8 to 4.2% reduction. Skipper and crew demand shifts to non-guided recreational sector | Most preferred option for the charter industry with modest benefits for the commercial industry. | State managers expect a concurrent minor reduction in the harvest of some associated species. |
| Annual Limit | 9.3 to 16.4 percent reduction depending on the annual limit. Reduction are likely durable. | Generally, the second most preferred option by the charter industry. Commercial industry would receive sizable benefits. | State managers expect a modest to significant increase in the charter harvest of available salmon species, lingcod, and rockfish. |
| One-fish bag limit | Reductions of between 10 percent and 60 percent depending on the temporal length of the bag limit reduction. Reductions are likely more durable. | Highest economic effect on the charter industry with the highest benefits for the commercial fleet. Least preferred option for the charter industry. | State managers expect a significant increase in the charter harvest of available salmon species, lingcod, and rockfish. |
| Option for a Second Fish with a Minimum Length | Reductions of between 21 percent and 40 percent depending on the minimum length for the second fish. Reductions are likely more durable. | Minor demand reductions expected, but a generally acceptable option for much of the charter fleet particularly at the lower minimum lengths. Modest to high benefits for the commercial fleet. | Charter harvest of state managed species would likely increase by modest amounts. |
| Season Closure Dates | Reductions of less than 1 percent to more than 16 percent depending on when the season closes. Anglers will flexible schedules will adapt rapidly after the first year. | Early season closure dates would likely close businesses while the later closure dates would only have minor effects. Modest, but significant benefits for the commercial fleet from an earlier season closure date. | Harvest of Coho salmon and other species available after the season closure would increase. |
| Weekday Closure | Expect an approximately 4.3 percent reduction for a single day or approximately 14 percent for a two-day closure. Most anglers will adapt very rapidly. | One of the least preferred options for the charter industry with minor benefits for the commercial fleet. | All effort on the closed day would shift to state managed species. While overall effort on that day would likely be lower than in the past, there could be a modest effect on state manage species. |
| Minimum Size Limit | Likely to reduce the number of fish harvested with the possibility of localized savings. Overall effects could be small savings or could result in an increase in overall harvest weight for the entire area. | Could harm the commercial fleet if the total weight increases while increasing costs for the charter fleet. | Charter harvest of state managed species would likely increase by modest amounts. |

## Combining Options

All of the options listed above can be combined with one another with the exception of the bag limit reduction and the option for a second fish exceeding a minimum size, as this latter option simply modifies the former. However, while the options are combinable, it is inappropriate to simply add their estimated effects as many of the options interact with each other. For example, it would be inappropriate to add the effects of a season closure date and a reduction in annual limit because some of the anglers who caught fish under the annual limit might have caught them after the proposed season closure date. Attributing the reduction to both the season closure date and the annual limit would double count the effect of the combined alternative on that angler. In this specific case, the 2006 logbook data would allow ADF&G to determine the portion of estimated savings attributable to an annual limit which would have occurred after specific season closure dates. This capability did not exist before 2006. However, the expedited nature of this analysis only allowed ADF&G time to conduct the analysis necessary to estimate the effects of each proposed option and sub-option. Including sub-options, but excluding the option for no harvest for skipper and crew, leads to more than 50 possible two-option combinations. Thus, even a qualitative discussion would take more time than was available for this analysis. The best the analysis can say is that adding the estimated effect of options together provides a more-than-maximum level estimate of how a combination of options would work together.

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

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

# 1 ENVIRONMENTAL ASSESSMENT

This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) addresses an amendment to federal fishery regulations affecting the charter halibut fishery. The National Environmental Policy Act (NEPA), Executive Order 12866, and the Regulatory Flexibility Act (RFA) 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 Chapter 1.2. Chapter 1.3 describes the alternatives considered for analysis. Chapter 1.4 describes the affected environment. Chapter 1.5 discusses the biological and environmental impacts of the alternatives as required by NEPA, as well as impacts on endangered species and marine mammals. The RIR and IRFA are contained in Sections 2 and 3, respectively.

## 1.1 Introduction

This analysis assesses the potential biological, social, and economic impacts of implementing regulations to control harvests in the halibut charter fisheries in International Pacific Halibut Commission (IPHC) Area 2C (Figure 1).

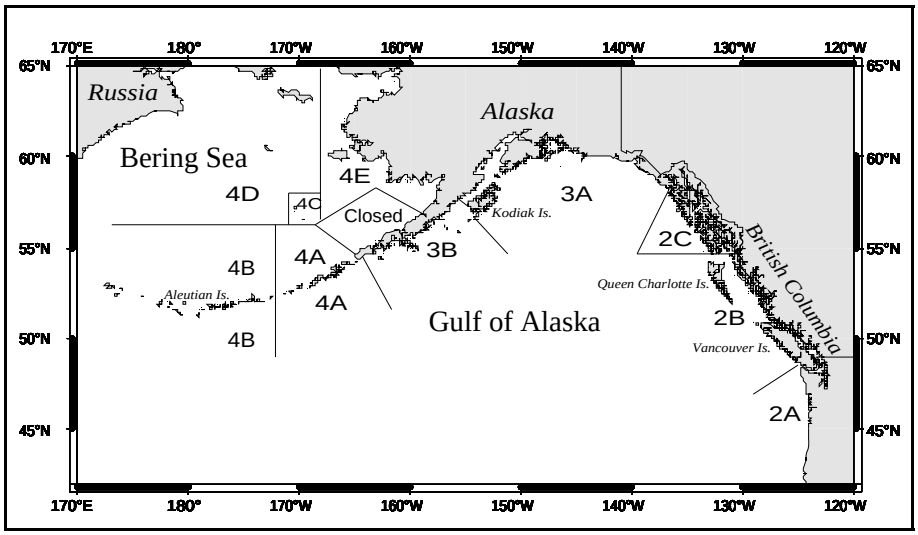


**Figure 1. IPHC regulatory areas for the commercial halibut fishery (Source: IPHC)**

The proposed action was initiated in October 2005, when the Council reviewed 2004 ADF&G data that indicated that the GHLs in both areas had been exceeded. Implementing management measures to reduce harvests below the guideline harvest levels (GHL) is the next management step as outlined in the Council's GHL policy. The Council selected a 5-fish annual limit as its preferred alternative for Area 2C in April 2006 (NPFMC 2006). The Council rescinded its preferred alternative for Area 2C in October 2006, upon request of NMFS because of high implementation and enforcement costs. At that same time, ADF&G data for 2005 and 2006 indicated that the GHL had been exceeded by increasing levels in those two years. The Council added several management options to Alternative 2, which resulted in this revised analysis.

Relevant information from the 1997, 2003, and 2006 GHL analyses (NPFMC 1997, 2003, and 2006) were brought forward into this analysis, as appropriate. Though the previous analyses are incorporated into this document by reference and are part of the administrative record for this action, only this current analysis,

along with the proposed rule, will constitute the regulatory package submitted to the Secretary of Commerce for review. If approved, the preferred alternative would be implemented in 2008 at the earliest.

Federal agencies share management of Pacific halibut *Hippoglossus stenolepis*. The domestic fishery is managed by the IPHC as provided by the Convention Between the United States and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and the Bering Sea (Convention) and the Northern Pacific Halibut Act of 1982 (Halibut Act). The Act authorizes the Council to:

> *"...develop regulations governing the United States portion of Convention waters, including limited access regulations, applicable to nationals or vessels of the United States, or both which are in addition to and not in conflict with regulations adopted by the Commission. Such regulations shall only be implemented with the approval of the Secretary, shall not discriminate between residents of different States, and shall be consistent with the limited entry criteria set forth in Section 303(b)(6) of the Magnuson Act. If it becomes necessary to allocate or assign halibut fishing privileges among various United States fishermen, such allocation shall be fair and equitable to all such fishermen, based upon the rights and obligation in existing Federal law, reasonably calculated to promote conservation, and carried in such manner that no particular individual, corporation, or other entity acquires an excessive share of the halibut fishing privileges..."*

In general, the language in the Magnuson-Stevens Fisheries Conservation and Management Act (MSA), the Halibut Act, and the Convention has been interpreted to assign responsibility to the Council on halibut management issues concerning allocations and limited entry. As reported by McCaughran and Hoag (1992), the Halibut Act granted authority to the Secretary of Commerce through the councils to allocate fishing privileges among US fishermen. The Councils did not become involved in halibut management until NOAA decided that the Commission should no longer consider regulations that relate to domestic allocation. An exchange of letters between NOAA and a Washington State congressman left the division in authority ambiguous. Therefore, an agreement among the IPHC, Pacific and North Pacific Councils, and NMFS decided that all conservation issues be carried out by the IPHC and that purely domestic allocative decisions be made by the Councils (McCaughran and Hoag 1992).

Executive Orders 12866 and 12962, NEPA, Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and RFA mandate that certain issues be examined before a final decision is made. These analytical requirements are addressed in this analysis.

### 1.1.1 Background and history of the charter halibut guideline harvest level

Charter halibut harvests, along with other non-commercial harvests, are unrestricted because there is no specific allocation to the sectors. This results in a reallocation to the charter sector from the commercial sector. Therefore as the charter fishery expands, its harvests reduce the allocation to the commercial halibut fishery and, subsequently, the value of quota shares (QS) in the commercial halibut IFQ Program.

A September 2003 final rule established a GHL for charter halibut harvests and a process whereby the Council is notified if the GHL is exceeded. The GHL established a pre-season estimate of acceptable annual harvests for the halibut fishery in Areas 2C and 3A, beginning in 2004. To accommodate limited growth of the charter fleet while approximating historical harvest levels, the GHL for each area was based on 125 percent of the average of 1995-99 charter harvest estimates, as reported by the ADF&G Statewide Harvest Survey (SWHS). The GHLs were set at 1,432,000 lb net weight in Area 2C and 3,650,000 lb net weight in Area 3A. Upon notification that a GHL has been achieved, the Council may initiate analysis of possible harvest reduction measures and NOAA Fisheries Service may initiate subsequent rulemaking to

reduce charter harvests. While the Council's 2003 preferred alternative included a suite of measures tied to ranges of harvest reductions that were intended to be implemented when harvests exceeded the GHLs, the final rule did not implement the proposed measures. The final rule did not prevent the Council from recommending measures before the charter harvests exceeded a GHL, nor did it obligate the Council to take specific action if the GHL is exceeded. This GHL policy, as implemented, serves only to notify the Council that a specific level of charter harvests has been achieved. A history of GHL actions by the Council is appended to this analysis.

## 1.2 Purpose and Need for the Action

The purpose of the proposed action is to reduce charter halibut harvests in Area 2C to the guideline harvest level (GHL) of 1.432 M lb, which was implemented in 2004. The GHL is intended to stop the reallocation from the commercial to charter sector.

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

## 1.3 Problem Statement

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

**PROBLEM STATEMENT**
**Adopted February 2006**

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

1. Pressure by charter operations may be contributing to localized depletion in several areas.
2. The recent growth of charter operations may be contributing to overcrowding of productive grounds and declining harvests for historic sport and subsistence fishermen in some areas.
3. As there is currently no limit on the annual harvest of halibut by charter operations, an open-ended reallocation from the commercial fishery to the charter industry is occurring. This reallocation may increase if the projected growth of the charter industry occurs. The economic and social impact on the commercial fleet of this open-ended reallocation may be substantial and could be magnified by the IFQ program.

4. In some areas, community stability may be affected as traditional sport, subsistence, and commercial fishermen are displaced by charter operators. The uncertainty associated with the present situation and the conflicts that are occurring between the various user groups may also be impacting community stability.
5. Information is lacking on the socioeconomic composition of the current charter industry. Information is needed that tracks: (1) the effort and harvest of individual charter operations; and (2) changes in business patterns.
6. The need for reliable harvest data will increase as the magnitude of harvest expands in the charter sector.

## 1.4 Description of the Alternatives

In October 2005, the Council reviewed ADF&G Sport Fish Division data that indicated that the GHLs were exceeded in Area 2C in 2004. In conformance with its 2000 policy to implement measures to attain a certain level of harvest reduction, the Council identified alternatives for each area. Those alternatives were based on the suite of proposed measures that were developed over the course of seven separate meetings of the GHL Committee, Advisory Panel, and Council in 2000 (Appendix I). During initial review of the draft analysis in February 2006, the Council clarified that individual components of each alternative could be selected as its preferred alternative. The Council selected its preferred alternative in April 2006 and rescinded it in December 2006, based on advice from NMFS. In December, the Council was also informed that the 2005 and preliminary 2006 charter halibut harvest estimates exceeded the Area 2C GHL. The Council revised the suite of options and rescheduled action to address the Area 2C GHL overages.

### 1.4.1 Alternative 1. No action

Taking no action would not implement measures to reduce charter halibut harvests to the GHLs. The no action alternative includes a limit on the number of lines to the number of customers onboard the charter vessel, which is already in regulations for Area 2C, and a prohibition on the retention of fish caught by skipper/crew when customers are onboard the charter vessel, which was implemented by the State of Alaska for 2006 in Area 2C, and is planned for 2007.

In January 2007, the IPHC recommended that the Secretaries of Commerce and State implement a reduction in the bag limit to 1 fish for the period from June 15 to July 31 in Area 2C to reduce charter halibut harvests that exceeded the GHLs, as a conservation measure. The Secretary rejected the IPHC recommendation for Area 2C because the Secretary of Commerce through NMFS will develop regulations for 2007 that will achieve a comparable level of reduction. The Secretary is considering five alternatives to manage the Area 2C charter fishery: (1) no action; (2) one fish per day per client bag limit imposed by Federal regulation; (3) Impose a bag limit of one fish of any size plus one fish of a larger minimum size of (i) 45 inches, (ii) 50 inches, (iii) 55 inches, or (iv) 60 inches; (4) allow a two fish bag limit but require each fish to be of a 32 inch minimum size; or (5) allow a two fish bag limit but require one fish to be less than 32 or 35 inches.

At the time of final action in June 2007, it may be possible to consider proposed Secretarial action to limit charter halibut harvests in 2007 as part of the status quo because the associated regulations are expected to be implemented by June 1, 2007.

### 1.4.2 Alternative 2. Implement management measures to reduce charter halibut harvests to the GHL.

Option 1 – No more than one trip per vessel per day;

Option 2 – No harvest by skipper and crew;

Option 3 – Annual limits of four fish or five fish per angler;

Option 4 – Reduced bag limits of one fish per day in July, July, August, or for the entire season;

Option 5 – A one-fish bag limit with the option to harvest a second fish larger than 45 inches, 50 inches, 55 inches, or 60 inches;

Option 6 – Closing the season after August 15th, September 1st, or September 15th;

Option 7 – Closing one or more days during the week to halibut fishing;

Option 8 – A minimum size limit of 32 inches.

The estimated effects of the proposed alternative uses 2006 ADF&G logbook estimates of charter halibut harvests. The effect of the options are not projected beyond 2006 because high year-to-year variability in charter halibut harvest levels, rates of change in harvest levels, and average fish size makes predictions difficult.

## 1.5 Affected Environment

The marine environment of the Gulf of Alaska (GOA) is made up of physical, biological and human components that may be affected by the groundfish fisheries and the halibut fishery off Alaska. The physical components include geological, oceanographic and climatic conditions. None of the alternatives has the potential to affect the physical component of the marine environment since they are limited to management measures in the guided sport hook-and-line fisheries. The most complete, detailed descriptions of the physical and marine habitat of the GOA are in the PSEIS (NMFS 2004a). The effects of fishing on the marine habitat and EFH are analyzed in section 4.9.6 of the PSEIS. The proposed alternatives address a limit on the entry into the guided sport halibut sector, using hook-and-line fishing gear. Because these alternatives would not impact benthic marine habitat or EFH, no additional analysis on habitat or EFH has been conducted. No endangered or threatened species would potentially be affected by either alternative.

### 1.5.1 Potential Impacts on Pacific Halibut Stocks

**Abundance**. The IPHC sets area catch limits 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 for 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, biomass estimates and local movement rates are not available to manage small areas.

As described by Clark and Hare (2005), 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 %) to the exploitable biomass estimate. The fishery CEY is calculated by subtracting an estimate of all other non-commercial removals from the Total CEY (Figure 2). The IPHC sets a catch limit only for commercial fisheries using longline gear.

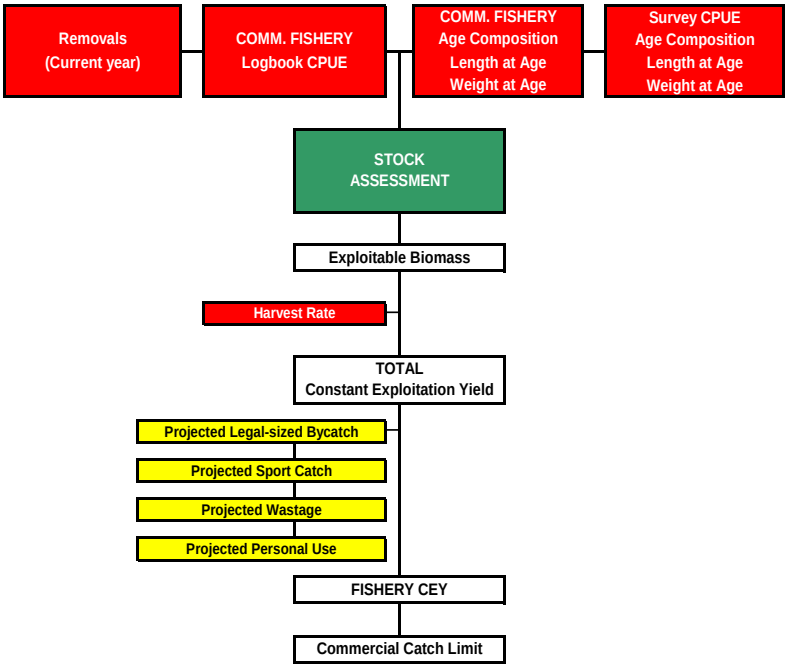


**Figure 2. IPHC stock assessment and catch limit setting process**

The most recent halibut stock assessment was conducted by the IPHC in December 2006. The halibut resource is considered to be healthy, with total catch near record levels. The estimate of coast wide exploitable biomass is 382 M net lb (IPHC 2005). The estimates of abundance are little changed in most areas. The 2006 Area 2C estimate is down by about 10 percent because of a lower commercial CPUE in 2005 and another low survey CPUE in 2005 following last year's 20 percent drop.

The following is excerpted from Clark and Hare (2006). Growing concerns about net migration from the western to the eastern Gulf of Alaska have led the staff to doubt the accuracy of the closed-area assessments that have been done for many years. A coastwide assessment with survey apportionment was presented to the IPHC, in addition to the closed-area assessments, and was used to calculate the available yield in each area. The two assessments produced very similar estimates of total abundance (total exploitable biomass about 400 M lb, total available yield about 80 M lb) but the distribution among areas was quite different, with the coastwide assessment showing more biomass and available yield in Areas 3B and 4 than the closed-area assessments and less in Area 2. Area

Table 12 shows projected CEY on the basis of the 2006 coastwide stock assessment, a 20% coastwide target harvest rate, and the biomass distribution estimated from the 2004-2006 survey CPUE by area. The IPHC did not adopt staff recommendations for the 2006 projections for Area 2C and, instead, adopted a CEY of 8.3 M lb. The Commission believed that further examination of options for partitioning the coastwide biomass estimate for each area before it adopted the new approach. Thus, the IPHC relied on previous methodology of separate regulatory assessments as the basis for determining 2007 catch limits. Lower catch rates in the eastern portion of the stock prompted the IPHC to recommend more restrictive catch limits for Area 2C. A stakeholder committee will meet with staff to learn more about the coastwide

model and make recommendations to the IPHC on adopting the new model for Area 2C in 2008. Using an area-wide approach, yields are projected to *increase in Area 2C* (after being adjusted downward as a result of the new migration model) over the next five years. The projections assume a constant harvest rate of.22.5%. The coastwide assessment results are depicted in Figure 3. For comparison, assessment results for Area 2C and 3A are presented in Figure 4. While the area trends are probably accurate, the absolute biomass estimates are not (Clark, pers. commun.).

**Table 12. CEY projections for 2008-2012 for Pacific halibut regulatory areas (Mlb)**

| | |
|---|---|
| 2007 | 6.6 |
| 2008 | 7.3 |
| 2009 | 8.0 |
| 2010 | 8.6 |
| 2011 | 9.2 |
| 2012 | 9.4 |

Source: Hare and Clark 2006

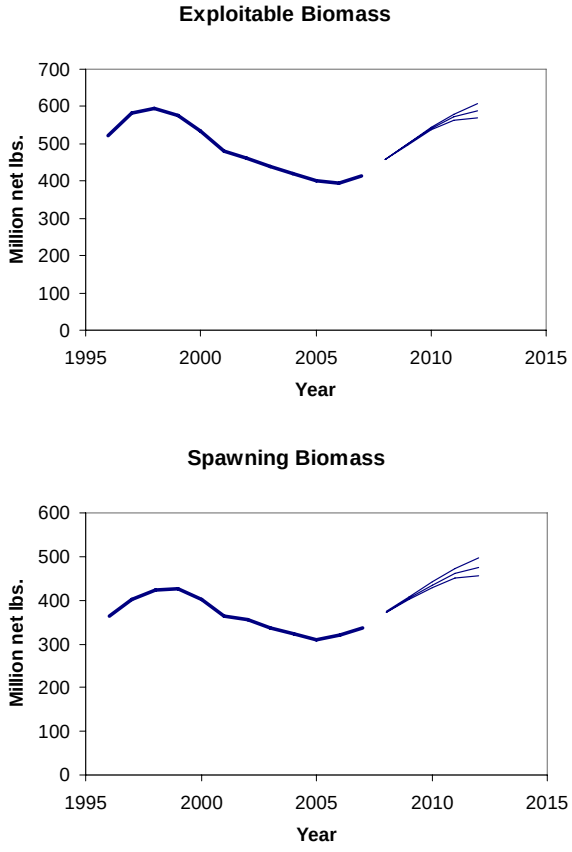


**Figure 3. Coastwide exploitable and spawning biomass estimates of Pacific halibut (Source: IPHC 2007)**

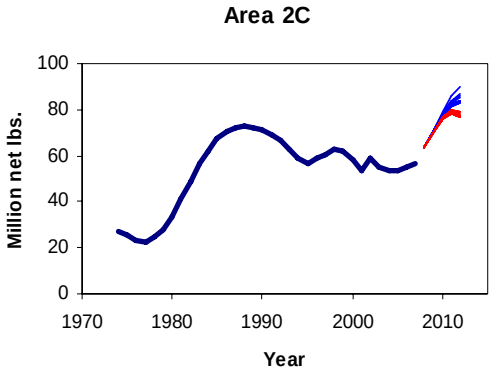


**Figure 4. Areas 2C and 3A exploitable biomass estimates of Pacific halibut (Source: IPHC 2007)**

The IPHC adopted commercial quotas for 2007 totaling 65.17 Mlb, compared with 55.26 M lb in 2006. The 2007 commercial quota in Area 2C was set at 8.51 M lb, compared with 10.63 M lb in 2006.

Additional descriptive information on halibut surveys, stock assessments, and research that were considered by the Council during its deliberation can be found in detail in the 2006 Report of Assessment and Research Activities (IPHC 2006). Further details on halibut management, production history, and life history are described in Section 3.7.2 of the Groundfish Programmatic SEIS (NMFS 1998a) and in this analysis.

**Fisheries**. The Pacific halibut resource is fully utilized. Three major cultural use traditions occur in Alaska for halibut: commercial, sport (guided and non-guided), and subsistence (Table 13). The 2006 removals of Pacific halibut in Areas 2C by sector are listed in (Table 14) and depicted in Figure 5. 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 598,000 lb (net weight) and 429,000 lb in 2006 in Area 2C and 3A, respectively (Fall et al. 2007). Methods included public outreach, mailed household surveys, and community visits.

**Table 13. 2006 removals of Pacific halibut in net weight (thousands of pounds, preliminary)**

| | |
|---|---|
| Commercial | 10,374 |
| Total Sport: | 3,033 |
| Guided Sport | 2,027 |
| Non-guided Sport | 1,004 |
| Bycatch Mortality: | |
| Legal-sized fish | 216 |
| Sublegal-sized fish | 125 |
| Personal Use | 598 |
| Wastage: | |
| Legal-sized fish | 21 |
| Sublegal-sized fish | 284 |
| IPHC Research | 95 |
| Total | 14,746 |

**Table 14. Harvests of Pacific halibut in Areas 2C, 1995-2006 (M lb)**

| AREA 2C | Commercial | | | | | | Sport | | | | | | Bycatch Mortality | | | | Wastag | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Quota | Removals* | Change from '95 | Price ($/lb) | ex-vessel value ($M) | Percent of total removals | Guided sport GHL | Guided sport removals | Change from '95 | % comb. guided+ commer. | Unguided Sport | Change from '95 | Legal sized fish | Sub-legal fish | Change from '95 | Subsis-tence | Legal sized fish | Sub-Legal sized |
| 1995 | 9.00 | 7.77 | | | | 78% | | 0.99 | | 11% | 0.77 | | 0.36 | | | 0 | 0.05 | 0.08 |
| 1996 | 9.00 | 8.87 | 14% | | | 78% | | 1.19 | 20% | 12% | 0.94 | 23% | 0.34 | | -6% | 0 | 0.04 | 0.14 |
| 1997 | 10.00 | 9.92 | 28% | | | 79% | | 1.03 | 5% | 9% | 1.14 | 49% | 0.26 | 0.10 | -74% | 0 | 0.04 | 0.14 |
| 1998 | 10.50 | 10.20 | 31% | | | 77% | | 1.58 | 61% | 13% | 0.92 | 20% | 0.22 | 0.14 | -78% | 0.17 | 0.04 | 0.18 |
| 1999 | 10.49 | 10.14 | 31% | | | 80% | | 0.94 | -5% | 8% | 0.90 | 18% | 0.23 | 0.12 | -49% | 0.17 | 0.07 | 0.17 |
| 2000 | 8.40 | 8.44 | 9% | $2.72 | $22.96 | 74% | | 1.13 | 15% | 12% | 1.13 | 47% | 0.23 | 0.12 | -38% | 0.17 | 0.04 | 0.13 |
| 2001 | 8.78 | 8.40 | 8% | $2.27 | $19.07 | 76% | | 1.20 | 22% | 13% | 0.72 | -6% | 0.22 | 0.12 | -45% | 0.17 | 0.04 | 0.16 |
| 2002 | 8.50 | 8.60 | 11% | $2.22 | $19.09 | 76% | | 1.28 | 29% | 13% | 0.81 | 6% | 0.18 | 0.16 | -49% | 0.17 | 0.03 | 0.11 |
| 2003 | 8.50 | 8.41 | 8% | $2.97 | $24.98 | 72% | | 1.41 | 43% | 14% | 0.85 | 11% | 0.17 | 0.17 | -50% | 0.628 | 0.03 | 0.10 |
| 2004 | 10.50 | 10.30 | 33% | $3.04 | $31.31 | 71% | 1.43 | 1.75 | 77% | 15% | 1.19 | 55% | 0.15 | 0.21 | -41% | 0.677 | 0.03 | 0.27 |
| 2005 | 10.93 | 10.63 | 37% | $3.17 | $33.70 | 73% | 1.43 | 1.95 | 98% | 16% | 0.85 | 10% | 0.14 | 0.2 | -39% | 0.598 | 0.03 | 0.23 |
| 2006 | 10.63 | 10.47 | 35% | $3.72 | $38.95 | 71% | 1.43 | 2.03 | 106% | 16% | 1.00 | 31% | 0.14 | 0.2 | -28% | 0.598 | 0.02 | 0.28 |

1) Guided, 1999-2006: ADF&G table dated Nov. 20, 2006 titled "Charter Halibut Harvests in IPHC Area 2C and 3A"
2) Unguided 1999-2004: Scott Meyer (ADF&G), worksheet titled "2C-3A_HarvestTables.xls"
3) Unguided 2005-2006: ADF&G letter to IPHC dated Oct. 23, 2006
4) All other categores, 1999-2005: IPHC Bluebooks
5) All other categores, 2006: Gregg Williams, pers. Commun.IPHC Bluebooks
* includes IPHC research fish

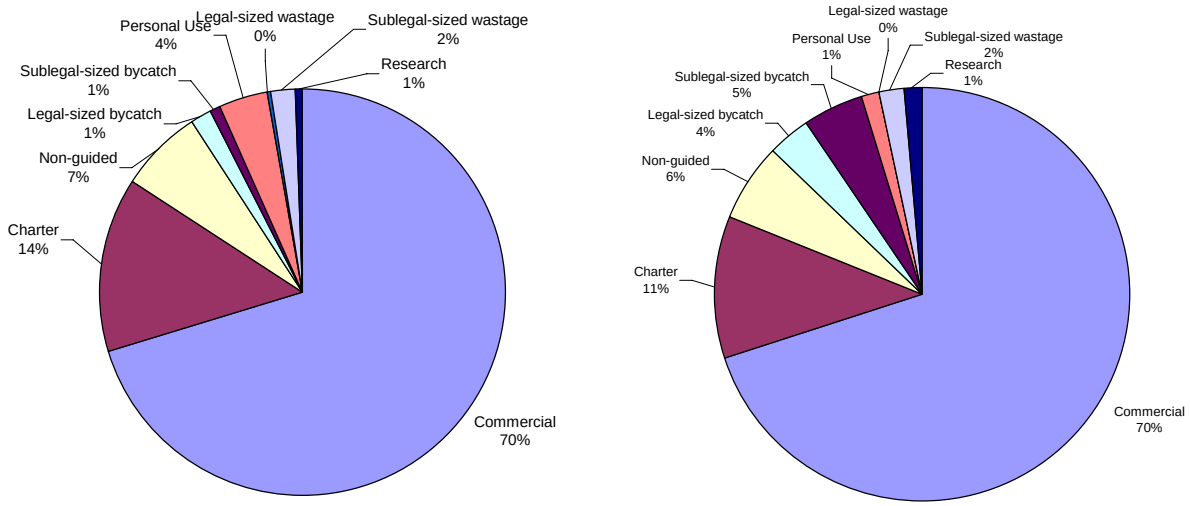


**Figure 5. Removals of Pacific halibut by sector in 2006 (Area 2C on left, Area 3A on right) (Source: IPHC).**

Sport fishing for halibut in Area 2C is an important recreational activity for resident and non-resident anglers. Sport harvests rapidly increased in the late 1980s to mid-1990s due to continued increases in targeted effort (Tersteeg and Jaenicke 2005). Fishing effort is mostly concentrated around Juneau, Ketchikan, Sitka, Wrangell, and Petersburg. However, substantial effort is also expended near remote fishing lodges and smaller communities throughout the region-such as Craig, Gustavus, and Yakutat (Jaenicke 2005).

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. Estimates usually 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. In summary, charter halibut harvests between 1995 and 2004 increased by more than 75 percent in Area 2C (from 986,000 to 1,750,000 lb). Charter halibut harvests amounted to approximately 14 percent of total halibut removals in Areas 2C in 2006, compared with 7 percent in 1999.

Sport businesses and vessels in Areas 2C are depicted in Figure 6. Table 15 demonstrates the changes in number of licensed business, vessels, trips, charter halibut harvests, and angler participation over the last ten years. In Area 2C, the number and pounds of charter halibut more than doubled. While businesses remained about the same, the number of active vessels increased by 15 percent and halibut charter anglers increased by 21 percent. In Area 3A, the number and pounds of charter halibut increased by 50 and 29 percent, respectively. While businesses remained about the same, the number of active vessels increased by 13 percent and halibut charter anglers increased by 23 percent.

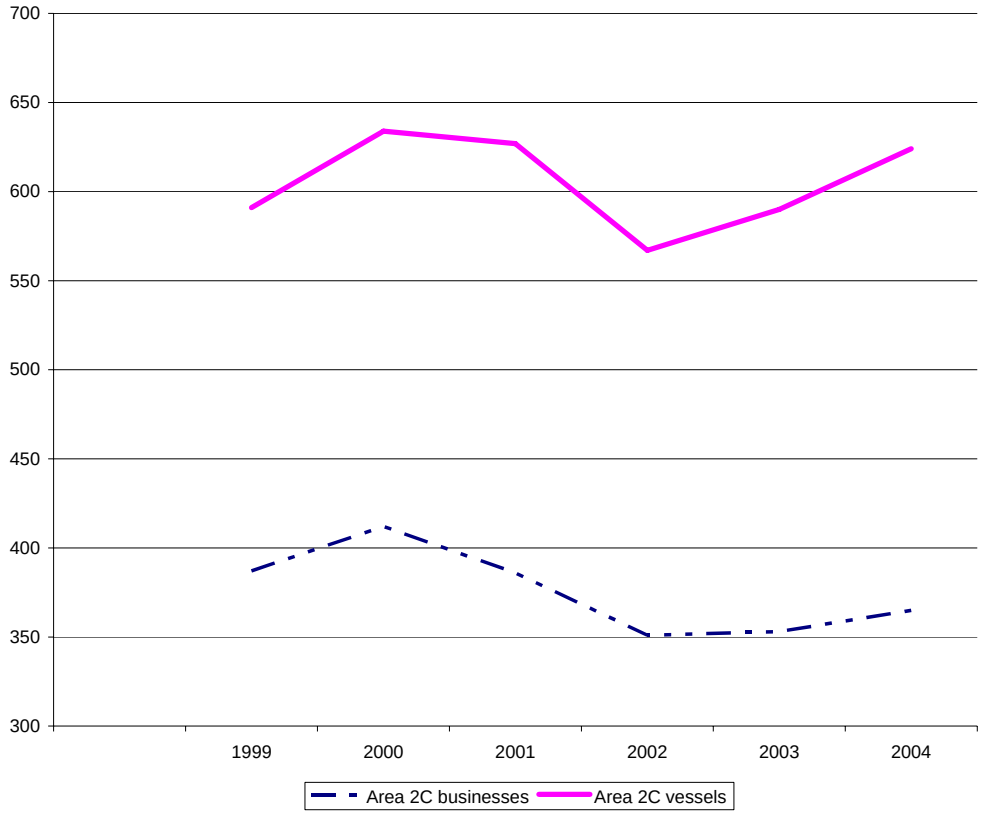


**Figure 6. Active charter businesses and vessels in Areas 2C and 3A (Source: ADF&G)**

**Table 15. Charter halibut participation, effort, and harvest during 1995-2005**

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

* an increasing number of sportfish lienses are sold over the internet

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

IPHC sportfishing regulations for Pacific halibut are found at 50 CFR 300.62. The 2006 annual measures for halibut fisheries were published at 71 FR 10850, Part 24. The GHL program was implemented in 2004, and regulations are published at 50 CFR 300.65. State of Alaska fishing seasons and reporting requirements are listed below.

- Most anglers 16-59 years old must have a current year's Alaska sport fishing license. There are two exceptions for Alaska residents:
  - 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.
- Resident and non-resident anglers younger than 16 do not need a sport fishing license.
- The open season for halibut is February 1-December 31.
- The bag limit is 2 fish daily and 4 in possession.
- There is no size limit.
- 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.
- Possession of sport-caught halibut:
  - a) No person may possess sport-caught halibut aboard a vessel when other fish or shellfish aboard the vessel are destined for sale, trade, or barter; and
  - b) until brought back to shore and offloaded, no person may fillet, mutilate, or otherwise disfigure a halibut in any manner that prevents the determination of the number of fish caught or possessed.
  - In Alaska, 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 on board the catcher vessel (new in 2007).

Charter halibut harvests, along with other non-commercial harvests, are unrestricted because there is no specific allocation to the sectors. This results in a reallocation to the charter sector from the commercial sector. Therefore as the charter fishery expands, its harvests reduce the allocation to the commercial halibut fishery and, subsequently, the value of quota shares (QS) in the commercial halibut IFQ Program.

A September 2003 final rule established a GHL for charter halibut harvests and a process whereby the Council is notified if the GHL is exceeded. The GHL established a pre-season estimate of acceptable annual harvests for the halibut fishery beginning in 2004. To accommodate limited growth of the charter fleet while approximating historical harvest levels, the GHL for each area was based on 125 percent of the average of 1995-99 charter harvest estimates, as reported by the ADF&G Statewide Harvest Survey (SWHS). The GHL was set at 1,432,000 lb net weight in Area 2C. Upon notification that a GHL has been achieved, the Council may initiate analysis of possible harvest reduction measures and NMFS may initiate subsequent rulemaking to reduce charter harvests. While commercial quotas fluctuate directly with stock abundance, the fixed GHLs are established annually in pounds. The GHLs are responsive to reductions in stock abundance. If either area's total Constant Exploitation Yield (CEY) is reduced by at least 15 percent below the average 1999-2000 total CEY, as determined by the IPHC, then the GHL would be reduced. For example, if the total CEY in Area 2C were to fall between 15 and 24 percent below its 1999-2000 average, then that GHL would be reduced by 15 percent to 1,217,200 lb. If it fell between 25 and 34 percent, then it would be reduced by an additional 10 percent to 1,095,480 lb. If the total CEY continued to decline by at least 10 percent, then it would be reduced by an additional 10 percent.

These "stair step" reductions were implemented because at the time of final action in 2000: (1) the status of the halibut stock was predicted to have been at its peak and declining; (2) the GHL formula allowed for

a 25 percent increase in past harvests; and (3) the charter sector requested a fixed allocation to provide better predictability for planning bookings for the next summer's fishing season. The overall intent was to maintain a stable charter fishery season of historic length, using area- specific measures to control harvests to the GHLs. The relative abundance between 2000 and 2005 is not estimated to have exceeded 15 percent (B. Leaman, pers. comm.); therefore, the GHLs have not been reduced.

The original groundfish fishery management plans for the Bering Sea/Aleutian Islands and GOA 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 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 enables 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). The commercial fishery was the predominant sector for removals, taking approximately 74 percent of total halibut removals in Area 2C, compared with 81 percent in 1999.

Halibut begin recruiting to longline gear at approximately 60 cm in length, but the commercial minimum size limit is 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 to 121 kg. The average size in the commercial catch in 1996 was between 9 and 20 kg depending on the area caught, and the average age was 12 years old (Forsberg, J., Unpub [1997]).

Interception of juvenile halibut (~30 cm and greater) often occurs in trawl fisheries targeting other groundfish species (such as rock sole, pollock, yellowfin sole, and Pacific cod). Incidental catch of halibut also occurs in groundfish hook and line and pot fisheries. Regulations in both Canada and U.S. currently dictate that all halibut caught incidentally must be discarded regardless of whether the fish is living or dead. These fisheries take place throughout the range of halibut and throughout most of the year. 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 has remained under 0.5 M lb annually. Bycatch mortality accounts for the halibut that die from being caught in other fisheries. The 2005 bycatch mortality estimate of 12.1 M lb is the lowest since 1987 but similar to the estimates for the last several years (IPHC 2005).

### Potential Impacts on Groundfish Bycatch

"Bycatch" in the charter halibut fishery includes 12 species of rockfishes, Pacific cod, and ling cod. The primary groundfish bycatch taken in the halibut charter fishery include limited amounts of Pacific cod and rockfishes (primarily yelloweye and black), with lesser amounts of spiny dogfish, salmon shark, and sablefish. State-managed species such as king salmon and ling cod, along with rockfishes, are also taken. These species may be listed as having been caught on a halibut targeted trip, but they may become the target species during the trip because the halibut bag limits have been reached. Additionally, the target species may change because halibut fishing during the particular trip is poor and the operator wants to satisfy the client by landing any species (S. Meyer, pers. comm.). Therefore, ADF&G staff recommended that it is not possible to assign groundfish catches to the charter halibut fishery; however, Table 16 identifies rockfish and lingcod harvests associated with charter bottomfish effort for 1996-2004.

**Table 16. Estimated rockfish and lingcod harvest (number of fish) by charter anglers by area and year. Information from Statewide Harvest Survey.**

| 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.

The issue of 'bycatch' is complex. Too often fish that are labeled bycatch are actually targeted, in both commercial and recreational fisheries. For example, in Southcentral Alaska, the sport fishery port samplers ask the anglers and charter skippers what species they were targeting. While they may identify 'halibut' as their target (because that was their species of choice), they may have specifically targeted lingcod for a portion of their trip because halibut fishing was poor. Commercial fishermen often 'top off' with bycatch species for which the directed fishery is closed (A. Bingham, pers. commun.).

The IPHC has been observing declines in halibut recruitment and predicts a decrease in the exploitable biomass in the long term. The harvest of state-managed groundfish (and in some cases, salmon) 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 catch salmon when the salmon returns are strong. No in-depth analysis of these data has been done, and it may be impossible given the lack of information. It is likely that harvest of state-managed species will increase if the halibut stock declines in abundance, with or without the proposed alternatives.

In summary, the interaction of halibut catch and harvest of other species is poorly documented and not well understood. Any discussion will be highly speculative. This information is insufficient to predict direct effects of charter halibut harvest. Other species taken incidentally in sport charter halibut fisheries include sculpins, arrowtooth flounder and several other flatfishes, pollock, spiny dogfish, sleeper shark, salmon shark, and greenling. No harvest estimates are available for these species.

### Potential Impacts on Habitat

No information is available on the impacts of the halibut fisheries on habitat. The proposed action would not increase the amount of harvest, the intensity of harvest, or the location of harvest, therefore, this action is presumed not to increase the impacts of the fisheries to EFH. Therefore, in the context of the fishery as a whole, this action will not adversely affect EFH for managed species. As a result of this determination, an EFH consultation is not required. There are no known significant impacts of the halibut charter fishery on marine habitat since there are no known significant changes in fishing practices as a result of the preferred alternative.

### 1.5.2 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 the NMFS for most marine mammal species, marine and anadromous fish species, and marine plants species and by the USFWS for bird species, and terrestrial and freshwater wildlife and plant species.

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

In addition to listing species under the ESA, the critical habitat of a newly listed species 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 17 provides the species listed as endangered and threatened under the ESA.

**Short-tailed albatross**. In 1997, NMFS 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 NMFS must implement to minimize the impacts of any incidental take.

**Table 17. ESA listed and candidate species that range into the BSAI and GOA groundfish management areas.**

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

[1]NMFS designated critical habitat for the northern right whale on July 6, 2006 (71 FR 38277).

[2] The Steller's eider, short-tailed albatross, spectacled eider, and Northern sea otter are species under the jurisdiction of the USFWS. For the bird species, critical habitat has been established for the Steller's eider (66 FR 8850, February 2, 2001) and for the spectacled eider (66 FR 9146, February 6, 2001). The Kittlitz's murrelet has been proposed as a candidate species by the USFWS (69 FR 24875, May 4, 2004).

### 1.5.3 Impacts on Seabirds

Any Federal action that may affect ESA-listed species may be subject to a Section 7 consultation. This is usually a two step process. Initially, the "action agency" or NMFS Sustainable Fisheries makes a determination whether the proposed action is or is not likely to adversely affect the listed species. If not, and NMFS Protected resources concurs, no further consultation occurs. If the action is likely to adversely a listed species, then a formal Section 7 consultation occurs.

In addition to those 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, murres, auklets, and puffins. Additional discussion about seabird life history, predator-prey relationships, and interactions with commercial fisheries can be found in the 2004 FPSEIS. Charter halibut gear are typically rod-and-reel with a maximum of two hooks and are operated in such a fashion that interactions with seabirds are unlikely. There are no known reported takes of seabirds in charter fisheries off Alaska. 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.

### 1.5.4 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. Marine mammals are not taken in halibut charter fisheries and therefore, none of the alternatives are expected to have a significant impact on marine mammals.

### 1.5.5 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 which seems rather 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.

None of the alternatives would have a significant impact on the environment. The main consequence of the proposed alternatives is to control halibut charter fisheries in IPHC Areas 2C and 3A. The economic effects of the proposed alternatives are detailed in Section 2.

Based on current information, it is reasonable to assume that the effect on the halibut resource of implementing measures to reduce charter halibut harvests, while allowing all other fishery removals to increase while limited by the quota set by the IPHC, is negligible. The IPHC has determined that resource conservation is not a factor in such allocations.

### 1.5.6 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 Section 2. Section 3 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.

Before 1973, all halibut fishing, including sportfishing, was governed by commercial fishing regulations (IPHC 1998). Sport catches were usually incidental to saltwater sportfishing for salmon. As the sport catch increased, the IPHC clarified its authority to manage the sport halibut fishery and adopted regulations for the "sport" fishery in 1973, including an 8-month season with limitations on an individual's daily catch and gear (Williams 1999). Since then, the popularity of bottomfish has surged and halibut sport fishing has supported a charter industry. Sport regulations have grown in complexity, with increased involvement by the State of Alaska, the Council, and NMFS. Estimates of halibut sport biomass are obtained through ADF&G creel census, postal surveys (SWHS), and a mandatory charterboat logbook program (SCVL) which continued from 1998 through 2001. Halibut harvests will be required to be reported in weekly logbooks beginning again in 2006.

Marine recreational fisheries are popular in Southcentral Alaska, supporting approximately 486,000 angler-days of effort for all finfish species (2000 estimate) (http://www.sf.adfg.state.ak.us/region2/groundfish/gfhome.cfm). An angler day equals one angler fishing for any part of a day. Effort has more than doubled in the last 20 years. A large portion of this recreational fishing effort is directed at halibut.

### Description of Fishery Participants

Charter halibut fishery participants for Areas 2C are presented in Table 13. In summary, the number of vessels active in the 2005 charter halibut fishery totaled 654 in Area 2C, respectively. Each vessel carries a skipper and some carry a mate; therefore, an estimate of the number of crew assuming skipper and mate is 1,308. The number of businesses active in the 2004 charter halibut fishery totaled 381. Sportfishing licenses totaled more than 120,000 in each area (Table 18).

**Table 18. Total number of sport fishing licenses (all marine and freshwater species) sold by vendors within Areas 2C and 3A, 1993-2004, by residency.**

*Note that numbers of licenses sold by internet/mail are provided as well for reference purposes, as these license sales can NOT be assigned to a geographic location*. Sales by vendors in other locations throughout the state (outside of IPHC Areas 2C and 3A) are NOT included (except the internet/mail sales).

| | Sport fishing licenses sold by vendors in IPHC 2C | | | | |
|---|---|---|---|---|---|
| Year | Alaska Residents | Non-residents | Unknown Residency | Total | Internet/Mail Sales (unknown location) |
| 1993 | 27,478 | 50,932 | 2,101 | 80,511 | 984 |
| 1994 | 27,685 | 60,350 | 2,193 | 90,228 | 1,075 |
| 1995 | 26,982 | 63,881 | 77 | 90,940 | 1,151 |
| 1996 | 26,725 | 67,896 | 56 | 94,677 | 1,261 |
| 1997 | 26,724 | 71,515 | 26 | 98,265 | 1,518 |
| 1998 | 25,241 | 71,789 | 49 | 97,079 | 1,699 |
| 1999 | 24,517 | 76,228 | 56 | 100,801 | 2,092 |
| 2000 | 24,173 | 81,030 | 42 | 105,245 | 4,972 |
| 2001 | 23,743 | 79,503 | 95 | 103,341 | 7,712 |
| 2002 | 22,976 | 83,540 | 45 | 106,561 | 9,350 |
| 2003 | 23,169 | 82,533 | 125 | 105,827 | 11,233 |
| 2004 | 23,363 | 98,490 | 5 | 121,858 | 14,211 |

Impacts on the Sport Fishery Sport fishing for halibut was nonexistent in the 1920s but has grown into a major industry in Canada and Alaska. The first IPHC regulations on sport fishing were instituted in 1973 and included an 8-month season with limitations on the individual's daily catch and the gear. Since that time, sport regulations have grown in complexity and have seen increased involvement by state, provincial and Federal agencies.

Sportfishing is done primarily for sport values (i.e., "sport," fun," "enjoyment," "fair competition"). Participation in a sport-quality activity is the primary cultural value. Sport regulations in general are consistent with these sport values, in that they provide for relatively inefficient gear (2-hooks, a "fair chase ethic"), limited daily bags (2-fish per day; food is not the primary purpose of the activity), and sport license requirements (user's pay for management, etc.). The sport cultural tradition in Alaska derives from Euroamerican historic traditions, and currently sport participants are primarily from Euroamerican cultural groups living in urbanized areas (but also some rural places) in Alaska and the continental U.S.

In addition to sport motives, a significant portion of Alaska residents and many nonresidents who fish for halibut under sport regulations may be motivated in large part to provide subsistence food with rod and reel. Anecdotal information suggests that many charter anglers evaluate the success of their trip by the poundage caught and whether it was cheaper to fish or buy the halibut. Halibut are not terribly exciting or difficult to catch. The bag limit of two fish may be perceived as adequate to satisfy food needs given the mean size of halibut. Whether or not there is a one to one correspondence in the cost consideration of choosing to sportfish versus purchasing commercially caught halibut remains to be tested; however, it is likely that some anglers derive additional value from stocking their freezers with fish they caught than they would have realized from purchasing commercially caught halibut.

Impacts on the Commercial Fishery The halibut commercial fishery has been in existence for over 100 years. The 1990s have seen a dramatic change in the management regime in the U.S. In 1995, the U.S. implemented an IFQ program, in which each licensed fisherman was given a share of the annual catch limit based on the individual's past production. It has resulted in much longer seasons, currently March 5$^{th}$ through November 15$^{th}$, replacing the 24-hour "derby" fisheries. It has also kept catches within the prescribed commercial limits. A suballocation to the Community Development Quota (CDQ) Program provides access to this fishery for Western Alaska communities. The Metlakatla Indian Community also has a small allocation under an agreement with the Department of Interior Bureau of Indian Affairs. There are no expected impacts on the commercial fisheries under the proposed action.

The quotas for the commercial longline fisheries in Area 2C are set once all other removals are deducted from the available yield. The increase in sport removals results in an uncompensated reallocation from the commercial sector to the sport sector. This reallocation has resulted in consideration of numerous actions to cap charter halibut removals, including the proposed action.

Impacts on other non-commercial uses The removals of Pacific halibut from the population that are accounted for in the stock assessment include commercial and sport catch, bycatch, wastage and personal use. Under the IFQ program, take-home fish is counted as part of commercial IFQ. Personal use fish includes the non-commercial and non-sport halibut, from a variety of sources for which little documented data are available. Sources include rod and reel catch not documented in the sport catch, illegally-set commercial gear, and illegally-retained bycatch in other fisheries, but is believed to be relatively minor.

Subsistence fishing is a traditional use in Alaska, primarily for food use by domestic family groups, including noncommercial sharing and distribution systems. A series of subsistence regulations implemented by NMFS are consistent with these values, in that they provide for established patterns of use, including customary efficient gear from the point of view of domestic family groups, relatively unrestricted seasons and bag limits except for conservation reasons (subsistence fisheries are for food and are generally self-limiting because the limited size of the subsistence sharing-consumption networks), and relatively simple reporting-permitting systems. The subsistence cultural traditions in Alaska have evolved over time, and the people who are most heavily involved in subsistence patterns are Alaska Native groups with local cultural traditions of use; in addition, non-Natives living in "rural" places (places with a mixed, subsistence-market economic system) participate in some subsistence activities. Subsistence production-distribution is commonly a major economic sector in rural communities. Mixed, subsistence-market

economies are characteristic of rural villages and a few large towns in Alaska— these are local systems of production-consumption where wild food production contributes a substantial portion of the food supply of the community (that is, about 50% or more the community's protein needs). Subsistence halibut fishing typically occurs in rural places with subsistence-market economies. A detailed description of the halibut subsistence fishery may be found in the EA/RIR adopted by the Council in 2000 and submitted to the Secretary for consideration in 2002 (http://www.fakr.noaa.gov/analyses/subsistence/halibut0403.pdf ).

State regulations recognize subsistence, personal use, commercial, and sport uses of halibut. They classify all halibut harvested with a rod-and-reel as a sport harvest. Persons harvesting halibut with a rod-and-reel are required to obtain an Alaska sport fishing license. However, most halibut fishers in rural Alaska communities do not recognize their activities to be sport in nature, but as subsistence or personal use, regardless of the gear type used to obtain it. The extent to which, (1) rural fishers actually obtain sport fishing licenses to harvest halibut with rod and reels, or (2) subsistence patterns are constrained by two fish per day sport bag limit, have not been assessed. The rural halibut harvest with rod and reel is supposed to be counted through a statewide annual mailed survey to holders of sport fishing licenses by the ADF&G Division of Sport Fish. Whether this survey adequately counts the rural take has been subject to debate in recent years, as discussed further below.

Conclusions The proposed action addresses allocation of the Pacific halibut resource between the charter and commercial sectors. There are no expected impacts on the halibut subsistence, personal use, or unguided sport fisheries because these takes are not limited and are not affected by actions to constrain guided sport harvests. There are no expected impacts on the commercial fisheries because users are not subject to the proposed action. While the proposed action does not address direct removals of charter halibut, limiting the number of fishing platforms available to anglers would affect removals indirectly. It would not change fishing practices or the amount of halibut allowed to be retained by anglers. Some charter businesses will benefit, while others will lose under the proposed action. Charter anglers may pay higher fees, as businesses that must purchase permits pass on some of those costs. No adverse impacts to the halibut resource or the benthic environment would be expected. It would not result in changes in food availability to predators and scavengers, changes in the population structure of target fish stocks, and changes in the marine ecosystem community structure. The proposed action does not affect allowable fishing gear or locations of fishing effort. There are no significant impacts on the halibut stock expected from the proposed action. However, limiting charter harvests to the GHL ends the uncompensated reallocation from the commercial to the charter sector and should result in higher quotas for the commercial sector than under the no action alternative.

## 1.6 Cumulative Effects

The proposed action is designed to limit entry into the charter halibut sector in Areas 2C and 3A. Any direct effects or reasonably foreseeable indirect environmental effects from the action would be minor, as the limited entry program itself would not entail changes in harvest 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. The proposed limited entry program is intended to identify the eligible participants in any future share-based program that the Council may recommend.

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 to further allocate the halibut resource to the charter sector or to individual charter businesses have been delayed to a future action. The proposed alternatives will have no effect on any halibut fishery sector or 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.

In January 2007, the IPHC recommended that the Secretaries of Commerce and State implement a reduction in the bag limit to 1 fish for the entire season in Area 2C to reduce charter halibut harvests that exceeded the GHLs, as a conservation measure. The Secretary of State rejected the IPHC's recommendation for management measures in Area 2C because the Secretary of Commerce through NMFS will develop regulations for 2007 that will achieve the same level of reduction as recommended by IPHC.

In March 2007, the Council will be considering a wide range of management measures to reduce harvest to the GHL in Area 2C for after 2007. These are viewed as additional interim measures while a long term solution to a permanent allocation is developed. Proposed interim measures include: (1) 1 trip per vessel per day; (2) no retention of halibut catch by skippers and crew; (3) annual catch limits of: (i) 4 halibut, (ii) 5 halibut; (4) 1 fish bag limit for June, July, August, or entire season; (5) trophy size limit for second fish of: (i) 45 inches, (ii) 50 inches, (iii) 55 inches, or (iv) 60 inches; (6) season closure date of: (i) August 15, (ii) August 31, (iii) September 15; (7) day of the week closure (pick a specific day); and/or (8) minimum size limit of 32 inches. Final action is expected in June 2007. The Council noticed the public that it plans to review similar management measures for Area 3A. These measures would be intended for implementation in the 2008 charter season.

The Council is currently considering the following alternatives for a permanent solution: (1) no action; (2) an allocation to the charter sector, including, but not limited to: (a) sub-allocations to smaller areas; (b) sub-allocations to underdeveloped coastal communities; and (c) individual shares based on effort; and (3) an individual fishing quota program.

Management authority to manage halibut off Alaska resides with the IPHC, NMFS, and the Council. State authority to directly regulate the halibut fishery in Convention waters is preempted by federal law. However, the State of Alaska is pursuing an amendment to the Northern Pacific Halibut Act of 1982. Such an amendment is intended to provide delegation of limited authority for States to regulate recreational fishing for halibut, upon such recommendation by the appropriate regional council and Secretary of Commerce. Such delegation would require a recommendation by a council to the Secretary, based on an analysis and NMFS rulemaking. It is expected that the proposed limited entry program would be implemented prior to delegation of authority to the State(s), if the State of Alaska's proposal is successful.

The Secretary of Commerce through NMFS will develop regulations for 2007 that is meant to achieve a level of reduction in guided sport halibut harvests comparable to the level that would have been achieved by the IPHC one-fish bag limit. The Secretary is considering five alternatives to manage the Area 2C charter fishery: (1) no action; (2) one fish per day per client bag limit imposed by Federal regulation; (3) Impose a bag limit of one fish of any size plus one fish of a larger minimum size of (i) 45 inches, (ii) 50 inches, (iii) 55 inches, or (iv) 60 inches; (4) allow a two fish bag limit but require each fish to be of a 32-inch minimum size; or (5) allow a two fish bag limit but require one fish to be less than 32 inches.

# 2 REGULATORY IMPACT REVIEW

## 2.1 Introduction

The proposed action was initiated in October 2005, when the Council reviewed Alaska Department of Fish and Game (ADF&G) data that indicated that the 2004 guideline harvest level (GHL) in both areas had been exceeded. In response, the Council developed an analysis of alternatives for implementing management options to reduce harvests below the GHLs, as identified in the Council's GHL policy. The Council selected a 5-fish annual limit as its preferred alternative for Area 2C in April 2006. The Council subsequently rescinded its preferred alternative, upon request by NMFS because of high implementation and enforcement costs. At that same time, ADF&G data for 2005 and 2006 indicated that the GHL had been exceeded by increasing levels in those two years. The Council added several management options to Alternative 2, which resulted in this revised analysis.

The Council in considering eight management options if the charter fleet exceeds the area GHL. In addition, the analysis discusses the implications of a status quo or no action option. The action options include:

- Option 1- No more than one trip per vessel per day;
- Option 2- No harvest by skipper and crew;
- Option 3-Annual limits of four fish or five fish per angler;
- Option 4-Reduced bag limits of one fish per day in July, July, August, or for the entire season;
- Option 5- A one-fish bag limit with the option to harvest a second fish larger than 45 inches, 50 inches, 55 inches, or 60 inches;
- Option 6-Closing the season after August 15$^{th}$, September 1$^{st}$, or September 15$^{th}$;
- Option 7- Closing one or more days during the week to halibut fishing;
- Option 8- A minimum size limit of 32 inches.

## 2.2 Purpose of the Regulatory Impact Review

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

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

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

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

The key elements of a RIR include:

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

In addition, this document includes an analysis of the effect of each alternative management option (Section 2.6), a Regulatory Flexibility Analysis (Section 3), and a discussion of other applicable laws (Section 4).

## 2.3 Description of the Fishery

The charter fleet is a fairly homogeneous group with similar operating characteristics and vessel sizes. The exceptions are a few larger, 'headboat' style vessels, and several vessels that are operated by lodges, which offer accommodations as well as an assortment of visitor activities. Nearly all of the vessels are 25 to 50 ft. in length and carry up to six paying fishermen each. Larger vessels can carry a dozen passengers or more (NPFMC 2005). A summary of fishery participants is provided in Section 1.5.6.1

## 2.4 Statement of the Problem

The purpose of the proposed action is to reduce charter halibut harvests in Area 2C to the GHL. The GHL is intended to stop the reallocation from the commercial to charter sector. In addition to the no action alternative, the Council is considering the following eight options under Alternative 2 to reduce halibut harvests to the GHL of 1.432 Mlb in Area 2C. Charter halibut harvests in Area 2C have grown at an annualized growth rate of 6.8 percent over the past 11 years. Figure 7 shows the growth of charter halibut harvests relative to the GHL of 1.432 Mlb. While the harvest of the charter industry rose and fell from year to year between 1995 and 1999, the industry has seen upward growth since that time. Annualized growth since 1999 averaged 11.7 percent per year.

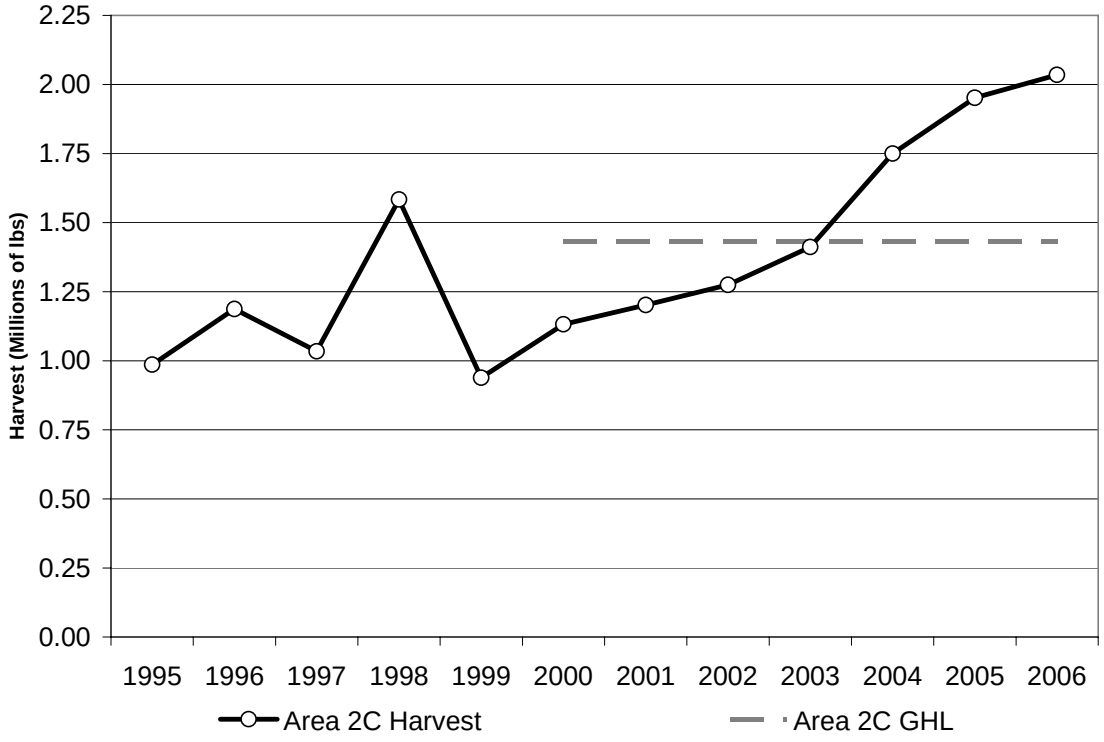


**Figure 7. Charter Fleet Halibut Harvests Year**

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

As shown by Table 19 and Figure 8 charter pressure (as measured by the number of active vessels, the total number of active vessels, the total number of clients, the average number of clients per trip, and the average numbers of trips per vessel) increased in the last several years. All of these are at their highest level in the recorded data period of 1998 through 2006. We note that one of the best options of upward pressure on demand, the number of clients per trip, has increased steadily in recent years. This increase indicates that the number of clients is rising faster than the number of trips and is likely an indicator of healthy demand for the services provided by the charter fleet.

**Table 19. Effort Options, 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.

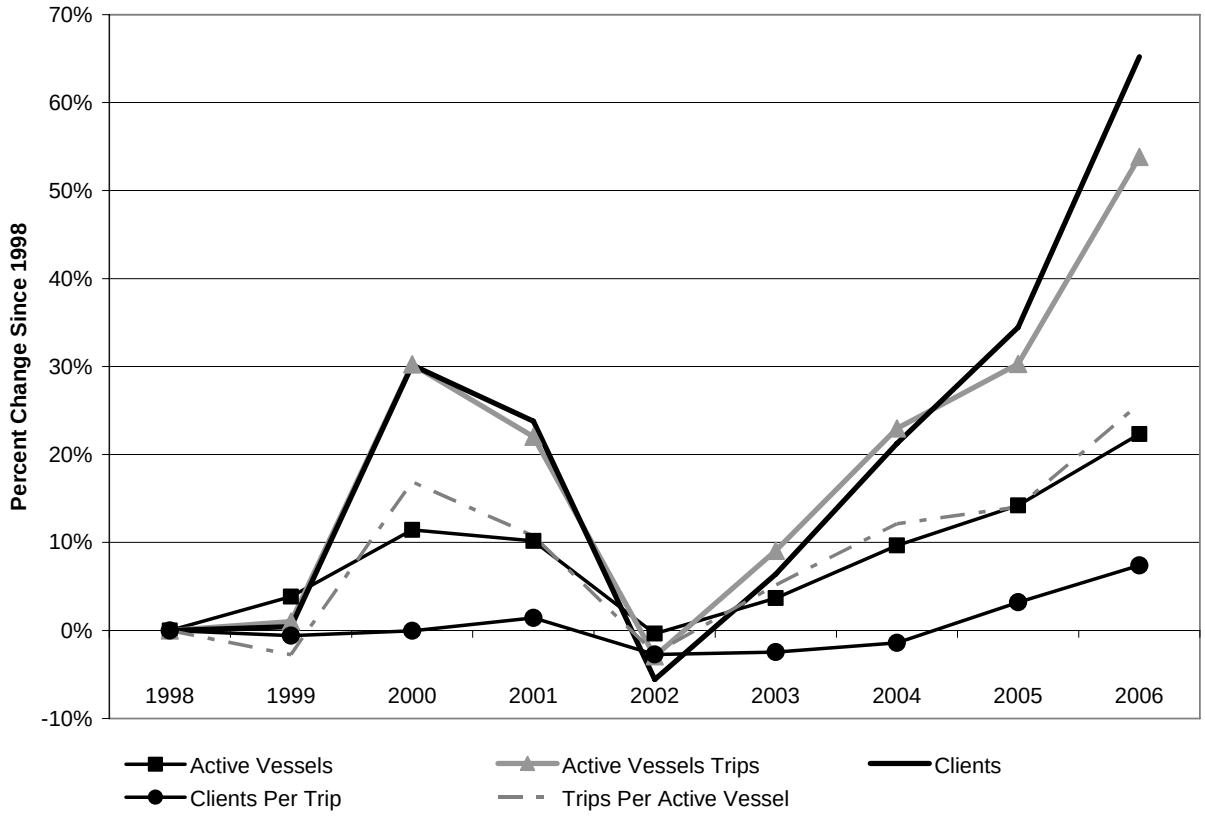


**Figure 8. Charter Fleet and Effort Growth, 1998-2006**

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

## 2.5 Baseline Analytical Data

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

The number and total weight of charter harvested halibut increased in Area 2C between 1995 and 2006. Table 20 shows estimated Pacific halibut harvest (number of fish, average net weight, and biomass) by charter anglers. This information represents a combination of total estimated Pacific halibut harvest obtained from the SWHS and on-site catch or creel sampling programs conducted in Area 2C. While the year to year halibut harvest and rate of change in the harvest are highly variable, the Area 2C harvest is now at 142.1 percent of the 1.432 million pound GHL established in 2000.

**Table 20. Charter Halibut Harvest, 1995-2006**

| Year | IPHC Area 2C | | | |
|---|---|---|---|---|
| | Charter-Harvested Halibut | Average Net Weight (lbs) per Halibut | Total Charter Halibut Harvest (M lbs) | Rate of Change from Previous Year[1] |
| 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[2] | 107,238 | 19.0 | 2.035 | 4.3% |
| 5-Year Average | 86,434 | 19.5 | 1.68 | N/A |

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

ADF&G provided logbook estimates for the number of total "active" vessels, total trips conducted by "active" vessels, number of bottomfish trips per season, per "active" vessel (in total), along with a summary of the total number of additional trips within one day conducted by "active" vessels (Table 21).[3] For data prior to 2006, all statistics are for bottomfish-targeted trips only and if a charter operator reported more than one trip per day, both trips had to be targeted at bottom fishing in order for the second trip in a day to be used for the information summary below.[4] The 2006 logbook allowed ADF&G to count the number of second day trips where halibut was actually harvested. The data show that a relatively small portion of trips are the second or more trips in a day for charter vessels and that the portion of trips qualifying as such is higher in Area 3A than in Area 2C. Additionally, while both the portion and number of trips qualifying as such has shown an increasing trend in Area 3A both the estimated portion and number of these trips has fallen in Area 2C.

[1] This column added by Northern Economics, Inc.

[2] 2006 harvest numbers including average weight and total fish harvested are provisional in nature and represent the best available estimates at the time of this analysis.

[3] An active vessel is defined as a vessel which recorded at least one trip per year with bottomfish harvesting effort.

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

**Table 21. Logbook Estimates of Second Trips per Day for Halibut**

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

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

ADF&G provided data on the frequency of "second trips" for halibut. Overall the portion of harvest has increased from between 0.5 percent to 1.2 for data collected in 1998, 1999, and 2001, to a range of between 1.8 percent and 2.4 percent in 2006 (Table 22).

**Table 22. Proportion of Harvest Occurring in Vessel Trips Beyond 1 trip per day**

| Year | ***Minimum*** occurs in trips beyond the 1st trip in a day | ***Average*** occurs in trips beyond the 1st trip in a day |
|---|---|---|
| Older Logbook Data | | |
| 1998 | 0.6 | 1.1 |
| 2000 | 0.8 | 1.2 |
| 2001 | 0.5 | 0.7 |
| 2006 Logbook Data | | |
| 2006 | 1.8 | 2.4 |

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

An improvement attributable to the updated 2006 logbooks is the ability of ADF&G to directly count the annual number of halibut caught by anglers while on charter trips. The inclusion of angler license numbers in logbooks makes this direct accounting method possible. Prior documents such as NPFMC (2006) relied on estimates based on Statewide Harvest Survey data. The majority of fish (55 percent) are taken by anglers who catch two or fewer fish per year. (Table 23).

**Table 23. Charter Harvest Level Estimates per Angler in Area 2C, 1996-2004**

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

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

ADF&G analyzed 2006 logbook and port sampling data of angler harvests for the analysis of the option reducing the charter bag limit to one fish. The data show the division of "first fish" in anglers' bag limits and "second fish". Overall, "second fish" account for fewer than 40 percent of the overall harvest (Table 24).

**Table 24. "Second" Fish as Portion of Area 2C Charter Angler Harvests, 2006**

| Month | Area 2C | | | | |
|---|---|---|---|---|---|
| | Harvest of "First" Fish | Harvest of "Second" Fish | Total Harvest | "Second" Fish as a Percentage of Overall Harvest | "Second" Fish by Weight |
| Jan | 0 | 0 | 0 | 0.0 | 0.00 |
| Feb | 4 | 0 | 4 | 0.0 | 0.00 |
| Mar | 15 | 10 | 25 | 0.0 | 0.00 |
| Apr | 18 | 12 | 30 | 0.0 | 0.00 |
| May | 3,616 | 1,955 | 5571 | 1.8 | 0.037 |
| Jun | 16,813 | 10,780 | 27,593 | 10.0 | 0.206 |
| Jul | 22,435 | 15,553 | 37,988 | 14.5 | 0.295 |
| Aug | 19,177 | 12,893 | 32,070 | 12.0 | 0.244 |
| Sep | 2,445 | 1,486 | 3,931 | 1.4 | 0.028 |
| Oct | 15 | 14 | 29 | 0.0 | 0.00 |
| Nov | 0 | 0 | 0 | 0.0 | 0.00 |
| Dec | 0 | 0 | 0 | 0.0 | 0.00 |
| Total | 64,537 | 42,701 | 107,238 | 39.7 | 0.81 |

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

For the second fish option ADF&G provided estimates of the harvest frequency for the four lengths included in that sub-option. More than 80 percent of the halibut harvested in Area 2C in 2006 were below the shortest second fish minimum length of 45 inches. More than 95 percent of the harvest is below the longest minimum length (Table 25).

**Table 25. Expected Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish, No Demand Effects**

| Minimum Length for the Second Fish (In) | Estimated Round Weight (lbs) | Proportion of 2006 charter harvest below target length by Number of Fish | Proportion of 2006 charter harvest below target length by Weight |
|---|---|---|---|
| 45 | 43 | 83.7% | 53.8% |
| 50 | 60 | 89.3% | 63.9% |
| 55 | 82 | 94.0% | 74.7% |
| 60 | 109 | 97.4% | 84.7% |

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

Table 26 shows effort and harvest relative to three proposed season closure dates. The data show that 16.4 percent of harvest and 18.7 percent of effort occur after August 15th. This means that anglers before August 15th experience slightly higher success rates as measured by weight of harvest than those anglers that fish after August 15th. Anglers who fished after August 31st catch 3.7 percent of the harvest and represent 5.9 percent of total season effort. Those fishing after September 15th harvest 0.7 percent of overall harvest for 1.1 percent of the effort.

**Table 26. Distribution of Effort and Harvest by Time**

| Time Period | Portion of Total Harvest Occurring During the Time Period | Portion of the Total Harvest Occurring After the Time Period | Portion of Total Effort Occurring During the Time Period | Portion of the Total Effort Occurring After the Time Period |
|---|---|---|---|---|
| January 1 - August 15 | 83.6% | 16.4% | 81.4% | 18.7% |
| August 16 - 31 | 12.7% | 3.7% | 12.8% | 5.9% |
| September 1-15 | 3.0% | 0.7% | 4.7% | 1.1% |
| September 16-December 31 | 0.7% | Not Applicable | 1.1% | Not Applicable |

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

Table 27 and Table 28 show effort by weekday as recorded by the 2006 ADF&G logbook program. In 2006, there is a very slight, but statistically significant, variation in fishing effort through the week with Friday showing the most effort (15.1 percent of the total) and Sunday showing the least effort (13.3 percent of the total).

**Table 27. Client Days Fished, 1999-2006**

| Year | Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | All Days |
|---|---|---|---|---|---|---|---|---|
| 1999 | 7,233 | 8,155 | 8,358 | 7,816 | 8,582 | 8,662 | 8,305 | 57,111 |
| 2000 | 8,954 | 9,209 | 8,997 | 8,037 | 9,424 | 8,849 | 9,241 | 62,711 |
| 2001 | 9,112 | 9,513 | 9,755 | 8,902 | 9,293 | 9,097 | 9,741 | 65,413 |
| 2002 | 7,734 | 8,253 | 8,186 | 7,098 | 8,066 | 8,712 | 8,409 | 56,458 |
| 2003 | 8,730 | 9,719 | 9,890 | 8,920 | 9,255 | 9,199 | 8,867 | 64,580 |
| 2004 | 9,913 | 11,006 | 10,624 | 9,980 | 10,575 | 10,215 | 9,865 | 72,178 |
| 2005 | 10,877 | 11,934 | 11,606 | 10,165 | 10,724 | 11,434 | 10,940 | 77,680 |
| 2006 | 12,604 | 13,657 | 13,668 | 12,473 | 13,345 | 13,497 | 13,150 | 92,394 |

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

**Table 28. Client Days Fished as a Percentage of Effort, 1999-2006**

| Year | Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | All Days |
|---|---|---|---|---|---|---|---|---|
| 1999 | 12.7% | 14.3% | 14.6% | 13.7% | 15.0% | 15.2% | 14.5% | 58,959 |
| 2000 | 14.3% | 14.7% | 14.3% | 12.8% | 15.0% | 14.1% | 14.7% | 64,797 |
| 2001 | 13.9% | 14.5% | 14.9% | 13.6% | 14.2% | 13.9% | 14.9% | 67,240 |
| 2002 | 13.7% | 14.6% | 14.5% | 12.6% | 14.3% | 15.4% | 14.9% | 57,284 |
| 2003 | 13.5% | 15.0% | 15.3% | 13.8% | 14.3% | 14.2% | 13.7% | 65,518 |
| 2004 | 13.7% | 15.2% | 14.7% | 13.8% | 14.7% | 14.2% | 13.7% | 72,862 |
| 2005 | 14.0% | 15.4% | 14.9% | 13.1% | 13.8% | 14.7% | 14.1% | 83,180 |
| 2006 | 13.6% | 14.7% | 14.8% | 13.5% | 14.4% | 14.6% | 14.2% | 93,210 |

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

For the minimum size limit option ADF&G data show that 48 percent of the halibut harvested by charter anglers fall under the size limit, but these fish represent only 23 percent of the yield. Charter anglers harvest larger fish than their unguided counterparts; a difference that may be explained by the greater experience of charter captains and the longer range of larger charter vessels (Table 29).

**Table 29. Portion of Area 2C Harvest Falling below the Minimum Size Limit by Recreational Sector, 2006**

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

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

## 2.6 Analysis

### 2.6.1 Individual Action Option Analyses

This section contains a discussion of the individual effects of the proposed management options:

- Option 1- No more than one trip per vessel per day;
- Option 2- No harvest by skipper and crew;
- Option 3-Annual limits of four fish or five fish per angler;
- Option 4-Reduced bag limits of one fish per day in July, July, August, or for the entire season;
- Option 5- A one-fish bag limit with the option to harvest a second fish larger than 45 inches, 50 inches, 55 inches, or 60 inches;
- Option 6-Closing the season after August 15$^{th}$, September 1$^{st}$, or September 15$^{th}$;
- Option 7- Closing one or more days during the week to halibut fishing;
- Option 8- A minimum size limit of 32 inches.

The effect of the management options on communities is located in Section 2.7.

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

### 2.6.2 Option 1-Effect of No More than One Trip per Day

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

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

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

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

As one might expect, the increasing frequency of "second trips" for halibut is leading to increasing portion of the harvest being attributable to these trips. Overall the portion of harvest has increased from between 0.5 percent to 1.2 percent for data collected in 1998, 1999, and 2001 to a range of between 1.8 percent and 2.4 percent in 2006 (Table 31).

**Table 31. Proportion of Harvest Occurring in Vessel Trips Beyond 1 trip per day**

| Year | ***Minimum*** occurs in trips beyond the 1st trip in a day | ***Average*** occurs in trips beyond the 1st trip in a day |
|---|---|---|
| Older Logbook Data | | |
| 1998 | 0.6 | 1.1 |
| 2000 | 0.8 | 1.2 |
| 2001 | 0.5 | 0.7 |
| 2006 Logbook Data | | |
| 2006 | 1.8 | 2.4 |

The analysis estimates that a ban on vessels making more than one trip per day where halibut is harvested would have reduced harvest in 2006 to between 138.7 percent and 139.5 percent of the GHL. This reduction is equivalent to between 38,000 and 49,000 pounds (Table 32).

**Table 32. Estimated Harvest Savings from Limiting Vessels to One Trip per Day, 2006**

| **Option** | **Lower Bound** | **Upper Bound** |
|---|---|---|
| Estimated Harvest Reduction (%) | 1.85 | 2.41 |
| Estimated Harvest Reduction (Mlb) | 0.038 | 0.049 |
| 2006 Harvest as a Portion of the GHL with the Option | 139.5 | 138.7 |

As noted in NPFMC (2006), key informant interviews with operators concurred that this management option would reduce halibut harvests by very small amounts—in the low single digit percentage range. However, they also indicated that the change might not reduce harvest at all. The predicted reduction associated with the management option assumes that the displaced clients could not find replacement charters to take them fishing. However, the key informant interviews indicated that many clients would likely find open seats on other boats within the fleet. They indicated that while there might be shortages in a specific time and place, many clients would be able to find replacement trips. If clients are able to find

replacement bookings, then the effect of the management option is likely to be overstated by the numerical analysis.[5] We note that the average number of clients per trip and the average number of trips per vessel have increased in the last several years (Table 33). While displaced anglers could likely find replacement seats at current client densities, if the number of vessels is limited and the number of clients continues to grow then it would eventually be difficult for displaced anglers to find replacement seats.

**Table 33. Effort Options, 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.

This management option would also likely result in overnight charter operators converting to the traditional one trip per day business model.[6] These operators usually run larger vessels capable of holding more passengers, and interviewees told us these operators usually limit the number of passengers on overnight trips to a level below their legal operating capacity. If these operators were forced to switch to one trip per day, they would be forced to run their boats at or near their full legal capacity. This change would reduce the efficacy of the management option and could actually result in more halibut being harvested over the long run depending on the excess capacity of these boats (NPFMC, 2006).

### 2.6.3 Option 2-Effect of No Harvest by Skipper and Crew

According to ADF&G logbook data from 1999 through 2001, harvests by crew members accounted for between 3.3 percent and 4.5 percent of the annual halibut harvest in Area 2C (Table 34).

**Table 34. Crew Harvest, 1999-2001**

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

Source: Northern Economics, Inc. estimates based ADF&G Logbook Data, 2005.

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

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

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

ADF&G estimates from November 2006 concluded that the May 24th, 2006 Emergency Order that banned skipper and crew harvest of halibut while paying clients were on the vessel saved approximately 86,000 pounds. These estimates are verified by comparing the estimates of Area 2C harvest based on linear trends in the SWHS data (which include crew catch because in prior years crew caught halibut while on trips) and the estimates from the 2006 logbook data. The linear trend estimates predicted a harvest of 2.113 Mlb while the logbook projects estimate a harvest of 2.035 Mlb. The 78,000 pound difference in these estimates is in part due to the fact that the linear SWHS projections would have included crew harvest while the logbooks (which reflect the actual catch) reflect the fact the crew harvest was banned under the Emergency Order. The 78,000 pound estimate and the 86,000 pound estimate are 3.8 percent and 4.2 percent of 2006 charter harvests. These portions corroborate estimates by the earlier analysis. We would expect these savings to become permanent if the ban were made permanent either through a State EO or Federal action. [7]

Prior interviews with charter operators indicated that the elimination of crew harvest was the most effective and palatable of the options offered in the previously considered action options. Area 2C charter operators told the analysis that they rarely harvest fish for their own use and that the state's line limit regulation effectively limits their opportunities to harvest additional crew fish. Conversely, large lodge operators in the area indicate that their crew members may catch and keep fish over the season because of the lodge's storage capacity. These crew members can store large amounts of halibut at the lodge during the summer and take fish home with them at the end of the season. Operators indicated that the portion of the crew harvest that is used by crew to feed their families would most likely shift from harvesting during charter trips to harvest during recreational trips. Thus, some harvest will shift from the GHL managed charter industry to the non-guided recreational sector.

### 2.6.4 Option 3-Effect of an Annual Limit

This option would establish a four-fish or five-fish annual limit on the number of halibut an individual could harvest while on charter trips in Area 2C. Table 35 shows the estimated reduction in harvest associated with this management option. ADF&G statisticians estimate that in 2006, a five-fish annual limit would have reduced overall harvest by charter clients by approximately 9.3 percent, while a five-fish limit would reduce overall harvest by nearly 16.5 percent. These options would have reduced the overall charter fleet harvest in Area 2C from 142.1 percent of the GHL to between 118.7 percent and 128.8 percent of the GHL. This option was the Council's April 2006 preferred alternative, but was rescinded in December 2006 on NMFS recommendation because of its high enforcement costs.

[7] This statement assumes that the number of individuals employed in the charter sector continues to grow. When new boats enter the sector we expect crew harvest to increase, but when existing boats increase the number of trips they take or when client density increases on existing boats there is no automatic increase in crew harvest as pre-existing trips may be enough to fill crew demand for halibut.

**Table 35. Effect of an Annual Limit on Charter Industry Halibut Harvest in Area 2C**

| Year | Actual Harvest as Percentage of GHL | Four-fish Limit Harvest Estimates | | | | Five-fish Limit Harvest Estimates | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Harvest Reduction Portion | Est. Reduction (M lbs) | Harvest (M lbs) | Total percentage GHL after Limit | Harvest Reduction Portion | Est. Reduction (M lbs) | Harvest (M lbs) | As percentage of the 2000 GHL after Limit |
| 2006 | 142.1 | 16.5% | 0.335 | 1.700 | 118.7% | 9.3% | 0.190 | 1.845 | 128.8% |

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

This management option is unlikely to affect the clientele of most charter operators; in fact it only affects the heaviest users of charter services. ADF&G data indicate that in 2006 a five-fish limit would have affected just 10 percent of all Area 2C anglers taking charters, while a four-fish limit would have affected 18 percent of all charter anglers (Section 2.5). During the key informant interviews for this analysis and prior analyses, operators of day-trip business indicated that this management option would only affect a small portion of their clients and would be unlikely to affect any of the clients who come from cruise boats. However, this management option is most likely to restrict harvest by the clientele of lodge operators and those charter boat operators that offer multi-day packages. Many of the operators provide clientele with a choice of trip length. The management option would limit the amount of halibut that those clients who wish to stay longer than three days at a lodge could harvest. For example, a visitor who currently stays with a lodge for four days could now leave with as many as eight fish. A five-fish limit would reduce the visitor's take by 37.5 percent, while a five-fish limit would reduce the visitor's take by 50 percent. Operators told the analysis that they had already seen cancellations by some clients and reduced willingness to book in advance by other clients when told that this option was under consideration.

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

This analysis represents a departure from prior analyses in that current estimates derive from the new 2006 logbooks, which record not only angler harvest, but each individual charter angler's sport fish license number. These data allow ADF&G to directly count catch by angler license number. Prior estimates depended on projections from the Statewide Harvest Survey (SWHS). The estimates for 2006 using the new logbooks are very close to past-year estimates using SWHS data (Table 36).

**Table 36. Prior-Year Estimate of Annual Limit Effects, 1996-2004**

| Year | Percent Saved | |
|---|---|---|
| | 4 Fish Limit | 5 Fish Limit |
| 1996 | 14.4% | 9.9% |
| 1997 | 14.9% | 10.3% |
| 1998 | 16.2% | 10.4% |
| 1999 | 14.1% | 9.4% |
| 2000 | 17.9% | 12.1% |
| 2001 | 17.0% | 11.1% |
| 2002 | 19.7% | 13.7% |
| 2003 | 19.8% | 13.1% |
| 2004 | 18.6% | 12.2% |

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

### 2.6.5 Option 4-Effect of 1-Fish Bag Limits

One of the proposed management options is to lower the bag limit to one fish from the current bag limit of two fish  This option includes four sub-options of lowering the bag limit in June, in July, in August, or for the entire season. Figure 9 shows the distribution of "first" and "second" fish within angler's bag limits. As shown by the figure, total harvest peaks in July with strong harvests in June and August. These three months accounted for 91 percent of total harvest in 2006. Overall, 66 percent of anglers who harvest a "first" fish also harvest a second fish. Within the three primary fishing months, the chance of harvesting a second halibut is the highest in July at 69.3 percent and lowest in June, at 64.1 percent. These differences are small, but statistically significant.

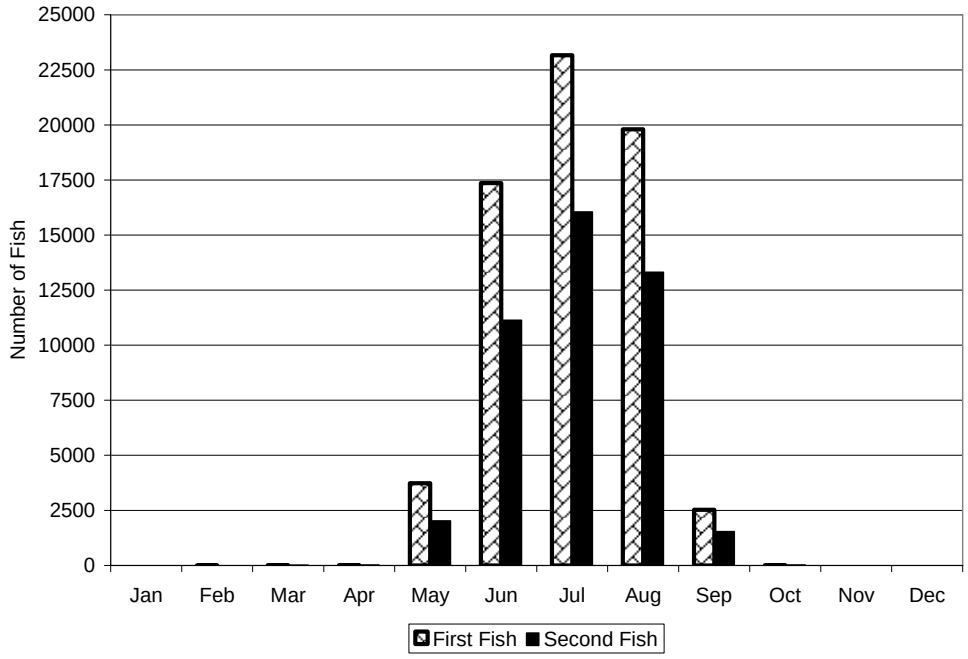


**Figure 9. Distribution of Area 2C Harvest Halibut by Number of Fish, 2006**

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

In 2006 charter anglers harvested 107,238 halibut between February and October.[8] As noted above, the vast majority of the harvest occurred during the three month period between the beginning of June and the end of August. Overall, the second fish in an anglers bag limit accounted for 39.8 percent of total harvest or 0.81Mlb (Table 37). As previously noted, 2006 harvest data are provisional and we expect these numbers to change slightly as ADF&G finalizes their estimates.

[8] The number of halibut harvested is based on provisional data and do not represent final, official ADF&G estimates.

**Table 37. "Second" Fish as Portion of Area 2C Charter Angler Harvests, 2006**

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

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

## Secondary Effects Discussion

The effect of this management option is likely to be affected by a number factors including:

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

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

### Changes in Angler Behavior during Trips

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

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

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

### Changing Demand for Charter Trips

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

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

**Table 38. Estimated Changes in Demand Relative to Changes in Price of a Trip from Criddle et al. (2003).**

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

Source: Criddle et al. (2003).

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

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

**Table 39. Estimated Changes in Demand from Changing Catch Rates**

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

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

The analysis is unable to definitely answer how much angler demand will decline because of a change in bag limit beyond saying that demand will likely be reduced and that the change in the bag limit is more likely to affect local anglers, anglers with a strong preference for halibut, and those whose trips are specifically for fishing. No survey has looked at the effect of changing bag limits in Area 2C for halibut. The best proxies are the studies discussed above, which looked at changes in catch rates and trip costs. If one accepts that halving the bag limit results in the same order of magnitude change as a large reduction in catch rates or a large increase in price, then these studies would seem to suggest that halving the bag limit might result in demand reduction as high as one-third. Conversations with charter captains have revealed "best guess" estimates of reduced participation rates as high as 50 percent amongst certain user groups, but that overall reduction in demand might be between 25 percent and 40 percent. Some operators would be forced out of business because they would not have enough client days at sea to pay their fixed costs. More than one captain has indicated that the potential for a one-fish bag limit and other management options has already resulted in the cancellation of trips by some customers.

### Changes in Discard Mortality

Discard mortality is not currently a component of charter harvest accounting methods. However, both the SSC and the IPHC have asked that this analysis discuss discard mortality. Discard mortality will reduce harvest savings from this option even without any change in angler behavior or demand simply because it will require anglers who previously harvested a second halibut to discard that fish. ADF&G staff asked this analysis to use a five percent mortality rate for discarded halibut and the analysis is able to account for the fact that more fish will be discarded.[9] We assume that every second fish caught in 2006 would now be a discard. This assumption ignores that fact that some anglers will not catch as many fish under single-fish bag limit as they do under a two-fish bag limit. However, some anglers faced with the lower bag limit will not keep the same first fish that they normally would keep and will continue fishing in pursuit of a larger fish. The authors believe that assumption allows us to show the maximum effect of discards if anglers are not able to significantly increase their catch per unit of effort (i.e., the angler day). Additionally, the assumption also allows us to show that changes in discard mortality are likely to be small when compared to changes in overall mortality (e.g., harvest plus discard mortality) from a drop in demand.

[9] A discussion of how ADF&G staff reached an estimate of five percent mortality is included in Appendix III.

ADF&G logbook data for 2006 show that there were 92,775 charter client days. These anglers discarded 51,155 fish and harvested 107,238 halibut for a total of 158,393 successfully landed fish. Applying the 5 percent mortality rate to the number of fish landed yields a discard mortality estimate of 2,558 fish (Table 40). These anglers harvested 1.16 fish and discarded 0.55 fish for a total catch of 1.71 fish per client day. Discard mortality was 0.03 fish per client day with total mortality at 1.22 fish per client day. If we assume that total client catch stays the same and there is no change in client behavior then under the one-fish bag limit, harvest per client day would fall to 0.7 halibut per day. This calculation assumes that clients who harvested zero fish would continue to harvest zero fish while those who harvested more than one halibut would be reduced to harvesting one halibut and discarding the halibut they otherwise would have kept. Under this scenario, total discards rise from 51,155 fish to 93,856 and discard mortality rises from 2,558 fish to 4,693 fish. However, total mortality (harvest + discard mortality) falls from 109,796 fish to 69,230 fish. This decline is equivalent to approximately 37 percent and assumes no efforts by anglers to increase the average size of the fish they retain.[10]

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

| Unit | Effort (Client Days) | Harvest (No. Fish) | Discards (No. Fish) | Estimated Discard Mortality (No. Fish) | Total Mortality (No. Fish) | Total Catch (No. Fish) |
|---|---|---|---|---|---|---|
| 2006 with a 2-Fish Bag Limit | | | | | | |
| Aggregate Area 2C | 92775 | 107,238 | 51155 | 2558 | 109796 | 158393 |
| Per Client Day | | 1.16 | 0.55 | 0.03 | 1.18 | 1.71 |
| Estimated 2006 Conditions with a 1-fish Bag Limit | | | | | | |
| Aggregate | 92775 | 64537 | 93856 | 4693 | 69230 | 158393 |
| Per Client Day | | 0.70 | 1.01 | 0.05 | 0.75 | 1.71 |

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

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

- Assume anglers with a two-fish bag limit harvest the first two halibut he/she successfully lands. If the one-fish bag limit encourages anglers to keep fishing for a longer period in search of a larger fish and the anglers successfully lands more than two fish there will likely be increased discard mortality (in aggregate).

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

[10] The study is unable to account for anglers efforts to increase the average size of the fish they catch because there is not enough data on the weights of fish that anglers currently catch.

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

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

### Bag Limit Reduction Analytical Results

Table 41 summarizes the estimated effect of the option without accounting for any changes in angler demand. Increased discards are likely to reduce the overall efficacy of the option. Overall reductions from increased discard mortality are equal to about 7 percent of the original estimated effect of the option. Estimated angler discards are not currently counted against the GHL by the IPHC. The June, July and August estimates do not account for anglers switching from a month with a reduced bag limit to a month without a reduced bag limit. Over the long run, anglers who change the timing of their trips to account for bag limit changes *will erode the savings from these options*. Thus, the estimates for single-month bag limits are based viewed as maximum estimates of the short-term effect of management sub-option.

**Table 41. Effect of a One-Fish Bag Limit Accounting for Initial Changes in Discard Mortality, but without Reduced participation.**

| Harvest and Total Mortality Reduction | June | July | August | Season |
|---|---|---|---|---|
| Harvest Only (%) | 10.0 | 14.5 | 12.0 | 39.7 |
| Harvest Only (Mlb) | 0.204 | 0.295 | 0.244 | 0.808 |
| Estimated Harvest as a Percent GHL | 127.9 | 121.5 | 125.1 | 85.7 |
| Including Discard Mortality (%) | 9.3 | 13.5 | 11.2 | 37.0 |
| Including Discard Mortality (Mlb) | 0.190 | 0.275 | 0.227 | 0.752 |
| Estimated Harvest as a Percent GHL | 128.9 | 122.9 | 126.2 | 89.6 |

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

In 2006, Area 2C harvests were approximately 142.1 percent of the area GHL. Instituting a season-long, one-fish bag limit would reduce harvests to approximately 85.7 percent of the area GHL, without accounting for discard mortality, and 89.6 percent of the area GHL when accounting for it. Reduced participation has a more powerful effect. As noted previously, current peer-reviewed literature suggests a one-fish bag limit could reduce demand by up to 30 percent or slightly more. Table 42 shows harvest as a percentage of GHL with varying levels of demand reduction. A 30 percent reduction would lower Area 2C harvest to 59.9 percent of the GHL without accounting for mortality issues.

**Table 42. Season Long One-Fish Bag Limit With Initial Changes in Discard Mortality & Reduced Participation**

| Demand Reduction | Without Mortality | | | With 5% Mortality | |
|---|---|---|---|---|---|
| | Harvest Reduction (%) | Harvest Reduction (Mlb) | Harvest as Percentage of the GHL | Harvest Reduction (Mlb) | Harvest as Percentage of the GHL |
| **0%** | **39.7%** | **0.808** | **85.7%** | **0.752** | **89.6%** |
| 10% | 45.8% | 0.933 | 77.0% | 0.869 | 81.4% |
| 20% | 51.9% | 1.055 | 68.4% | 0.983 | 73.5% |
| **30%** | **57.9%** | **1.178** | **59.9%** | **1.097** | **65.5%** |
| 40% | 63.9% | 1.300 | 51.3% | 1.211 | 57.5% |
| 50% | 69.9% | 1.423 | 42.8% | 1.325 | 49.6% |
| 60% | 75.9% | 1.545 | 34.2% | 1.439 | 41.6% |
| 70% | 81.9% | 1.668 | 25.7% | 1.553 | 33.7% |
| 80% | 88.0% | 1.790 | 17.1% | 1.667 | 25.7% |

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

The analysis estimates the effect of a single-fish bag limit for June, July and August that accounts for reduced participation. However, these estimates should be viewed as the single-year effect because anglers will likely rapidly adapt because the long-term belief is that demand would migrate to other months, but there are no data on how rapidly or completely angers will adjust. Thus, Table 43 may grossly overestimate the long-term effects of a single-month bag limit reduction.

**Table 43. Month One-Fish Bag Limit Accounting for Initial Changes in Discard Mortality & Reduced participation**

| Within Month Demand Reduction | Harvest Without Mortality as % of the GHL | | | Harvest With Mortality as % of the GHL | | |
|---|---|---|---|---|---|---|
| | June | July | August | June | July | August |
| 0% | 127.9% | 121.5% | 125.1% | 128.9% | 122.9% | 126.2% |
| 10% | 125.7% | 118.3% | 122.4% | 126.8% | 120.0% | 123.8% |
| 20% | 123.5% | 115.2% | 119.8% | 124.8% | 117.0% | 121.4% |
| 30% | 121.4% | 112.1% | 117.2% | 122.8% | 114.1% | 119.0% |
| 40% | 119.2% | 108.9% | 114.7% | 120.8% | 111.2% | 116.5% |
| 50% | 117.1% | 105.8% | 112.1% | 118.8% | 108.3% | 114.1% |

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

### 2.6.6 Option 5-Effect of Size Limits for Second Fish

A variation on the one-fish bag limit is allowing anglers to keep fishing for a larger, or "trophy," second fish. Under this option, anglers would generally have a one-fish bag limit except that they could keep fishing after harvesting their first fish to pursue a second halibut that met a minimum length standard. The option contains four sub-options establishing this minimum length for the second halibut at 45 inches, 50 inches, 55 inches, or 60 inches. As shown in Table 44, the higher this limit is set, the closer this option comes to replicating the equivalent of a one-fish bag limit. Without accounting for reduced participation or changes in discard mortality, ADF&G analysts predicted that a 45 inch limit would reduce harvest by 21.6 percent or 0.44 Mlb. A 60-inch bag limit would reduce harvests by 33.9 percent or 0.69 Mlb.

**Table 44. Expected Effect of a 1-Fish Bag Limit with the Opportunity to Harvest a Second Fish, No Demand Effects**

| Minimum Length for the Second Fish (In) | Estimated Round Weight (lbs) | Proportion of 2006 charter harvest below target length by Number of Fish | Without Mortality | | With Mortality | |
|---|---|---|---|---|---|---|
| | | | Expected Harvest Reduction | Harvest as Percentage of GHL | Expected Harvest Reduction | Harvest as Percentage of GHL |
| 45 | 43 | 83.7% | 21.3% | 111.8% | 19.9% | 113.9% |
| 50 | 60 | 89.3% | 25.4% | 106.0% | 23.6% | 108.5% |
| 55 | 82 | 94.0% | 29.7% | 99.9% | 27.6% | 102.8% |
| 60 | 109 | 97.4% | 33.6% | 94.3% | 31.3% | 97.6% |

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

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

IPHC data show that fish above the proposed minimum lengths are rare to varying degrees depending on length. Just less than 12 percent of fish are longer than 45 inches while less than 1 percent of fish in Area 2C measuring longer than 60 inches (Appendix IV). Thus, the selection of the minimum size length makes a difference in the number of larger fish that are available for anglers to harvest. All things being equal, an angler might face a better than 1 in 10 chance of encountering a 45-inch fish, but a less than 1 in 100 chance of encountering a 60-inch fish. This difference will play into demand through anglers' differing risk/reward preferences. Table 45 shows the expected effects of the sub-options with demand effects included in the reduction estimates. Without accounting for mortality or any increase in the average size of the harvested fish, the study estimates that a 10 percent reduction in demand under a 45" minimum size limit would have reduced the charter harvest to approximately 100.4 percent of the GHL. Minimum size limits of 50", 60", and 65" would have resulted in harvest equivalent to 95.3 percent, 89.8 percent, and 84.7 percent of the GHL respectively.

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

| Demand Reduction | Without Mortality | | | | With Mortality | | | |
|---|---|---|---|---|---|---|---|---|
| | 45" Min | 50" Min | 55" Min | 60" Min | 45" Min | 50" Min | 55" Min | 60" Min |
| 0% | 111.8% | 106.0% | 99.9% | 94.3% | 113.9% | 108.5% | 102.8% | 97.6% |
| **10%** | **100.4%** | **95.3%** | **89.8%** | **84.7%** | **102.3%** | **97.5%** | **92.4%** | **87.7%** |
| 20% | 89.3% | 84.7% | 79.8% | 75.3% | 90.9% | 86.6% | 82.1% | 77.9% |
| 30% | 78.1% | 74.1% | 69.8% | 65.9% | 79.5% | 75.8% | 71.8% | 68.2% |

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

This option has several negative features from a discard mortality perspective. First, the opportunity to keep a second halibut will encourage individuals to maximize effort throughout the day. While some

anglers currently maximize effort as part of their personal preferences, the pursuit of the larger second fish could be inculturated into the charter experience as charter providers seek to keep all clients happy while clients truly interested in harvesting a second fish pursue their quarry. Second, the establishment of the upper limit means that anglers who otherwise might have stopped fishing with a 42-inch fish 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 or if the angler succeeds in replacing the 42-inch fish with a fish above the minimum size limit.

As noted above, increasing discard mortality will generally require anglers to discard more than the 51,155 that were discarded in the 2006 charter fishery. It is unclear whether this option will result in increased or decreased mortality discards. Mortality discards could decrease if reduced participation lowers the number of fish anglers catch. Reduced participation is most likely to occur with a higher minimum size limit on the second fish because the chances of harvesting a second fish are greatly reduced. On the other hand, if the regime does not reduce demand and encourages anglers who would have stopped fishing earlier to continuing pursuing their fish, then the number of discarded fish and discard mortality could increase. There are not enough data on angler behavior while fishing to reliably estimate how this option will affect discard mortality, but there is enough uncertainty that IPHC staff have not endorsed this option without a better understanding of incremental mortality.

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

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

### 2.6.7 Option 6-Effect of Season Closure Dates

Season closure dates after the end of August will do very little to reduce harvest while closure dates earlier in August could substantially lower harvest until anglers adjust to new regulatory regime. Table 46 shows effort and harvest relative to three proposed season closure dates. The data show that 16.4 percent of harvest and 18.7 percent of effort occur after August 15$^{th}$. This means that anglers before August 15$^{th}$ experience slightly higher success rates as measured by weight of harvest than those anglers that fish after August 15$^{th}$. Anglers who fish after August 31$^{st}$ catch 3.7 percent of the harvest and are 5.9 percent of effort. Those fishing after September 15$^{th}$ harvest 0.7 percent of overall harvest for 1.1 percent of the effort.

**Table 46. Distribution of Effort and Harvest by Time**

| Time Period | Portion of Total Harvest Occurring During the Time Period | Portion of the Total Harvest Occurring After the Time Period | Portion of Total Effort Occurring During the Time Period | Portion of the Total Effort Occurring After the Time Period |
|---|---|---|---|---|
| January 1 - August 15 | 83.6% | 16.4% | 81.4% | 18.7% |
| August 16 - 31 | 12.7% | 3.7% | 12.8% | 5.9% |
| September 1-15 | 3.0% | 0.7% | 4.7% | 1.1% |
| September 16-December 31 | 0.7% | Not Applicable | 1.1% | Not Applicable |

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

Closing the season after August 15th would save 16.4 percent of the harvest if no anglers rebooked their trips to before the season closure date. Current ADF&G data and charter fleet interviews indicate that there is capacity in the charter fleet to absorb some of these displaced anglers but likely not all of them or even the majority. The effect of this option would be the strongest in the first year and then diminish over time as anglers adapted to the closure date. Two other sub-options would have smaller effects which would also diminish over time. A closure date of August 31st would save a maximum of 3.7 percent of the 2006 harvest levels while a September 15th closure date would save less than one percent if anything at all. A charter harvest operator interviewed for this analysis described the decline in the flow of anglers after September 1st as "like turning off a spigot." Operators also expressed that an August 15th closure would likely force many operators out of business because the reduction in number of days on the water would make it so operators couldn't recover even their fixed costs for the season.

**Table 47. Distribution of Effort and Harvest**

| Time Period | Portion of Total Harvest Occurring During the Time Period | Portion of the Total Harvest Occurring After the Time Period | Harvest Savings (Mlb) | 2006 Harvest as a Portion of the GHL with the Option |
|---|---|---|---|---|
| January 1 - August 15 | 83.6% | 16.4% | 0.334 | 118.8% |
| August 16 - 31 | 12.7% | 3.7% | 0.076 | 136.8% |
| September 1-15 | 3.0% | 0.7% | 0.015 | 141.1% |
| September 16-December 31 | 0.7% | Not Applicable | Not Applicable | Not Applicable |

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

### 2.6.8 Option 7-Effect of the Day of the Week Closures

The seventh option under consideration is the closure of one or more days of the week to halibut fishing by charter vessels. The analysis shows that this option will result in limited savings at this point in time, but will become a more effective control on effort if the number of vessels in the fleet is limited as proposed under a separate action and if the average number of anglers per vessel continues to grow. As shown in Table 48 and Figure 10 there is a very slight variation in fishing effort through the week with Friday showing the most effort (15.1 percent of the total) and Sunday showing the least effort (13.3 percent of the total). Key informant interviews indicated that most 2C trips are from non-residents who plan their trips well in advance and this forward planning helps smooth out demand. These interviews indicated that "walk-up demand" is very small in Area 2C when compared to Area 2A or Area 3A.

**Table 48. Distribution of Effort and Harvest**

| Effort & Catch | Sun. | Mon. | Tues. | Wed | Thurs. | Fri. | Sat. | Avg. |
|---|---|---|---|---|---|---|---|---|
| Effort (Client-Days) | 12,309 | 13,331 | 13,767 | 13,165 | 13,347 | 14,001 | 12,741 | 13,237 |
| | 13.3% | 14.4% | 14.9% | 14.2% | 14.4% | 15.1% | 13.8% | 14.3% |
| Halibut Kept (No. of Fish) | 15,299 | 16,044 | 16,625 | 15,735 | 15,829 | 16,060 | 15,143 | 15,819 |
| | 13.8% | 14.5% | 15.0% | 14.2% | 14.3% | 14.5% | 13.7% | 14.3% |

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

Harvest by day shows less variance than effort by day. As shown in Figure 10, effort and harvest are closely correlated. Interestingly, the only days that show more than a one percent deviation from a one-to-one relationship of harvest and effort are Friday and Sunday. Friday's harvest is four percent less than one might expect given the estimated effort level, while Sunday's is four percent higher. There are no empirical data to explain this deviation, but key informant interviews suggest that non-residents are more likely to be traveling on weekend days and that residents make up a higher portion of the fishery Friday through Sunday and are more likely to fish multiple days. Thus, an angler fishing on the weekend can be more selective on Friday knowing that they have two more days to fish. Conversely, an angler fishing on Sunday may be less selective knowing that the next angling opportunity, if any, is farther in the future.

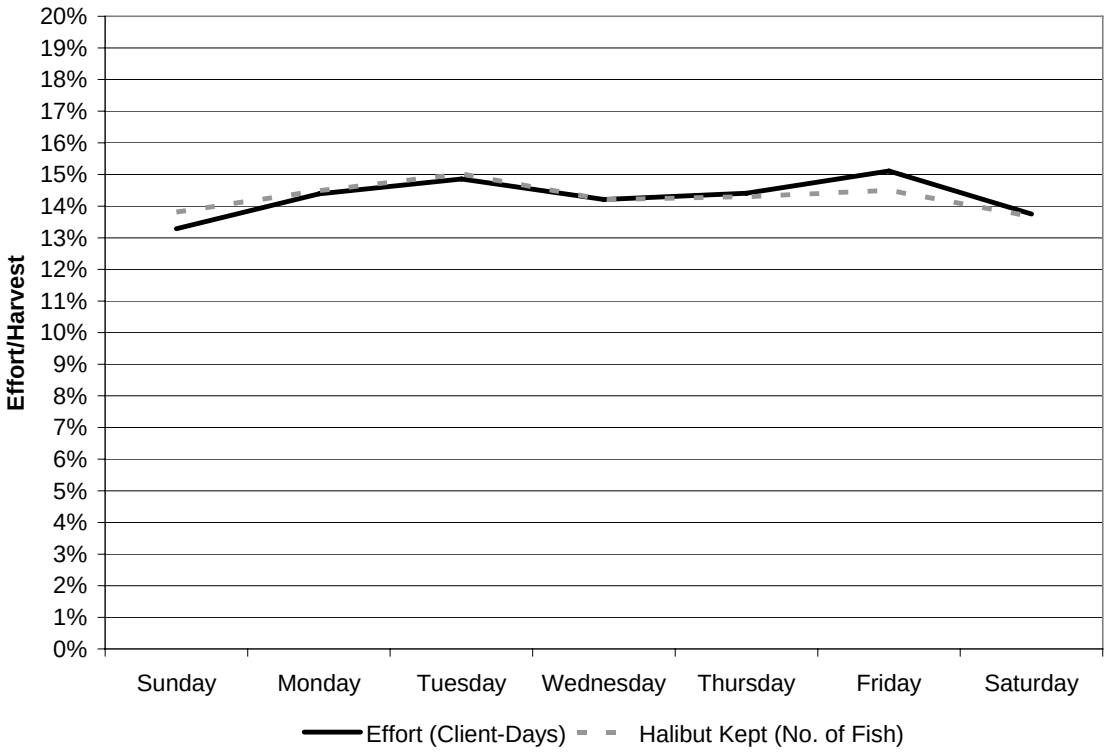


**Figure 10. Intraweek Distribution of Harvest and Effort, 2006**

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

Given the limited variability between days of the week, the analysis estimates the effect of the management option with an average generic day of the week of 14.3 percent of effort and 14.3 percent of harvest. The efficacy of this management option depends on the number of days closed to fishing and the portion of anglers that would be able to replace their angling experiences during other days of the week. ADF&G data suggests that there is substantial latent capacity within the industry between 1999 and 2006.

During this period the average trip involved 3.5 to 3.6 passengers on boats that average 6 spaces. There are no data available which indicate the point at which the average number of clients per trip would be high enough to make it difficult for displaced anglers to find replacement trips. Key informant interviews suggest that most anglers (e.g., 60 to 80 percent) displaced by a single-day closure would be able to find replacement spaces during other days of the week. If 70 percent of anglers replaced their lost seats, the option would reduce overall harvest by approximately 4.3 percent, thereby reducing the harvest from a 142.1 percent of the GHL to 136.0 percent of the GHL. Key informant interviews for this analysis and for NPFMC (2006) indicate that there could be localized space shortages during peak times of the year.

**Table 49. Expected Effect of a Single Day of the Week Closure**

| Replacement Rate (%) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Harvest Reduction (%) | 14.3 | 12.9 | 11.4 | 10.0 | 8.6 | 7.1 | 5.7 | 4.3 | 2.9 | 1.4 | 0.0 |
| Harvest Reduction (Mlb) | 0.291 | 0.262 | 0.233 | 0.204 | 0.174 | 0.145 | 0.116 | 0.087 | 0.058 | 0.029 | 0.000 |
| Average Clients Per Trip | 3.88 | 3.94 | 4.01 | 4.07 | 4.13 | 4.20 | 4.26 | 4.33 | 4.39 | 4.46 | 4.52 |
| Harvest as % of the GHL | 121.8 | 123.8 | 125.9 | 127.9 | 129.9 | 132.0 | 134.0 | 136.0 | 138.0 | 140.1 | 142.1 |

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

The effects of the closure become more evident if more than one day is closed. If any two days are closed the base effect is 28.6 percent of the harvest. However, key informant interviews indicate that a lower percentage of anglers would be able to replace their lost seats because of inflexible schedules, the inability to rebook large parties, etc. While there are no empirical data on how many anglers would be able to find replacement seats, interviews suggested that a two-day closure could leave up to half the displaced anglers without seats. Under this scenario the analysis estimates the harvest reduction at 14.3 percent producing a new harvest level of 121.8 percent of the GHL.

**Table 50. Expected Effect of a Closing Two Days of the Week**

| Replacement Rate (%) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Harvest Reduction (%) | 28.6 | 25.7 | 22.9 | 20.0 | 17.1 | 14.3 | 11.4 | 8.6 | 5.7 | 2.9 | 0.0 |
| Harvest Reduction (Mlb) | 0.581 | 0.523 | 0.465 | 0.407 | 0.349 | 0.291 | 0.233 | 0.174 | 0.116 | 0.058 | 0.000 |
| Average Clients Per Trip | 3.88 | 4.03 | 4.19 | 4.34 | 4.50 | 4.65 | 4.81 | 4.96 | 5.12 | 5.27 | 5.43 |
| Harvest as % of the GHL | 101.5 | 105.6 | 109.6 | 113.7 | 117.7 | 121.8 | 125.9 | 129.9 | 134.0 | 138.0 | 142.1 |

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

Key informant interviewees stressed that while aggregate effort does not differ much between individual days, individual days are important on the community level. In some communities the predominant source of clients is the cruise industry and cruise docking are concentrated on certain days of the week. For example, a Sitka charter broker told the study that in 2006 Wednesday was the day the cruise ships who booked through that broker landed in Sitka and closing the fishery on Wednesdays would have disproportionately affected the boat operators booking through that broker. Given that cruise ships tend to travel in a fixed pattern, it would seem that any day of the week could have disproportionate impacts on specific communities. For more discussion on these data please Section 2.7.

Interviewees who offered multi-day experiences indicated that this option would disrupt their business model. Currently most multi-day operators offer three-day and four-day packages. Eliminating halibut from one day of one of those packages would significantly change the experience the operators are offering to client. Several interviewees indicated that their current margins would not support lowering prices to accommodate this change in the clients' experiences. More than a one-day per week closure would result in even greater disruption of the multi-day business model.

Finally, halibut fishing pressure increased in the last several years. The number of active vessels, the total number of active vessels, the total number of clients, the average number of clients per trip, and the average numbers of trips per vessel are all at their highest level in the recorded data period of 1998 through 2006. The average number of clients per trip is increasing to the point where day of the week closure could become more effective if vessels continued to become more crowded. With the number of vessels capped and the average number of clients per trip increasing, the ability of displaced clients to find replacement seats will be limited.

**Table 51. Effort per Trip, 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.

### 2.6.9 Option 8-Effect of Minimum Size Limits

The proposed management options include a minimum harvestable size limit of 32 inches or below for the charter sector. The analysis concludes that it is unable to accurately predict the effect of this option. While empirical data suggest the possibility of increased total harvest weight, key informant interviews indicate that some savings would likely be seen in the certain sub-areas. Hence, the overall effect of the option is very unclear. A minimum size limit at that length may increase total harvest weight rather than decrease total harvest weight if anglers are able to replace smaller fish with larger fish above a certain size.

ADF&G data indicate that halibut below 32 inches account for 48 percent of the Area 2C charter catch by number and 23 percent by weight (Table 52). These portions are higher in the non-guided (non-charter) recreational sector. Within the latter sector, halibut below the limit account for 61 percent of the harvest by number and 30 percent by weight. This differential likely reflects 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 greater knowledge of halibut habitat and distribution.

**Table 52. Portion of Area 2C Harvest Falling below the Minimum Size Limit by Recreational Sector, 2006**

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

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

While the data at face value would seem to indicate substantial savings from a minimum size limit, empirical 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 total harvested biomass. Fisheries managers previously used minimum size limits in Area 2A and the result was an increase in total biomass harvested (Hare and Clark 2007). While the retained catch of very small fish and the total number of fish fell, the overall average weight of harvested fish rose enough to result in a total increase in harvested biomass (Hare and Clark 2007).

ADF&G data from 2006 data indicate that this scenario could happen with a minimum size limit in Area 2C. As shown in Table 53, in 2006 anglers harvested an estimated 51,474 halibut below the size limit and these fish average 9.1 pounds. 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 the amounts seen for halibut below the size limit. In 2006 charter anglers harvested approximately 55,764 halibut above the size limit averaging 28.1 pounds. The total weight of these halibut was 1.57 Mlb.

**Table 53. 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% | 01:03.1 | |

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 harvests. However, at least some anglers are likely to replace those smaller halibut with halibut above the limit. If the total weight of "replacement" fish weighs more than the estimated 468,000 pounds in savings, then the option would result in an increase in total harvested biomass. The analysis calculated that if the equivalent of approximately one halibut in three saved by the limit is replaced by an average halibut above the limit, then there will be in increase in total harvested biomass.

Empirical data from IPHC setline surveys demonstrate the potential problem with the minimum size limit. As shown by Figure 11 and Figure 12, a 32 inch limit protects approximately 50 percent of the number of fish from harvest, but only a quarter of the surveyed biomass.[11] The bulk of the surveyed biomass is from fish larger than 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 (Appendix IV). However, the analysis notes that there is not enough information on angler behavior and the distribution of catch by size to determine the efficacy of this option or other potential options.

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 limit is replaced with just a 34-inch fish above the limit, then the total weight of halibut harvested will likely increase (Table 54).

[11] 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.

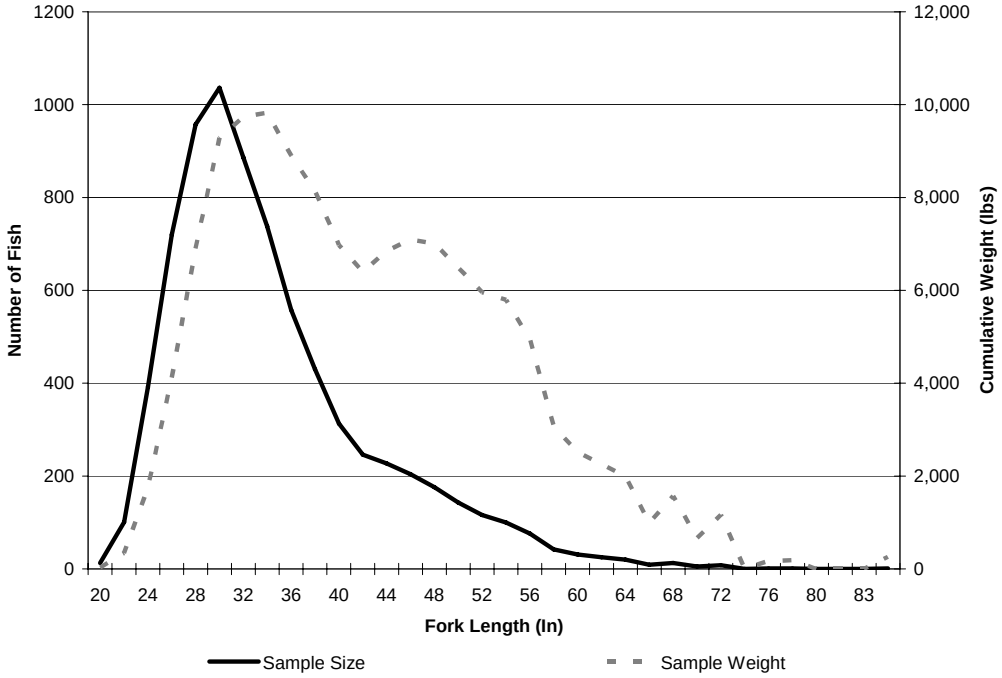


**Figure 11. IPHC Setline Survey Data, 2007 (Source: IPHC)**

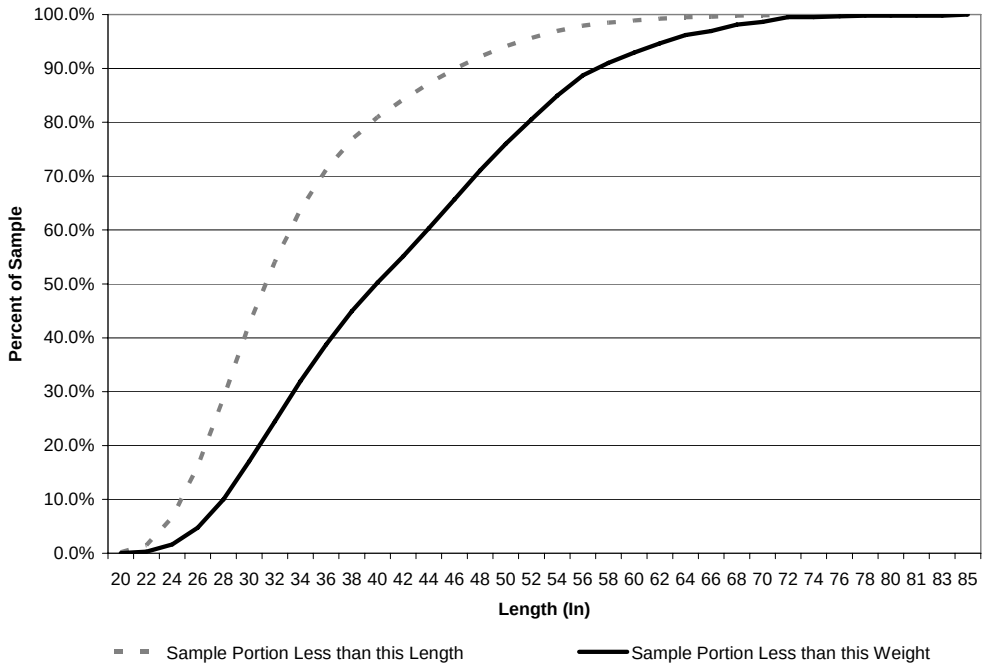


**Figure 12. IPMC Setline Survey Data Cumulative Frequencies, 2007 (Source: IPHC).**

**Table 54. Required Replacement Success Rates at Various Average Lengths and Weights**

| Average Length of Replacement Fish (in) | Average Round Weight (lbs.) | Required Replacement Ratio |
|---|---|---|
| 34 | 17.3 | 53% |
| 36 | 20.7 | 44% |
| 38 | 24.7 | 37% |
| 40 | 29.3 | 31% |
| 42 | 34.3 | 26% |
| 44 | 39.9 | 23% |
| 46 | 46.0 | 20% |

Operator interviews suggest that the ability of anglers to replace smaller fish with larger fish will vary by area and the operator's business model. For example, operators located in Sitka and Ketchikan indicated that larger fish were scarce in 2006 in part because of localized depletion as rising fuel prices encouraged both the commercial and charter fleets to operate in the same waters. Operators offering multi-day package experiences also indicated that their clients generally harvest their halibut quickly and then move on to salmon fishing during the same trip. A minimum size limit would likely reduce the overall number and weight of halibut harvested as these anglers might not extend the amount of time they spend fishing for halibut when they could be harvesting salmon.

## 2.7 Economic and Socioeconomic Impacts of Options

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

### 2.7.1 Expected Effect of Each Option

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

### 2.7.2 Option 1-Effect of No More than One Trip per Day

Option 1, a limit on vessels of no more than one trip per day would have reduced harvest under 2006 conditions between 0.038 and 0.049 Mlb (between 1.8 and 2.4 percent). With this option, the GHL

overage would have stood at between 138.7 percent and 139.5 percent of the GHL instead of the estimated 142.1 percent (Table 55). The analysis for this option showed that "second trips" of the day for halibut are increasing as a percentage of overall trips, but still represent a relatively small portion of overall effort (Section 2.6). Key informant interviews indicated that a very small portion of the charter fleet in 2C relies on this business model, which is much more common in Area 3A. More interviewees viewed this option as the least painful for the industry.

**Table 55. Summary Effect of No More than One Trip per Day**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| One Trip per Day | Lower Bound | 0.038 | 1.8 | 2.6 | 139.5 |
| | Upper Bound | 0.049 | 2.4 | 3.4 | 138.7 |

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

### 2.7.3 Option 2-Effect of No Harvest by Skipper and Crew

ADF&G banned harvest by skipper and crew while paying clients are on charter vessel effective May 26, 2006. The analysis expects ADF&G to renew the emergency order (EO) this year. Data from 2006 indicate that ADF&G's 2006 EO saved between 3.8 and 4.2 percent of the harvest (Table 56). This range is inside the range of previous estimates (NPFMC, 2006). The analysis expects that continued EO's or a federal action to permanently ban skipper and crew harvest would reduce future harvests by approximately 4 percent.

**Table 56. Summary Effect of a No Harvest by Skipper and Crew**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest |
|---|---|---|---|
| No Harvest By Skipper and Crew | Lower bound | 0.078 | 3.8% |
| | Upper Bound | 0.086 | 4.2% |

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

### 2.7.4 Option 3-Effect of an Annual Limit

Option 3, an annual limit of either four fish of five fish, would have reduced harvest under 2006 conditions by 0.190 (five fish limit) and 0.335 Mlb (four fish limit). These amounts are equal to between 9.3 percent and 16.3 percent of the 2006 harvest respectively. With these options, the GHL overage would have stood at between 128.7 percent and 118.7 percent of the GHL respectively instead of the estimated 142.1 percent (Table 57). While key informant interviewees told us that this option would disproportionately affect lodge operators and operators who offered multi-day packages, the lodge operators interviewed for this analysis indicated that this option is preferable compared to other options. The analysis notes that the four fish limit is the only option not involving an effective change in the bag limit that results in a more than 20 percentage point decline in the GHL overage. NOAA Fisheries has expressed concerns about the enforcement costs of this option. However, the analysis notes that the new 2006 logbooks have lowered enforcement costs because they track angler harvest by sport fishing license number.

**Table 57. Summary Effect of an Annual Limit**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Annual Limit | Four Fish | 0.335 | 16.4 | 23.4 | 118.7 |
| | Five Fish | 0.190 | 9.3 | 13.3 | 128.8 |

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

### 2.7.5 Option 4-Effect of Lower Bag Limits

Option 4 would lower the daily bag limit from two halibut to one halibut in June, July, August, or for the entire season. This analysis may reduce demand for charter halibut trips. Key informant interviews and a review of the peer-review literature indicate that the expected demand reduction could be as high as 30 percent. The analysis presents two estimates for each sub-option. These are the effect of the option without any demand reduction and the effect of the option with a 30-percent demand reduction. For the full season bag limit, the demand reduction is likely to be within these two points. The month-long bag limit reductions are more complicated as anglers can transfer effort to other months. There are no data available to help predict the magnitude of these transfers. However, key informant interviews indicate that one possibility is that the demand reduction and demand transfers cancel each other out and that the base estimate of no demand decline stand as the best estimate of the options overall effect.

The analysis estimates that:

- A reduction in bag limit in June 2006 would have reduced total season harvest between 0.204 and 0.297 Mlb, which is equivalent to between 10.0 percent and 14.6 percent of the total 2006 harvest. As noted above, key informant interviews indicated that between demand transfer and demand reduction the base estimate of 10 percent might be the best estimate.

- A reduction in bag limit in July 2006 would have reduced total season harvest between 0.295and 0.430 Mlb, which is equivalent to between 14.5 percent and 21.1 percent of the total 2006 harvest. As noted above, key informant interviews indicated that between demand transfer and demand reduction the base estimate of 14.5 percent might be the best estimate.

- A reduction in bag limit in August 2006 would have reduced total season harvest between 0.244 and 0.356Mlb which, is equivalent to between 12.0 percent and 17.5 percent of the total 2006 harvest. As noted above, key informant interviews indicated that between demand transfer and demand reduction the base estimate of 12 percent might be the best estimate.

- The full season bag limit reduction would have reduced total season harvest between 0.808 and 1.178 Mlb, which is equivalent to a 39.7 and 57.9 percent reduction in the harvest. This level of reduction would have reduced the GHL overage from 142.1 percent of the GHL to between 59.9 percent and 85.7 percent of the GHL.

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

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

**Table 58. Summary Effect of Lower Bag Limits**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| June One-fish bag limit | No Demand Decline | 0.204 | 10.0 | 14.2 | 127.9 |
| | 30% Demand Decline | 0.297 | 14.6 | 20.7 | 121.4 |
| July One-fish bag limit | No Demand Decline | 0.295 | 14.5 | 20.6 | 121.5 |
| | 30% Demand Decline | 0.430 | 21.1 | 30.0 | 112.1 |
| August One-fish bag limit | No Demand Decline | 0.244 | 12.0 | 17.1 | 125.1 |
| | 30% Demand Decline | 0.356 | 17.5 | 24.9 | 117.3 |
| Full Season One-fish bag limit | No Demand Decline | 0.808 | 39.7 | 56.4 | 85.7 |
| | 30% Demand Decline | 1.178 | 57.9 | 82.2 | 59.9 |

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

### 2.7.6 Option 5-Effect of Size Limits for Second Fish

Option 5 would establish an effective one-fish bag limit with an option to harvest a second fish above a minimum length. The option includes four sub-options of establishing a 45 inch, 50 inch, 55 inch, or 60 inch minimum length. As with Option 4, this option may reduce angler demand for charter trips. However, key informant interviews indicated that this option would likely lead to much small reduction in demand than a full-season bag limit reduction. These interviewees estimated demand reductions overall could be in the 10 percent range. This summary presents the no demand decline and 10 percent demand decline scenarios as high and low estimates of the potential effects of these option. The analysis estimates that:

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

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

- A 55 inch minimum length on the second fish would have reduced 2006 harvest in Area 2C between 0.604 and 0.749 Mlb. These amounts are equivalent to a 29.7 and 36.8 percent decline in 2006 harvest. Under this option the GHL overage would have declined from 142.1 percent of the GHL to between 89.8 percent and 99.9 percent of the GHL.

- A 60 inch minimum length on the second fish would have reduced 2006 harvest in Area 2C between 0.684 and 0.822 Mlb. These amounts are equivalent to a 33.6 and 40.4 percent decline in

2006 harvest. Under this option the GHL overage would have declined from 142.1 percent of the GHL to between 84.7 percent and 94.3 percent of the GHL.

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

**Table 59. Summary Effect of Size Limits for a Second fish**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Option For A Second Fish-45" | No Demand Decline | 0.434 | 21.3 | 30.3 | 111.8 |
| | 10% Demand Decline | 0.597 | 29.3 | 41.7 | 100.4 |
| Option For A Second Fish-50" | No Demand Decline | 0.516 | 25.4 | 36.1 | 106.0 |
| | 10% Demand Decline | 0.671 | 33.0 | 46.9 | 95.3 |
| Option For A Second Fish-55" | No Demand Decline | 0.604 | 29.7 | 42.2 | 99.9 |
| | 10% Demand Decline | 0.749 | 36.8 | 52.3 | 89.8 |
| Option For A Second Fish-60" | No Demand Decline | 0.684 | 33.6 | 47.8 | 94.3 |
| | 10% Demand Decline | 0.822 | 40.4 | 57.4 | 84.7 |

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

### 2.7.7 Option 6-Effect of Season Closure Dates

Option 6 establishes a season ending date of August 15th, August 31st, or September 15th. Based on key informant interviews, the economic effects of this option and its efficacy are highly correlated. The earlier the closing date the more effective the option is at lowering harvest and the higher the likelihood that businesses will not be able to make the minimum number of client days at sea they need to stay open. The analysis found that:

- An ending date of August 15th would have reduced expected harvest by 0.334 Mlb or 16.4 percent of the 2006 harvest. This date would have reduced the GHL overage from 142.1 percent to 118.8 percent.

- An ending date of August 31st would have reduced expected harvest by 0.076 Mlb or 3.7 percent of the 2006 harvest. This date would have reduced the GHL overage from 142.1 percent to 136.8 percent.

- An ending date of September 15th would have reduced expected harvest by 0.015 Mlb or 0.7 percent of the 2006 harvest. This date would have reduced the GHL overage from 142.1 percent to 14.1 percent.

These estimates do not include the fact that some anglers would eventually adapt to the closure date and fish before the date. These estimates should be viewed as the short-term effect of the options with an increasing reduction in long-term efficacy the longer this option is in place. These estimates essentially assume that the closure date was announced mid-season and no anglers were able to adapt to the change. There are no empirical data that would allow the analysis to estimate how quickly anglers would adapt.

**Table 60. Summary Effect of a Season Closure Date**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Season Closure | Aug 15th | 0.334 | 16.4 | 23.3 | 118.8 |
| | Aug 31st | 0.076 | 3.7 | 5.3 | 136.8 |
| | Sept 15th | 0.015 | 0.7 | 1.0 | 141.1 |

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

### 2.7.8 Option 7-Effect of the Day of the Week Closures

Option 7 provides an option to close a day of the week to halibut fishing. As noted in Section 2.6, the difference in effort and harvest between days is very small so the analysis provides the estimated effect of closing a generic day. The analysis estimates that a one-day closure would reduce harvest by 0.087 Mlb or 4.3 percent of total 2006 harvest. This estimate accounts for the fact that most anglers would be able to find replacement seats on vessels during other days of the week. This reduction would have reduced the GHL overage from 142.1 percent of the GHL to 136.0 percent of the GHL. A two-day closure is more effective as a lower percentage of displaced anglers would find replacement seats. The analysis estimates that a two-day closure would have lowered 2006 harvest by 0.291 Mlb or 14.3 percent.

**Table 61. Summary Effect of a Day of the Week Closure**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Weekday Closure | One Day-Best Estimate | 0.087 | 4.3 | 6.1 | 136.0 |
| | Two Days-Best Estimate | 0.291 | 14.3 | 20.3 | 121.8 |

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

Key informant interviews indicated that the economic effects of this option would disproportionately fall on operators with the highest investment in fixed assets whose business model consists of going out every day or nearly every day. Part-time operators would be less affected if they had flexibility to move their operating days around the closure. Additionally, the analysis shows that communities where cruise ships only call on one or two days per week could disproportionate affects if the closure date coincided with cruise visits.

### 2.7.9 Option 8-Effect of Minimum Size Limits

Empirical evidence from other halibut fisheries (e.g., Area 2A) indicate that minimum size limits in the past resulted in increases in total harvest weight. The analysis in Section 2.6 shows that if one in three fish saved by the minimum size limit is replaced by an average fish from above the minimum size limit, then the total harvest weight will increase. The analysis shows that the replacement fish do not have to be extraordinarily large fish. Simply replacing better than one in three 9-10 pound fish with a 27-30 pound fish will result in an increase in total harvest weight. While IPHC population data show that this type of replacement is possible, several key informant interviewees indicated that this type of replacement would have been difficult in their area in 2006 because the commercial and charter fleets were clustered closer to shore because of high fuel costs.

Key informant interviews indicated that in certain sub-areas anglers would have difficulty replacing fish below the limit with fish above the limit. Operators in Sitka and Ketchikan indicated that replacing these fish would be nearly impossible during a standard trip.

For these reasons, the analysis concludes that it is unable to accurately predict the effect of this option. While empirical data suggest the possibility of increased total harvest weight, key informant interviews indicate that some savings would likely be seen in the certain sub-areas. Hence, the overall effect of the option is very unclear.

**Table 62. Summary Effect of Minimum Size Limits**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| Minimum Size Limit | No Sub Option | Unclear | Unclear | Unclear | Unclear |

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

For quick reference, Table 63 shows the estimated affect all of the options as if they had been in place in 2006.

**Table 63. Effect of Options of Charter Industry Halibut Harvest (2006) in Area 2C**

| Management Option | Sub-Option or Additional Information | Expected Reduction (Mlb) | Expected Reduction as a % of Current Harvest | Expected GHL Reduction (Percentage Points) | Expected Post-Option Harvest as a Portion of the GHL (%) |
|---|---|---|---|---|---|
| One Trip per Day | Lower Bound | 0.038 | 1.8 | 2.6 | 139.5 |
| | Upper Bound | 0.049 | 2.4 | 3.4 | 138.7 |
| Annual Limit | Four Fish | 0.335 | 16.4 | 23.4 | 118.7 |
| | Five Fish | 0.190 | 9.3 | 13.3 | 128.8 |
| No Harvest by Skipper and Crew | Lower bound | 0.078 | 3.8 | N/A | N/A |
| | Upper Bound | 0.086 | 4.2 | N/A | N/A |
| June One-fish bag limit | No Demand Decline | 0.204 | 20.4 | 14.2 | 127.9 |
| | 30% Demand Decline | 0.297 | 14.6 | 20.7 | 121.4 |
| July One-fish bag limit | No Demand Decline | 0.295 | 14.5 | 20.6 | 121.5 |
| | 30% Demand Decline | 0.430 | 21.1 | 30.0 | 112.1 |
| August One-fish bag limit | No Demand Decline | 0.244 | 12.0 | 17.1 | 125.1 |
| | 30% Demand Decline | 0.356 | 17.5 | 24.9 | 117.3 |
| Full Season One-fish bag limit | No Demand Decline | 0.808 | 39.7 | 56.4 | 85.7 |
| | 30% Demand Decline | 1.178 | 57.9 | 82.2 | 59.9 |
| Option For A Second Fish-45" | No Demand Decline | 0.434 | 21.3 | 30.3 | 111.8 |
| | 10% Demand Decline | 0.597 | 29.3 | 41.7 | 100.4 |
| Option For A Second Fish-50" | No Demand Decline | 0.516 | 25.4 | 36.1 | 106.0 |
| | 10% Demand Decline | 0.671 | 33.0 | 46.9 | 95.3 |
| Option For A Second Fish-55" | No Demand Decline | 0.604 | 29.7 | 42.2 | 99.9 |
| | 10% Demand Decline | 0.749 | 36.8 | 52.3 | 89.8 |
| Option For A Second Fish-60" | No Demand Decline | 0.684 | 33.6 | 47.8 | 94.3 |
| | 10% Demand Decline | 0.822 | 40.4 | 57.4 | 84.7 |
| Season Closure | Aug 15th | 0.334 | 16.4 | 23.3 | 118.8 |
| | Aug 31st | 0.076 | 3.7 | 5.3 | 136.8 |
| | Sept 15th | 0.015 | 0.7 | 1.0 | 141.1 |
| Weekday Closure | One Day-Best Estimate | 0.087 | 4.3 | 6.1 | 136.0 |
| | Two Days-Best Estimate | 0.291 | 14.3 | 20.3 | 121.8 |
| Minimum Size Limit | No Sub Option | Unclear | Unclear | Unclear | Unclear |

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

Table 64 shows all of the sub-options (including accompanying high and low ranges discussed above) ordered by their effect on the GHL. For example, a full-season one-fish bag limit with the upper estimate of demand reduction (30 percent) shows would have reduced 2006 harvest by 82.2 percent of the GHL. This number means that harvest as a portion of the GHL would fall by 82.2 points from 142.1 percent to 59.9 percent of the GHL.

One important feature of this table is that it clearly shows that the only single options that bring harvest down close the GHL are the bag limit reduction options (including the option for a second fish above a minimum size). The most effective single option that does not involve a bag limit reduction is the annual limit of four fish. This option is also one of the more acceptable options to operators.

Another important feature is that it shows which options have high and low estimates that bracket the GHL. For example, a 50" minimum size limit on the second fish would likely have resulted in harvest levels equivalent to between 95.2 percent and 106.0 percent of the GHL.

**Table 64. Effect of Options Ordered by Reduction in the GHL**

| Management Option | Sub-Option or Additional Information | Expected GHL Reduction (Percentage Points) | 2006 Harvest as Portion of the GHL with this Option |
|---|---|---|---|
| Full Season One-fish bag limit | 30% Demand Decline | 82.2 | 59.9 |
| Option For A Second Fish-60" Minimum Size | 10% Demand Decline | 57.4 | 84.7 |
| Full Season One-fish bag limit | No Demand Decline | 56.4 | 85.7 |
| Option For A Second Fish-55" Minimum Size | 10% Demand Decline | 52.3 | 89.8 |
| Option For A Second Fish-60" Minimum Size | No Demand Decline | 47.8 | 94.3 |
| Option For A Second Fish-50" Minimum Size | 10% Demand Decline | 46.9 | 95.2 |
| Option For A Second Fish-55" Minimum Size | No Demand Decline | 42.2 | 99.9 |
| Option For A Second Fish-45" Minimum Size | 10% Demand Decline | 41.7 | 100.4 |
| Option For A Second Fish-50" Minimum Size | No Demand Decline | 36.1 | 106.0 |
| Option For A Second Fish-45" Minimum Size | No Demand Decline | 30.3 | 111.8 |
| July One-fish bag limit | 30% Demand Decline | 30.0 | 112.1 |
| August One-fish bag limit | 30% Demand Decline | 24.9 | 117.2 |
| Annual Limit | Four Fish | 23.4 | 118.7 |
| Season Closure | Aug 15th | 23.3 | 118.8 |
| June One-fish bag limit | 30% Demand Decline | 20.7 | 121.4 |
| July One-fish bag limit | No Demand Decline | 20.6 | 121.5 |
| Weekday Closure | Two Days-Best Estimate | 20.3 | 121.8 |
| August One-fish bag limit | No Demand Decline | 17.1 | 125.0 |
| June One-fish bag limit | No Demand Decline | 14.2 | 127.9 |
| Annual Limit | Five Fish | 13.3 | 128.8 |
| Weekday Closure | One Day-Best Estimate | 6.1 | 136.0 |
| No Harvest by Skipper and Crew | Upper Bound | 6.0 | 136.1 |
| No Harvest by Skipper and Crew | Lower Bound | 5.4 | 136.7 |
| Season Closure | Aug 31st | 5.3 | 136.8 |
| One Trip per Day | Upper Bound | 3.4 | 138.7 |
| One Trip per Day | Lower Bound | 2.6 | 139.5 |
| Season Closure | Sept 15th | 1.0 | 141.1 |
| Minimum Size Limit | No Sub Option | Unclear | Unclear |

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

### 2.7.10 Economic Effects on Industry and Communities

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

### Effect of No Action

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

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

Using these assumptions, the model predicts the Area 2C GHL overage could grow from 0.603 Mlb in 2006 (roughly 4.3 percent of total CEY) to 2.250 Mlb in 2014 (roughly 26 percent of total CEY). These increases reflect a reduction in total CEY as noted in the IPHC's estimates for 2007. Related losses in ex-vessel value would increase from $2.3 million in 2007 to approximately $8.54 million in 2015 (Table 65). Losses in ex-vessel value directly affect crew and communities dependent on the commercial fleet and the combined affect of losses from CEY reductions and increases in GHL overages are likely to affect the commercial fleet in a substantial way. Under these comparative static estimates, the combined losses from CEY reductions and GHL overage could total more than $22.8 million in 2007. While the CEY reduction accounts for approximately $22.0 million of that estimated loss, the ex-vessel losses from charter harvests will continue to grow and represent a larger portion of those losses each year.

**Table 65. Long-Term Commercial Losses in Ex-Vessel Value based on Estimated Commercial CEY Reductions and Guided Sport Catch-Area 2C**

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

Source: Northern Economics Estimates based on IPHC 2006 Stock Assessment Estimates and 2006 ADF&G estimates of guided and unguided sport catch.
Note: All non-dollar figures are in millions of pounds.

**Option 1 – One Trip per Day**

As previously analyzed in NPFMC (2006), a likely economic effect associated with a limit of charter vessels to one trip per day would be that a number of boats would be forced to change their business model. While the analysis does not know the number of businesses that rely on this business model, Table 66 shows the number of vessels that made more than one trip in a day during the 1998 through 2006 seasons. The number of "second trips" per day more than doubled since 1998 even though the overall number of trips is up by just over 50 percent. As a portion of trips, second trips of the day are still a relatively small portion of overall effect, but that portion has increased from 2.0 percent in 1998 to 2.6 percent in 2006. However, the percentage of vessels that now conduct at least one "second trip" during a year has increased to more than 25 percent of the fleet. Operators dependent on these second trips would face a significant disruption of their business model. In particular, this option is likely to affect operators in the major cruise ship ports such as Ketchikan, Juneau, and Sitka. An argument heard during the analysis for NPFMC (2006) and this analysis is that because of the limited range and duration of these trips (i.e., most trips are less than 4 hours) they do not generate the catch per unit of effort that other operators generate. Thus, this management option would have a substantial negative effect on these operators while having a negligible effect on harvest.[12] As noted in Section 2.6, limiting charter fleet vessels to one trip per day would reduce harvest between 1.85 percent and 2.4 percent. However, interviews with charter industry members indicated that the long-term effect of the alternative is likely to be even less.

**Table 66. Area 2C Vessels Affected by the limiting Vessels to One Trip per Day**

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

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

Another potential effect of this component is the possibility that some clients who would have chosen to go halibut fishing might chose to pursue another activity in the area or could chose not to take their trip to Alaska at all. Herrmann et al.(2001), based on a 1998 postal survey of Kenai saltwater anglers, noted that charter clients spent between $167.47 and $294.21 daily depending on whether they were local or from out of state. If clients could not, or chose not to, take a halibut trip and didn't spend this money elsewhere in the local economy, then the management option would result in economic losses related to client expenditures. However, the analysis is currently unable to quantify how many anglers would be unable to find a replacement charter trip, would choose not to take halibut trip altogether, or would spend their money in another sector of the economy. As shown in Table 66, the number of trips after the first trip of

[12] The catch per unit effort argument could potentially be verified through ADF&G data, but sub-area data for the analysis were not available for this draft.

day in Area 2C is less than 3 percent of the total number of trips in the area. Thus, the overall effects would be small relative to the total expenditures related to halibut charters, but localized losses could be felt by individual businesses.

**Option 2 – No Harvest by Skipper and Crew**

ADF&G banned halibut harvest by skipper and crew during charter trips after May 26th, 2006 through an Emergency Order, and is expected to renew that order in 2007 and beyond. As noted in NPFMC (2006), charter operators indicated that the elimination of harvest by crew members was likely to have little economic impact on their business. In fact, many interviews for that analysis and this analysis indicated that the elimination of the crew harvest was the most acceptable option presented to them. The economic impact of this management option is most likely to fall on crew members themselves, if they are unable to acquire halibut for personal use through other low-cost means. The analysis in NPFMC (2006) estimated that in 2004 crew harvested between 58,000 and 78,000 pounds of halibut while ADF&G estimates that crew would have harvested approximately 80,000 in Area 2C without the EO. Halibut that is not replaced through low-cost means would have to be replaced at retail prices or by substituting other protein sources, leading to higher costs for crew members. For, example if halibut costs an average of $15 per pound at the retail counter then it would have cost crew approximately $645,000 to replace the lost halibut on a pound for pound basis at the retail counter. At least one interviewee told us that crew at lodges considered the halibut to be part of their wages. If true, it means that the elimination of crew harvest could lead to higher labor costs for operators if crew members demand to be compensated for the reduction in wages. However, many operators told us that if crew harvest were eliminated, crew would conduct personal recreational trips on days when they did not have paying clients or in the shoulder season so that skippers, deck hands, and family members could continue to acquire halibut for personal use and offsetting the potential costs of the option.

**Option 3 – Annual Harvest Limit**

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

Sitka and Prince of Wales Island, which are home to several large lodges, could feel the effects of this management option more acutely than other communities. As noted above, saltwater anglers spend a significant amount of money each day (between $167.47 and $294.21 per day on the Kenai Peninsula in 1997). If anglers chose not to travel to Area 2C for these experiences, then local economies and companies would suffer. As noted above, Criddle et al., (2003) estimated that a 30 percent reduction in expected halibut catch per day would result in a 25.1 percent reduction in angler participation in Kenai area fisheries. However, an annual limit does not necessarily reduce catch per day if catch and release fishing is allowed. Discussions with NMFS economists indicated a lack of elasticity estimates that would allow the analysis to estimate how annual limits might affect demand for longer charter experiences.

NMFS economists indicated that such work was in progress, but is unavailable at this time (Lee, 2007; Lew, 2007). However, less formal estimates indicate that anglers will respond to lower limits by seeking other angling or recreational opportunities. For example, a 2007 study of charter clients in Sitka, AK found that 70 percent of charter clients indicated that a change in bag (not annual) limits would negatively affect the future probability of a return trip to Sitka, depending on the size of the change and the species of fish involved (McDowell 2005). While a change in annual limits may not affect the daily bag limit for most anglers, the study does show that anglers are sensitive to such changes. The economic effects of such changes are likely to be local because while anglers would experience a loss in welfare surpluses associated with catch reductions, they might also choose to redirect their angling dollars to other locations resulting in no changes in net benefits on a national level.

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

**Option 4 – One-fish bag limit**

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

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

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

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

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

**Option 5 – One-fish bag limit with an Option to Harvest a Second Fish**

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

- Anglers on multi-species trips (which are common for anglers on multi-day package trips) usually target halibut in the morning and then target salmon or other species after catching a limit of halibut. These anglers would face a choice about whether to search for a larger second halibut or whether they should leave their halibut fishing site to pursue salmon. Interviews suggested that these anglers would be generally accepting of a minimum size on the second fish as long as the option existed to pursue that fish if the anglers got into an area where large fish were abundant.

- Anglers on four-hour trips associated with cruise vessels are less likely to be affected by this option because their current trips do not generally offer the opportunity to quickly harvest two halibut. At the same time, the range of these trips is generally limited when compared to the range of anglers on full-day trips. This limited range generally restricts the ability of these anglers to pursue larger fish, so this option could result in effective one-fish bag limit for these anglers. However, as stated above, anecdotal information suggests these anglers have lower success rates in comparison to full-day anglers and the change in effective bag limit may not have much affect on angler demand.

- Anglers who target halibut specifically are mostly likely to be affected by this option, but to a much lesser extent than a one-fish bag limit. These anglers likely spend the most time targeting halibut and thus have the greatest chance to catch larger fish. That said, demand from this group will likely fall if they are unable to successfully replicate their current harvest rates with roughly equivalent harvest rates.

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

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

### Option 6 – Season Closure Date

A season closure date would likely result in lower spending on saltwater charters. As noted previously, saltwater anglers spend a significant amount of money each day. If anglers chose not to travel to Area 2C for these experiences, then local economies and companies would suffer. However, this effect will be moderated by a number of factors including:

- Committed halibut anglers will likely shift their demand for saltwater charters to before the season closure;

- Some anglers will continue to visit Alaska and could substitute spending their money on halibut charters on spending for others goods and services.

Obviously, an earlier season closure date would have a greater overall effect. Closure dates after August 31st will have much smaller effects than a season closure data of August 15th.

Key informant interviews with charter operators from inside passage communities raised a concern that a season closure date, as opposed to a season opening date, could disproportionately affect these communities. Halibut are migratory animals which spend the winter months in deeper waters and the summer months in shallower water feeding on migrating salmon. Communities such as Wrangell and Petersburg must often wait until early to mid-June before halibut start arriving in their fishing grounds while communities such as Sitka have access to fish much earlier and can start fishing early. A season closure date has the effect of making the fishing season much shorter in inside passage communities than in more western communities. A season opening date would affect western communities more significantly, but leave all communities with seasons of roughly equal lengths. For example, a season closure date of August 15th would result in a fishing season in Petersburg of 75 days while the fishing season in Sitka might be longer by 15 to 30 days for a total of between 90 and 105 days. On the other hand, a season opening date of June 1st would leave all communities with the same number of prime fishing days (approximately 90 day) before the season declined rapidly in early September.

Some operators expressed concerns that an early season closure date would reduce the number of paying client days below the number that they need to operate. Several operators indicated they had already reduced their early booking in preparation for this type of option. Clearly, business failure is a potential response to a reduction in the length of the season. However, the analysis is unable to quantify the probability or potential magnitude of these effects. Key informants rated this option as one of the worst for their industry if the August 15th sub-option is selected. A September 15th sub-option would have much smaller effects.

### Option 7 – Day of the Week Closure

Day of the week closures are most likely to effect operators offering multi-day packages and communities that rely heavily on fishing during a particular day or days and have customers who are unable to change their day of fishing within that community.

If a community's charter industry depends on cruise passengers arriving on a single day during the week that community would experience larger effects from a single-day closure if that closure coincides with the day cruise ships come to that community. Cruise passengers are normally in town for less than a 24-hour period and would have limited abilities to rebook their fishing experiences. While they might rotate their fishing day to another community, certain communities might lose if the majority of their cruise passengers come on the closure date. Juneau, Ketchikan, and Skagway accounted for 74 percent of all port calls by Alaska-bound cruise vessels in Southeast Alaska (Table 67 and Table 68). Peak days in these

communities are Wednesdays and Thursdays. However, no day receives more than 20 percent of overall port calls. Some of the smaller communities are dependent on specific days. Elfin Cove receives 97 percent of its calls on Sundays and Fridays. Haines and Metlakatla are dependent on Wednesdays and Fridays with more than 75 percent of calls occurring on those days. Wrangell is dependent on Mondays and Thursdays with more than 80 percent of calls occurring on those days. The study concludes that a single-day ban could be more economically damaging for small communities than large communities if the closure coincided with traditional port calls. However, these communities appear more likely to be visited at the ends or beginnings of trips rather than in the middle.

**Table 67. Cruise Vessel Calls By Day, 2006**

| Frequency | Elfin Cove | Haines | Juneau | Ketchikan | Metlakatla | Petersburg | Sitka | Skagway | Wrangell | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Sunday | 17 | 10 | 94 | 44 | 2 | 7 | 36 | 66 | 3 | 279 |
| Monday | 0 | 7 | 96 | 84 | 2 | 11 | 51 | 88 | 11 | 350 |
| Tuesday | 0 | 2 | 116 | 77 | 2 | 36 | 42 | 80 | 1 | 356 |
| Wednesday | 1 | 38 | 108 | 88 | 16 | 21 | 42 | 100 | 0 | 414 |
| Thursday | 0 | 1 | 106 | 94 | 0 | 8 | 42 | 82 | 18 | 351 |
| Friday | 17 | 31 | 47 | 85 | 12 | 19 | 41 | 56 | 2 | 310 |
| Saturday | 0 | 0 | 83 | 28 | 3 | 20 | 9 | 31 | 0 | 174 |
| Total | 35 | 89 | 650 | 500 | 37 | 122 | 263 | 503 | 35 | 2,234 |

Source: Northwest Cruise Association, 2007

Port calls in 2006 by cruise vessels peaked on Wednesday with 18.5 percent of visits (Table 67 and Table 68). The three days with the lowest portion of port calls are Saturday, Sunday, and Fridays with the number of Saturday visits less than half of the Wednesday peak. Intuitively this result makes sense as these are the days that cruise vessels are mostly likely to be steaming to and from their ports of origin. The analysis infers from this data and from that fact that fishing pressure is relatively constant throughout the week, that a weekend closure date might disproportionately affect local residents or non-resident non-cruise visitors using charters while a weekday closure date might disproportionately affect non-resident cruise passengers. However, the limited data on the market segmentation of charter clients prevents the analysis from confirming this inference.

**Table 68. Distribution of Vessel Calls and Total Share of Traffic (%), 2006**

| Community | Elfin Cove | Haines | Juneau | Ketchikan | Metlakatla | Petersburg | Sitka | Skagway | Wrangell | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Traffic Share | 1.6 | 4.0 | 29.1 | 22.4 | 1.7 | 5.5 | 11.8 | 22.5 | 1.6 | 100.0 |
| Sunday | 48.6 | 11.2 | 14.5 | 8.8 | 5.4 | 5.7 | 13.7 | 13.1 | 8.6 | 12.5 |
| Monday | 0.0 | 7.9 | 14.8 | 16.8 | 5.4 | 9.0 | 19.4 | 17.5 | 31.4 | 15.7 |
| Tuesday | 0.0 | 2.2 | 17.8 | 15.4 | 5.4 | 29.5 | 16.0 | 15.9 | 2.9 | 15.9 |
| Wednesday | 2.9 | 42.7 | 16.6 | 17.6 | 43.2 | 17.2 | 16.0 | 19.9 | 0.0 | 18.5 |
| Thursday | 0.0 | 1.1 | 16.3 | 18.8 | 0.0 | 6.6 | 16.0 | 16.3 | 51.4 | 15.7 |
| Friday | 48.6 | 34.8 | 7.2 | 17.0 | 32.4 | 15.6 | 15.6 | 11.1 | 5.7 | 13.9 |
| Saturday | 0.0 | 0.0 | 12.8 | 5.6 | 8.1 | 16.4 | 3.4 | 6.2 | 0.0 | 7.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Northwest Cruise Association, 200

Interviewees that offered multi-day experiences indicated that this option would disrupt their business model. Currently most multi-day operators offer three-day and four-day packages. Eliminating halibut from one day of one of those packages would significantly change the experience the operators are offering to client. Several interviewees indicated that their current margins would not support lowering prices to accommodate this change in the clients' experiences. More than a one-day closure would result in even greater disruption of the multi-day business model. Unlike changes in cruise passenger trips,

cancelled multi-day trips would likely not be replaced by expenditures elsewhere in Area 2C. Instead, expenditures would likely move to another fishing location somewhere else or into another activity all together.

The analysis expects that most anglers would adapt to a single-day closure. A multiple-day closure would increase the efficacy of the option, but also begin to affect the charter industry through lost revenues. As noted above, the "right" two-day combination could eliminate 75 percent or more of the potential cruise business in some smaller communities. It would be difficult for operators to regain those revenues through increased fares on other passengers given that they would be offering the same product as from before the management change. Operators placed this option as one of the more economically difficult for their industry.

**Option 8 – Minimum Size Limit**

The minimum size limit would have limited socioeconomic effects on charter operators and charter communities given that it would likely have limited effect on angler behavior. The option would not change the bag limit or affect catch rates for anglers. In addition, the biological data from IPHC indicates that anglers who currently keep fish 32 inches or smaller stand have a chance of replacing those fish with larger halibut. Operators indicate that anglers in some sub-areas would have difficulty replacing fish. Key informant interviews indicated that given the limited effect the option would have on the angling experience, there is a good chance that anglers would view the 32 inch limit as a conservation option with little effect on demand.

On the other hand, this option could have negative economic effects on the commercial fleet if it results in an increase in total harvest weight. Every pound of increase would result in a direct loss to the commercial fleet equivalent to the prevailing ex-vessel price. Increased information on the length of animals caught by anglers would allow future analyses to model the probability of particular loss amounts associated with this type of management option.

### 2.7.11 Enforcement Issues and Recordkeeping

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

> *…enforcement occurs on an opportunistic basis. All agencies agreed at that time some level of additional enforcement would be needed under a GHL system, depending upon the allocation and implementation scheme adopted. Also, the decision to allocate additional enforcement to this program would properly entail an evaluation of the public interest in doing so, versus doing less enforcement somewhere else. Staff discussed GHL enforcement issues, especially the implications of activating the various options like line, bag, and trip limits. Although a state enforcement officer was not present, the other agencies essentially reported that additional enforcement resources would not be forthcoming to support this program.*
>
> *Having said that, there are characteristics of the recreational charter fishery that suggest a different and lesser level of enforcement may be needed to ensure an adequate level of compliance with the program. Several characteristics of the fishery differentiate it from other fisheries and work to the advantage of regulators:*
>
> *a. The recreational charter fishery operates in the public eye. Requiring operators to prominently post GHL control options like bag limits and line limits onboard charter would help promote*

*compliance. The State could further support this by requiring those businesses selling sportfishing licenses to do the same.*

*b. The recreational charter fishery is highly competitive. While there are some operations in isolated locations, many boats tie up and operate in close proximity to other charter. It is reasonable to expect that those operators who are following the rules would be quick to notice another operator who wasn't following the rules.*[13]

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

Additionally, note that ADF&G currently regulates the recreational harvest of king salmon, rainbow trout, salmon sharks, and other species in certain areas by requiring anglers to record harvests of these species on the back of their fishing licenses immediately upon harvest. This system or a system involving charter stamps could be used to regulate annual harvest limits in Area 2C.

These factors, along with the current system of opportunistic enforcement, may provide a level of compliance sufficient to ensure the GHL options have the desired effect in controlling the fishery.

In addition to the discussion above, NOAA Fisheries provided the following discussion of enforcement issues.

### 2.7.12 NOAA Fisheries Discussion of Enforcement and Reporting Requirements

#### Enforcement and reporting requirements

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

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

(1) The State of Alaska legislature would need to amend the State confidentiality statute to allow NOAA OLE and NMFS access to confidential angler and operator information. Without this information, NOAA OLE cannot seize angler license information and logbooks for inspection and evidence, enter logbook and license data in Federal court, or perform post season audits of data to pursue violators (Table 69). NMFS would also need access to angler and charter operator registration and logbook information to provide the necessary program support (e.g., database management). A memorandum of understanding between the State, NOAA OLE, and NMFS would also likely be needed to allow data sharing.

[13] Charter operators cannot offer a "trip with higher bag or rod limits," as suggested in this excerpt. Those limits are set in regulation and operators would not advertise illegal activity.

(2) NOAA OLE would need to be deputized by the State of Alaska Commission of Public Safety. NOAA OLE needs the authority to inspect logbooks, angler licenses, or catch cards (Table 69). Without this authority, anglers and charter operators are not obligated to show their license information to a Federal enforcement officer.

**Table 69. Summary of NOAA OLE enforcement actions and their applicable State laws.**

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

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

### Trip limit (Option 1)

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

The ADF&G logbook currently collects this information and is specific to the both the trip and day fished. To provide onsite enforcement of the regulation, NOAA OLE would need the date when the trip started, the date when the trip ended, and information that would identify clients who harvested halibut. The State 2007 logbook will indicate the day a fishing trip occurred. This would provide NOAA OLE with information about the date the trip started, including the number of trips that occurred on a given day, and the date the trip ended. An operator could cheat on the logbook by recording two trips under a single trip; however, the client limit in area 2C would require the total number of clients on any single trip to not exceed six. If six people were recorded in the logbook and not onboard the vessel when checked by

NOAA OLE, the operator would be in violation. Recording multiple trips under the auspices of a single trip would also be detrimental to the logbook information collected by ADF&G.

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

**Prohibition of retention by skipper or crew (Option 2)**

An option to prohibit the retention of halibut by skipper and crew was promulgated by ADF&G in area 2C for 2006 (Emergency Order, EO, # 1-R-01-0631) and areas 3A and 2C for 2007 (EO # 2-R-03-02-07 and 1-R-02-07, respectively). These EO regulations apply to the charter fishery (including species other than halibut) and are enforced by the State of Alaska Department of Public Safety. A Federal regulation prohibiting the retention of halibut by skipper and crew would require NOAA OLE to enforce the regulation.

Enforcement of a regulation prohibiting skipper and crew retention would require enforcement to observation skipper or crew harvest at sea or a vessel returning to the dock with the number of harvested halibut exceeding the collective bag limit for clients. The logbook records skipper and crew harvest; however, obviously skipper and crew would generally not record an illegally harvested halibut. Thus, the logbook would facilitate NOAA OLE's ability to issue a citation only if the number of harvested halibut exceeded the number of anglers that are not skipper or crew. This would not eliminate the ability of anglers to avoid this regulation by designating a person that would otherwise be a skipper or crew as an angler. NOAA OLE could identify guides using their ADF&G guide license (assuming the conditions in Section 2.0 are met); however, crew are not required to be licensed by the State or Federal government and thus do not have any identification information indicating they are crew. Enforcement of this regulation would improve commensurate with increased enforcement staffing levels.

According to ADF&G logbook data from 1999 through 2001, harvests by crew members accounted for between 3.3 percent and 4.5 percent of the annual halibut harvest in Area 2C. ADF&G estimates from November 2006 concluded that the May 24, 2006 Emergency Order that banned skipper and crew harvest of halibut while paying clients were on the vessel saved approximately 86,000 pounds. This estimate results in an approximate harvest reduction of 4 percent using the 2006 SWHS information. Thus, a reduction in catch within that range of the ADF&G estimate for 1999-2000 was realized. This suggests compliance with the skipper and crew reduction is currently occurring in the fishery.

**Annual Limit (Option 3)**

The annual limit would substantially increase Federal enforcement and administrative costs in Area 2C. In 2006, approximately 87,700 charter clients, distributed over 681 charter vessels, fished from a charter vessel in Area 2C (ADF&G 2006). ADF&G estimates that approximately 7 percent of these clients harvested six or more halibut and approximately 10 percent of the clients harvested five or more halibut.

Given the 2-fish daily bag limit described in status quo, anglers harvesting more than four fish would have fished for at least three days.

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

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

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

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

- NOAA OLE would need the ability to check for compliance at sea, dockside, and through a post-season audit of angler catch. To meet these needs, a harvest record indicating the number of halibut harvested would be needed for each angler, as well as a vessel-specific record of each angler's catch (serially matched to an angler's catch card) that would be submitted to NOAA OLE on a regular basis throughout the fishing season. A vessel-specific record would be needed to track the charter operators involved with violations. The angler harvest record would be used during dock-side or at-sea enforcement and to provide a record of angler-specific halibut harvest for the charter guide.

- Use of State recordkeeping and reporting tools would require NOAA OLE to obtain the necessary authority to inspect State recordkeeping tools (i.e., charter logbook and sport fishing license). Because of State statutory law, the Federal government cannot obtain charter logbook or angler license information at the resolution necessary for enforcement. Moreover, NOAA OLE is not

authorized by the State to enforce State regulations, and thus cannot require an angler to show his or her license to an enforcement agent.

- NOAA OLE would need the ability to audit charter logbooks at the end of a charter fishing season. This audit would reveal anglers that exceeded the 5-fish annual limit, including anglers who fished on multiple charter vessels.

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

Type of information required by NOAA OLE

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

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

- Federal use of the State reporting tools: NMFS and NOAA OLE would work with the State and use the State charter logbook and angler licensing system to meet enforcement requirements.

- Federal recordkeeping and reporting tools: NMFS and NOAA OLE would develop and implement a Federal logbook and angler catch record to meet enforcement requirements. Two methods could be used to implement a Federal logbook:

    - Written logbook**:** A written logbook similar to the current ADF&G charter logbook would be submitted to NMFS by charter operators. Anglers would use a written catch record.

    - Electronic logbook. Logbook information would be electronically reported to NMFS and NOAA OLE. Anglers would use a written angler catch record.

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

Cost estimate for using State reporting tools

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

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

Federal use of State charter and angler recordkeeping and reporting tools would require ADF&G administrative support. To meet Federal data needs, ADF&G would need to provide adequate staff time to query charter operator and angler information, package this information, and send it to NMFS annually. ADF&G staff time would also be required to coordinate with the NMFS and NOAA OLE to develop a transfer methodology (including security concerns) and provide ongoing support to NMFS staff. Moreover, additional ADF&G staff time may be required to respond to NOAA OLE request for scanned logbook pages and angler license information before the information is transferred to a NMFS database. ADF&G would need to respond to requests for scanned logbook pages on a case by case basis.

A secure Internet portal may reduce NMFS programmer time. An Internet portal would allow designated NMFS and NOAA OLE employees to log on to an ADF&G site or sites to access charter logbook and angler data. This option would result in ADF&G incurring programmer costs associated with implementing the portal and necessary query structure. The extent of these costs is largely unknown because the data query and programming structure have yet to be determined. The Internet portal would also likely require a high level of coordination between the agencies and would be more programmer intensive than a periodic data transfer.

If the previously discussed legal and administrative issues are resolved, NMFS and NOAA OLE could use the information from the SCVL, guide and business registration, and angler license database to identify and pursue cases. Once a violation was identified, NOAA OLE would use the serialized angler license number to obtain information (including PID and DVL information) about the individual angler from the ADF&G license database, and the logbook to identify the charter operator and vessel (including the registered business). Anglers and charter operators would be contacted about their violation, and enforcement would take appropriate action.

Federal regulations implementing the annual limit would describe the type of information a charter operator and client are required to record. The State logbook and angler sport fishing license would be used to fulfill these information needs as outlined in Federal regulation. However, Federal regulations cannot only refer to the completion of the State logbook and angler license as fulfilling Federal reporting requirements. Regulations must describe the type of information to be recorded in the State logbook and indicate the State logbook could be used to meet these information needs. For example, in the commercial fishery, regulations at 50 CFR 697.5 describe information that is to be reported for the commercial fishery.

The State may change its logbook and angler license requirements at any point in time, including a change to the information requirements for charter operators and anglers. These changes may result in

State reporting tools not meeting the information requirements for enforcing the annual limit. Moreover, changes to State law may also prevent NOAA OLE from accessing information essential to enforcement or change the authority granted to NOAA OLE to enforce the annual limit. In either situation, NOAA OLE would not be able to enforce the annual limit using State reporting tools and a Federal logbook program would be necessary.

**Minimum size (Options 5 and 8)**

Alternative 2, Option 5, would require one halibut to be at least 45, 50, 55, or 60 inches in length as option from the head to tail or under Option 8, both halibut would need to be 32 inches or greater as option from head to tail. Enforcement of this type of regulation would require on-the-water or dockside option of harvested halibut. This management option would not require any additional reporting requirements for charter operators or charter anglers. However, Option 5 would require operators to position fish greater than 43 lb, 60 lb, 82 lb, or under 109 lb in such a way that they could be option. 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 large species is not unprecedented in federally and state 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 Option 5. The 2006 Atlantic shark regulations require a 54 inch minimum length limit applied to the allowable harvest of one shark per vessel per day (including mako and porbeagle) and a 99 inch limit minimum size limit on blue marlin. Moreover, in southeast Alaska, charter anglers are required to option Chinook salmon and Lingcod.

**Closure dates and one-fish bag limit (Option 4, 6, 7)**

The enforcement of closure dates and a one-fish bag limit both require on-the-water or dockside enforcement and both require an enforcement officer to observe a person with an illegal halibut. This would require regular visits by enforcement officers to areas where halibut are landed. These areas include remote areas such as lodges and urbanized areas such as Auke Bay or Sitka. In the case of a closure, enforcement officers would need to check offloading sites throughout the closure period and board vessels to determine the presence of illegally harvested halibut. A one-fish bag limit would require enforcement officer to spot check charter anglers at the dock and inspect vessels to insure all fish are counted. These regulator options would not require additional recordkeeping and reporting than already occurs under the status quo.

**Enforcement costs**

With the exception of the annual limit (Option 3), NOAA OLE does not have a cost estimate for enforcement of the options described under Alternative 2. It is difficult to derive a cost estimate for these options because of the large number of vessels and anglers distributed over a large, remote geographical area. Enforcement costs would vary with the desired level of enforcement. Under the status quo, enforcement does not have the resources required to provide a credible level of enforcement for the options under Alternative 2. For example, in 2006 NOAA OLE reported boarding only 14 charter trips (out of 20,000 trips); whereas in the IFQ fisher for halibut and sablefish, NOAA OLE inspected 146 trips (out of 7,500 trips). Greater compliance with the proposed action would be obtained if enforcement resources were increased to a level similar to the annual limit. This magnitude of increase would require an additional $600,000 in enforcement funds which would fund four enforcement officers. This funding increase would allow enforcement officers to inspect a greater proportion of the trips taken annually by charter operators in area 2C.

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

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

These points are useful for augmenting enforcement efforts, but all may in part rely on the enforcement effort being perceived as credible by charter operators and the angling public. It is unlikely that point (a) could be mandated due to the additional enforcement required to insure posting occurred on all charter boats, and the logistical and enforcement complexity of insuring vendors post the regulation. However, anglers could be made aware of the regulation by posting the information at port of landing, news releases, websites, and on catch/harvest cards. Point (b) would likely be most effective in areas with multiple charter vessel operators from different lodges in close proximity, or clients with knowledge of the regulation to pressure a guide to comply. Some clients would be operating from remote lodges where few, if any, neighboring lodges exist. Thus, multi-day charters and isolated lodges violating a regulation would likely be unaffected by peer pressure unless clients were aware of the regulation and NOAA OLE was able to detect violations. Finally, point (c) would rely on a charter operator's evaluation of the risk and cost of being caught in violation against potential rewards (e.g., happy client) and a desire to follow regulations. Given the potential sanction associated with being caught and the desire by some guides to inherently follow regulations, many guides/operators would likely not risk the penalty from an infraction or want to break the law.

### Charter operator responsibilities

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

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

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

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

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

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

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

NOAA OLE would have the authority to take enforcement action on the charter angler or operator depending on the infraction. Charter operators would be solely responsible for charter logbook recordkeeping and reporting requirements, as well as requirements associated with the distribution of angler catch cards. The situation associated with the violation would determine the action taken by NOAA OLE. A detailed discussion about recordkeeping and reporting tools is found in Section 2.0.

### 2.7.13 Effects on Net Benefits to the Nation

The net benefits to the nation arising out of the action options can accrue from several sources. First, the action options should initially reverse and then slow the open-ended reallocation between commercial and guided sport sectors. This reversal should instill commercial quota holders with greater confidence in the value of their quotas, which will in turn support the market for quota shares and encourage appropriate investment and capitalization in the commercial sector. Further, the reallocation of halibut harvest amounts back to the commercial sector may affect the benefits realized by U.S. consumers through changes in product availability and price. This section summarizes the different effects of the options to allow comparison and conclusions concerning the overall effects of the options on net benefits to the nation.

#### No Action/Status Quo

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

For prior analyses the SSC requested that the discussion of the no-action alternative be expanded to include estimates of consumer losses due to reductions in the commercial TAC if charter-based sport fishing overages continued. The analysis combined the overage estimates derived for the ex-vessel revenue losses analysis with a consumer surplus and total revenue model from Herrmann and Criddle

(2006) to generate estimates of total consumer losses associated with GHL overages.[14] This model estimates that Area 2C GHL overages would result in a $0.233 million loss beginning in 2006 and increasing to $1.8 million by 2015.

**Table 70. Long-Term Commercial Losses in Ex-Vessel Value based on Estimated Commercial CEY Reductions and Guided Sport Catch-Area 2C**

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

Source: Northern Economics Estimates based on IPHC 2005 Stock Assessment Estimates and 2005 ADF&G estimates of guided and unguided sport catch.
Note: All non-dollar figures are in millions of pounds.

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

All of the options could help reverse the open-ended reallocation between commercial and guided sport sectors and could instill commercial quota holders with greater confidence in the value of their quotas which will in term support the market for quota shares. A greater confidence in the value of quotas will also encourage appropriate investment and capitalization in the commercial sector. Further, the reallocation of halibut harvest amounts back to the commercial sector may affect the consumer surplus

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

benefits realized by U.S. consumers. However, the options could result in long-term increased costs incurred by charter operators dependent on a multiple-trip per day business model, crew members dependent on halibut harvests for personal use, and operators dependent on clients interested in fishing experiences lasting longer than two days or those dependent on repeat customers who take more than two trips per year. Theoretically, if operators could adapt their operations to service the same number of clients on fewer fish then efficiency is gained resulting in net national benefits. However, as discussed in Section 2.6 many of the options, particularly those that affect bag limits, are likely to result in fewer return clients. Thus, it isn't clear from the available research that the industry can service the same number of clients on fewer fish.

### 2.7.14 Summary and Conclusions

The expected effects of the options for Area 2C are discussed in Table 71 and Table 72. Table 71 shows all of the sub-options (including accompanying high and low range) ordered by their effect on the GHL. The least effective option is likely to be the minimum size limit followed by a Sept. 15$^{th}$ season closure date, and then one trip per day restrictions. The most effective options are those that change the daily bag limit in one form or another. These options would result in the highest consumer surplus gains and the largest reductions in angler welfare. As noted previously, the analysis is unable to perform full net benefit analyses like those in Edwards 1995 and Criddle 2004.

As shown in Table 72, generally, charter operators preferred options that provided the least disruption of current business models, while commercial benefits are directly tied to the magnitude and durability of the harvest reductions that the options provide. Key informant interviews indicated that charter operators may have a preference for the no retention by skipper and crew, second fish of a specified minimum size, and annual limit options. Interviewees rate the one-fish bag limit, season closure dates, and weekday closure dates as the most disruptive options. From a commercial perspective, the best options are the one-fish bag limit, the second fish of a minimum specified size, and the annual limit option in that order.

**Table 71. Effect of Options Ordered by Reduction in the GHL**

| Management Option | Sub-Option or Additional Information | Expected GHL Reduction (Percentage Points) | 2006 Harvest as Portion of the GHL with this Option |
|---|---|---|---|
| Full Season One-fish bag limit | 30% Demand Decline | 82.2 | 59.9 |
| Option For A Second Fish-60" Minimum Size | 10% Demand Decline | 57.4 | 84.7 |
| Full Season One-fish bag limit | No Demand Decline | 56.4 | 85.7 |
| Option For A Second Fish-55" Minimum Size | 10% Demand Decline | 52.3 | 89.8 |
| Option For A Second Fish-60" Minimum Size | No Demand Decline | 47.8 | 94.3 |
| Option For A Second Fish-50" Minimum Size | 10% Demand Decline | 46.9 | 95.2 |
| Option For A Second Fish-55" Minimum Size | No Demand Decline | 42.2 | 99.9 |
| Option For A Second Fish-45" Minimum Size | 10% Demand Decline | 41.7 | 100.4 |
| Option For A Second Fish-50" Minimum Size | No Demand Decline | 36.1 | 106.0 |
| Option For A Second Fish-45" Minimum Size | No Demand Decline | 30.3 | 111.8 |
| July One-fish bag limit | 30% Demand Decline | 30.0 | 112.1 |
| August One-fish bag limit | 30% Demand Decline | 24.9 | 117.2 |
| Annual Limit | Four Fish | 23.4 | 118.7 |
| Season Closure | Aug 15th | 23.3 | 118.8 |
| June One-fish bag limit | 30% Demand Decline | 20.7 | 121.4 |
| July One-fish bag limit | No Demand Decline | 20.6 | 121.5 |
| Weekday Closure | Two Days-Best Estimate | 20.3 | 121.8 |
| August One-fish bag limit | No Demand Decline | 17.1 | 125.0 |
| June One-fish bag limit | No Demand Decline | 14.2 | 127.9 |
| Annual Limit | Five Fish | 13.3 | 128.8 |
| Weekday Closure | One Day-Best Estimate | 6.1 | 136.0 |
| No Harvest by Skipper and Crew | Upper Bound | 6.0 | 136.1 |
| No Harvest by Skipper and Crew | Lower Bound | 5.4 | 136.7 |
| Season Closure | Aug 31st | 5.3 | 136.8 |
| One Trip per Day | Upper Bound | 3.4 | 138.7 |
| One Trip per Day | Lower Bound | 2.6 | 139.5 |
| Season Closure | Sept 15th | 1.0 | 141.1 |
| Minimum Size Limit | No Sub Option | Unclear | Unclear |

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

**Table 72. Summary of Effects by Option**

| Option | Expected Size and Durability of Reductions | Effects on Industry | Effect on State Managed Fisheries |
|---|---|---|---|
| One Trip per Vessel per Day | 1.8 to 2.4% reduction in harvest. Anglers will likely adapt rapidly. | Relatively minor effects on the charter industry excepting those businesses that focus on multiple trips per day. Minor benefits for the commercial industry. | State managers expect a concurrent minor reduction in the harvest of some associated species. |
| No Retention by Skipper and Crew | 3.8 to 4.2% reduction. Skipper and crew demand shifts to non-guided recreational sector | Most preferred option for the charter industry with modest benefits for the commercial industry. | State managers expect a concurrent minor reduction in the harvest of some associated species. |
| Annual Limit | 9.3 to 16.4 percent reduction depending on the annual limit. Reductions are likely durable. | Generally, the second most preferred option by the charter industry. Commercial industry would receive sizable benefits. | State managers expect a modest to significant increase in the charter harvest of available salmon species, lingcod, and rockfish. |
| One-fish bag limit | Reductions of between 10 percent and 60 percent depending on the temporal length of the bag limit reduction. Reductions are likely more durable. | Highest economic effect on the charter industry with the highest benefits for the commercial fleet. Least preferred option for the charter industry. | State managers expect a significant increase in the charter harvest of available salmon species, lingcod, and rockfish. |
| Option for a Second Fish with a Minimum Length | Reductions of between 21 percent and 40 percent depending on the minimum length for the second fish. Reductions are likely more durable. | Minor demand reductions expected, but a generally acceptable option for much of the charter fleet particularly at the lower minimum lengths. Modest to high benefits for the commercial fleet. | Charter harvest of state managed species would likely increase by modest amounts. |
| Season Closure Dates | Reductions of less than 1 percent to more than 16 percent depending on when the season closes. Anglers will flexible schedules will adapt rapidly after the first year. | Early season closure dates would likely close businesses while the later closure dates would only have minor effects. Modest, but significant benefits for the commercial fleet from an earlier season closure date. | Harvest of Coho salmon and other species available after the season closure would increase. |
| Weekday Closure | Expect an approximately 4.3 percent reduction for a single day or approximately 14 percent for a two-day closure. Most anglers will adapt very rapidly. | One of the least preferred options for the charter industry with minor benefits for the commercial fleet. | All effort on the closed day would shift to state managed species. While overall effort on that day would likely be lower than in the past, there could be a modest effect on state manage species. |
| Minimum Size Limit | Likely to reduce the number of fish harvested with the possibility of localized savings. Overall effects could be small savings or could result in an increase in overall harvest weight for the entire area. | Could harm the commercial fleet if the total weight increases while increasing costs for the charter fleet. | Charter harvest of state managed species would likely increase by modest amounts. |

# 3 REGULATORY FLEXIBILITY ACT

## 3.1 Introduction

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

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

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

## 3.2 Reasons for Considering the Proposed Action

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

## 3.3 Objectives and Legal Basis of the Proposed Actions

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

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

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

### 3.4.1 Definition of a Small Entity

Three types of small entities are defined in the RFA:

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

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

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

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

Federal courts and Congress have indicated that a RFA analysis should be limited to small entities subject to the regulation.[15] As such, small entities to which the rule will not apply are not considered in this analysis.

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

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

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

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

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

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

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

- Option 1 would allow no more than one trip per vessel per day;
- Option 2- would create a Federal ban on harvest by skipper and crew;
- Option 3-would establish annual limits of four fish or five fish per angler;
- Option 4-would reduced bag limits of one fish per day in July, July, or August, or for the entire season;
- Option 5- would create a one-fish bag limit with the option to harvest a second fish larger than 45 inches, 50 inches, 55 inches, or 60 inches;
- Option 6- would close the season after August 15$^{th}$, September 1$^{st}$, or September 15$^{th}$;
- Option 7- would close one or more days during the week to halibut fishing;
- Option 8- would create a minimum size limit of 32 inches.

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

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

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

Some charter operators have clients who make multiple trips during a year; the annual limit on angler harvest could reduce these operators' revenues by reducing their client's demand for charter trips. ADF&G data indicate that in 2006, 17 percent of one-angler households from the SWHS harvested more than four fish while 10 percent harvested more than five fish. Demand from this segment is more likely to be affected by the proposed regulations if these clients do not transfer their demand for halibut to other species requiring charter access (thus continuing to take the same number of charter trips per year).

Charter operators who depend more on multi-day trips or repeat trips by clients within a given year will greater negative effects than operators with a more diverse clientele or those who focus only on providing a single-day experience.

**Commercial Fisheries Statement.** The effects of the analyzed options on the commercial fishery would be positive given that the options would help reduce charter harvest of halibut to levels closer to, or below, the Area GHLs. However, the long-term efficacy of the current options may be limited given that the options do not address the long-term growth of the charter sector through increasing client demand and the entry of new vessels into the fleet. Thus, while the options' expected effects on the commercial fleet are positive, the duration of these effects is currently unknown. Option 4—the single-fish bag limit option—would provide the largest and most durable positive effects for the commercial fleet because they generate the greatest reductions in charter fleet harvest. The analysis notes that the only stand-alone option that will reduce harvest to near the GHL involve changing the bag limit including the option of a minimum size limit on the second fish. As discussed in Section 2.7, the effect of the status quo would be increased consumer surplus and producer losses to charter fleets.

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

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

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

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

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

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

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

## 3.7 Conclusion

The analysis estimates that nearly all of the firms affected by the proposed actions would qualify as small business entities. The compliance costs of the proposed actions will vary widely depending on the size of

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

# 4 CONSISTENCY WITH OTHER APPLICABLE LAWS

## 4.1 Introduction

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

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

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

From the language in the Halibut Act, it is clear that while jurisdictional authority for the limited access and other allocation options resides within the provisions of the Halibut Act, consideration of those types of options is subject to many of the same criteria described under the Magnuson-Stevens Act. In particular, the 303(b) (6) provisions of the Magnuson-Stevens Act and the language from National Standard 4 are directly referenced. Therefore, the following sections are included to discuss the consistency of the proposed options relative to certain provisions of the Magnuson-Stevens Act and other applicable laws, without regard for whether such treatment is formally required.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**2006**. Council scheduled action in 2006 to recommend management options to lower charter halibut harvests.

## APPENDIX II. Management option matrix adopted by the Council in 2000.

| **Area 2C Management Tools** | |
|---|---|
| Required Reduction | Management Tool |
| <10% | Trip Limit |
| 10% - 15% | Trip Limit<br>No Harvest by Skipper + Crew |
| 15% - 20% | Trip Limit<br>No Harvest by Skipper + Crew<br>Annual Limit of 7 Fish |
| 20% - 30% | Trip Limit<br>No Harvest by Skipper + Crew<br>Annual Limit of 6 Fish |
| 30% - 40% | Trip Limit<br>No Harvest by Skipper + Crew<br>Annual Limit of 5 Fish |
| 40% - 50% | Trip Limit<br>No Harvest by Skipper + Crew<br>Annual Limit of 4 Fish |
| >50% | Trip Limit<br>No Harvest by Skipper + Crew<br>Annual Limit of 4 Fish<br>One-fish bag limit in August |

| **Area 3A Management Tools** | |
|---|---|
| Required Reduction | Management Tool |
| <10% | Trip Limit |
| 10% - 20% | Trip Limit<br>No Harvest by Skipper + Crew |
| 20% - 30% | Trip Limit<br>No Harvest by Skipper + Crew<br>Annual Limit of 7 Fish |
| 30% - 40% | Trip Limit<br>No Harvest by Skipper + Crew<br>Annual Limit of 6 Fish |
| 40% - 50% | Trip Limit<br>No Harvest by Skipper + Crew<br>Annual Limit of 5 Fish |
| >50% | Trip Limit<br>No Harvest by Skipper + Crew<br>Annual Limit of 4 Fish<br>One-fish bag limit in August |

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

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March 8, 2007

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

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

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

### APPROACH

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

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

where $r_t$ = the proportion of halibut released by target category $\left(\sum r_t = 1\right)$, and

$M_t$ = the mortality rate by target category.

The mortality rate for each target category was calculated as

$$M_t = \left(C_t M_C\right) + \left(O_t M_O\right),$$

where $C_t$ = the assumed proportion of halibut released by circle hooks in each target category,

$M_C$ = the assumed mortality rate for circle hooks,

$O_t$ = the assumed proportion of halibut released by other hooks in each target category, and

$M_O$ = the assumed mortality rate for other hook types.

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

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

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

## Assumed Values

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

The 16% rate assumed for the commercial fishery is probably too high for the recreational fishery for the following reasons. Halibut released in the charter fishery are on the line for a matter of minutes or, in the case of large fish, tens of minutes. By comparison, longline-caught fish may be on the line for up to 10-12 hours. Sport-caught fish would be expected to have less lactic acid buildup, less exposure to sand fleas, and be better able to maintain position in strong currents and avoid predators following release. Hook strippers are not used in the charter fishery. Most fish are released outboard of the boat by the captain or crew, usually by twisting them off using a gaff. A mortality rate of 3.5% was chosen for halibut caught on circle hooks in the charter fishery. Since this rate was estimated in a study of halibut caught on J hooks using longline gear, it may be too high. It is, however, conservative in that it accommodates the fact that not all fish caught on circle hooks in the sport fishery are carefully released or in excellent condition. Small halibut in particular are more prone to circle hook injuries in the eyes.

A number of hooking mortality studies for other marine species was reviewed. These studies evaluated a variety of hook types, including J hooks and circle hooks with bait, and artificial lures with single or treble hooks. Studies evaluating J hooks and circle-hooks consistently found higher mortality rates for J hooks. Estimates for "other" hook types (other than circle hooks) were highly variable, ranging from 1.7% to 28%, but most were below 10% (Table 1). A mortality rate of 10% was adopted for "other" hook

types. Assumption of a lower rate may be justified, but the lack of information specific to this fishery justifies use of a conservative rate.

The proportion of halibut released from each hook type has not been documented for the Area 2C charter fishery. ADF&G staff contacted charter operators in Sitka, Ketchikan, Craig, Petersburg, and Juneau, and estimated that at least 90% of halibut released while bottomfishing were caught using circle hooks (R. Chadwick, M. Wood, D. Fleming, and S. Millard, pers. comm.). A Sitka charter operator estimated circle hook use at 95% in that fishery (R. Suarez, pers. comm.). Two charter operators estimated 80-90% of halibut were caught on circle hooks in the Craig area, even though one of them uses J hooks more often (M. Wood, pers. comm.). Therefore, for anglers targeting bottomfish, 90% of released halibut were assumed to have been caught on circle hooks, with the remaining 10% assigned to all other hook types. For trips with only salmon effort recorded, 100% of released halibut were assumed to have been caught on other hook types. For trips with effort in both target categories, these percentages were applied and weighted by the relative numbers of fish released in the bottomfish or salmon target categories to arrive at overall hook use rates of 79% for circle hooks and 21% for other hooks.

## Overall Mortality Rate Estimate

Integrating the release proportions, informed estimates of hook use, and assumed mortality rates results in an overall estimate of hooking mortality of 4.8% for the Area 2C charter fleet in 2006 (Table 2). This is similar to the range of 5-7% release mortality rate assumed for species not subject to barotrauma in the Oregon sport fishery (D. Bodenmiller, Oregon Dept. Fish and Wildl., pers. comm.).

Because the majority of released halibut were caught on bottomfish trips, the overall mortality rate is sensitive to the choice of the proportion of halibut released on circle hooks. The overall mortality rate is also more sensitive to these assumed proportions than to the assumed mortality rate for each hook type. For example, for every 1% relative increase in the assumed proportion of halibut caught on circle hooks when targeting bottomfish, the overall mortality rate decreases relatively by 1.063% (Table 3). The same degree of change occurs up or down, but in opposite directions. For example, a 10% relative decrease in the proportion of halibut released on circle hooks, from 90% to 81%, would result in a 10.63% relative increase in the mortality rate, for an overall mortality rate of 5.36% (= 4.847 × 1.1063). By comparison, relative changes in the assumed discard mortality rates for each hook type have a smaller effect on the overall rate, and in the same direction. For example, Table 3 shows that for every 1% relative change in the circle hook mortality rate, the overall mortality rate changes 0.572%.

The overall mortality rate was rounded to 5% and suggested as an interim option for analysis of management alternatives for Area 2C pending additional examination of the data. Logbook and creel survey data are being compared for consistency in the estimated proportion of halibut released in each target category. The department is also working on a more comprehensive estimation of recreational fishery release mortality for the charter and non-charter sectors in Areas 2C and 3A. The additional work may result in revisions to the 4.8% rate provided here, and mortality rates may vary by year and regulatory area due to differences in the proportions of released fish in each target category.

**Table 1. Studies looking at mortality using a variety of hook types.**

| | Mortality Rate (%) | | | |
|---|---|---|---|---|
| Species | Circle Hook | J Hook | Mixed Hook Types | Reference |
| 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: | **0.048** |

**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[a] | 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% |

[a] – The base case is the preferred estimate from Table 2.

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## APPENDIX IV. IPHC Set Line Survey Biomass Frequencies

| Fork Length (In) | Average Net Weight (lbs) | Surveyed Population At Length or Below (%) | Surveyed Biomass At Length or Below (%) |
|---|---|---|---|
| 20 | 2.5 | 0.2% | 0.0% |
| 22 | 3.4 | 1.5% | 0.3% |
| 24 | 4.4 | 6.7% | 1.6% |
| 26 | 5.7 | 16.2% | 4.7% |
| 28 | 7.2 | 28.8% | 10.0% |
| 30 | 9.0 | 42.4% | 17.1% |
| 32 | 11.0 | 54.1% | 24.5% |
| 34 | 13.3 | 63.8% | 31.9% |
| 36 | 16.0 | 71.2% | 38.7% |
| 38 | 18.9 | 76.8% | 44.9% |
| 40 | 22.3 | 81.0% | 50.2% |
| 42 | 26.0 | 84.2% | 55.1% |
| 44 | 30.2 | 87.2% | 60.3% |
| 46 | 34.8 | 89.9% | 65.7% |
| 48 | 39.8 | 92.2% | 71.1% |
| 50 | 45.3 | 94.1% | 76.0% |
| 52 | 51.4 | 95.6% | 80.5% |
| 54 | 58.0 | 96.9% | 84.9% |
| 56 | 65.1 | 97.9% | 88.7% |
| 58 | 72.8 | 98.5% | 91.0% |
| 60 | 81.2 | 98.9% | 93.0% |
| 62 | 90.1 | 99.2% | 94.7% |
| 64 | 99.8 | 99.5% | 96.2% |
| 66 | 110.1 | 99.6% | 96.9% |
| 68 | 121.1 | 99.8% | 98.1% |
| 70 | 132.9 | 99.9% | 98.6% |
| 72 | 145.5 | 100.0% | 99.5% |
| 74 | 158.8 | 100.0% | 99.5% |
| 76 | 173.0 | 100.0% | 99.7% |
| 78 | 188.0 | 100.0% | 99.8% |
| 80 | 203.9 | 100.0% | 99.8% |
| 81 | 220.7 | 100.0% | 99.8% |
| 83 | 238.5 | 100.0% | 99.8% |
| 85 | 257.2 | 100.0% | 100.0% |