Analysis of Management Options for the Area 2C and 3A Charter Halibut Fisheries for 2014

A Report to the North Pacific Fishery Management Council

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1.0 Introduction

The North Pacific Fishery Management Council's Charter Halibut Implementation Committee met October 25 to select a list of management measures to be analyzed for the 2014 season. This choice was complicated by the fact that, at the time, it was unknown whether the charter halibut fishery will be managed under the current Guideline Harvest Level (GHL) regime or the Catch Sharing Plan (CSP) approved by the Council in October 2012. Management is quite different under these two regimes. Under GHL management, a GHL was set based on the Total Constant Exploitable Yield (TCEY) determined by the International Pacific Halibut Commission (IPHC). Charter harvest was estimated in numbers of fish by the Alaska Department of Fish and Game (ADF&G) using the Statewide Harvest Survey (SWHS). Under GHL management, the charter harvest did not include an estimate for release mortality, or "waste." Crew harvest of halibut is prohibited in IPHC Regulatory Area 2C but not in Area 3A. Under the CSP, however, a charter allocation is set as a fraction of a combined commercial-charter catch limit approved by the IPHC, and the charter sector's release mortality is included in their allocation. Likewise, the commercial sector's waste is included in their allocation. Charter harvest accounting under the CSP will be based on ADF&G charter logbooks, which generally have indicated a higher harvest than the SWHS, especially in Area 3A. Crew harvest will be prohibited in Areas 2C and 3A under the CSP.

Given the unknown management scenario and potentially wide range of possible harvest targets in each area, the committee selected a number of management measures to be analyzed for each IPHC area. The committee requested analysis of projected charter yield under the following measures for Area 2C:

1. One-fish bag limit and U45-O68 reverse slot limit (status quo),
2. One-fish bag limit with maximum size limit,
3. One-fish bag limit and annual limit combined with a maximum size limit.
4. One-fish bag limit, and annual limit combined with a reverse slot limit,

The committee requested the following analyses for Area 3A:

1. Two-fish bag limit, no size limit (status quo),
2. Two-fish bag limit with a maximum size limit on the second fish (one fish any size),
3. Two-fish bag limit (any size) with annual limit,
4. Two-fish bag limit (any size) and prohibit harvest by skipper and crew (default under CSP),
5. Two-fish bag limit (any size) combined with vessel trip limit of one trip per day.

As of the date of this report, it was announced that the Secretary of Commerce signed the CSP rule. Therefore, this document assumes that the CSP will be in place for 2014 and does not explicitly analyze the prohibition on crew harvest in Area 3A. Instead, projections are made based on client harvest data only.

The objective of this analysis was to identify specific management measures or combinations of management measures that are expected to keep total charter removals (in units of net weight) in each regulatory area within the catch target determined by the IPHC at the annual meeting in January 2014. These catch limits will not be known by the Council when making recommendations. However, on December 4 the IPHC released results of the latest stock assessment and provided management targets for

the Area 2C and Area 3A charter fisheries associated with the "Blue Line" alternative. The Blue Line is the level of total removals in each area that meets the IPHC harvest policy target of 21.5%. In this document, the most liberal management measures that result in a projected charter removal that is less than or equal to the Blue Line are highlighted. A final section of the document will present some likely alternative targets for the charter fishery and indicate potential management measures that would achieve the desired harvest reduction.

2. 0 Methods

2.1 Subareas

Projections of charter yield in this report are generally calculated as the product of harvest (in numbers of fish) and average net weight (headed and gutted) in pounds. In all cases, average weight was calculated from length using the current IPHC length-weight relationship (Clark 1992). Nearly all calculations for Area 2C and Area 3A were done by subarea and then combined to provide results for the regulatory area as a whole. Most analyses were done at the subarea level because most of the variables analyzed (client harvest, average weight, etc.) vary substantially by subarea.

There are six subareas in Area 2C and eight subareas in Area 3A (Table 1). ADF&G collected length data from harvested halibut and interviewed anglers and charter captains in at least one port in each subarea. With a few exceptions, the subareas correspond to ADF&G sport fishery management areas as well as SWHS reporting areas. In Area 2C, the halibut fishery in the Haines/Skagway area (SWHS Area F) is quite small and not sampled for size. Data from this area are combined with data from Juneau (SWHS Area E). In Area 3A, SWHS Area J is split into three subareas: Eastern Prince William Sound (EPWS), Western Prince William Sound (WPWS), and the North Gulf coast (NG). Likewise, Cook Inlet (SWHS Area P) is split into Central Cook Inlet (CCI) and Lower Cook Inlet (LCI) subareas. Both of these management areas are split into subareas based on the location of halibut landings, not the location of harvest. For example, Central Cook Inlet includes all points of landings north of and including Anchor Point. The splits are based on port of landing, rather than catch location because (a) this allows matching of harvest estimates of logbook data to estimates of average weight from port sampling, and (b) port of landing is recorded more precisely than catch locations.

2.2 Assumptions Regarding Harvest and Size

For this analysis, management measures such as annual limits and trip limits were assumed to affect only the number of fish harvested, at least on a subarea basis. No direct effect on average weight was assumed, but because these measures alter the relative distribution of harvest among subareas, they can affect the overall average weight for a regulatory area. When calculations are made by subarea, the area average weight is essentially a weighted mean, where the weighting factors are the relative proportions of harvest in each subarea. On the other hand, size limits were assumed to affect only the average weight of harvested fish.

The real effects of management measures could be more complicated. For example, it is possible that implementation of annual limits could increase the average size of retained fish. If an annual limit is established that is significantly lower than an angler's typical annual harvest, it may provide incentive for the angler to high-grade, or selectively retain larger fish. It is also possible that size limits have an effect on the number of halibut retained. For example, under a maximum size limit or reverse slot limit, an angler may choose to harvest more fish annually because the fish are smaller than they would have been without the limit. On the other hand, if a maximum size limit is set low enough, anglers may choose not to spend the money to book a charter trip for halibut.

These simplifying assumptions were adopted because there are insufficient data to either document or incorporate more complex relationships in the analysis. Neither annual limits nor trip limits have been enacted in the Alaska charter halibut fishery. Size limits have only been in effect for the charter fishery in Area 2C, and only since 2011. These data are inconclusive on the effects of size limits. Harvest in 2011

under the 37-inch maximum size limit was about 11% lower than in 2010, but the decrease in charter harvest in 2C coincided with a decrease in unguided harvest, which was not regulated under a size limit. It is possible that charter and unguided harvest decreased due to some other factor. The Area 2C charter harvest increased in 2012 with implementation of a reverse slot limit, but also increased in 2013 even though there was no change in the size limit. Factors other than regulations may affect the number of halibut harvested.

2. 3 Harvest Projections

Forecasts for 2014 were based on the entire available time series of logbook harvest numbers, excluding crew, for each subarea through 2013, where the 2013 estimates are preliminary estimates (Table 2). The preliminary estimates for 2013 were based on regressions of harvest through July on harvest for the entire year. The relationships between partial-year and entire-year logbook harvest were very strong for nearly all subareas, and were felt to provide good preliminary estimates of harvest for 2013. Without them, the time series forecasts for 2014 would be two-period forecasts (from time series' ending in 2012) and would not include information from the most recent season. No other data, such as socioeconomic factors have yet been linked to the halibut fishery in a way that would allow forecasting of future effort or harvest. Time series forecasts are uncertain because they rely on past trends, which are not necessarily reliable predictors of future trends.

Forecasting was done using the Box and Jenkins (1976) procedure for fitting autoregressive integrated moving average (ARIMA) models, as recommended by the Council's Scientific and Statistical Committee in October 2012. The Box-Jenkins procedure employs a well-developed, interactive mathematical procedure to investigate properties of the past data that may be used for forecasting. ARIMA models can take on a variety of forms, and the goal of the Box-Jenkins procedure is to find the simplest model that adequately describes the data.

The time series of charter harvests are short (8 years, 2006-2013), which is generally shorter than recommended for ARIMA forecasting. In addition, the variability in these time series has at times been quite high compared to the level of harvest (Figures 1 and 2). As a result, the Box-Jenkins approach identified most of the harvest histories as random walks, with no autoregressive or moving average components. In these cases, the procedure identified the "naïve" model as best, which is to say that the best forecast of next year's harvest was simply last year's harvest (or estimate). The best model was typically selected as the model with the smallest Akaike's Information Criterion corrected for small sample size (AICc).

Simple exponential and double exponential smoothing models were also fit to the harvest time series as alternatives to the ARIMA forecasts. Simple exponential models tended to fit better when the data did not contain a strong trend, and double exponential models generally fit trended data better. Summing the best exponential forecasts for each subarea resulted in Area 2C and 3A forecasts that were virtually identical to the ARIMA forecasts. Therefore, all 2014 harvest forecasts for each IPHC area were based on the sum of the best ARIMA forecast for each subarea.

2.4 Projecting Harvest under Annual Limits

Data on annual harvests by license number are available from the charter logbook. This information can be compiled only for anglers required to be licensed (excludes unlicensed youth anglers). The number of individual license numbers was tallied for annual harvests of 1, 2, 3, etc. halibut up to the maximum. This analysis was done by subarea, both including and excluding crew harvest, using data from 2012, the most recent year with the same bag limit as the current year. The projection of harvest under various annual limits assumed that the distribution of annual harvest among license numbers would be the same in 2014 as in 2012, and would be the same as for unlicensed anglers. It further assumes that imposition of annual limits will not have an effect either way on the number of anglers, but that it will only truncate harvest associated with each license number at the annual limit. For example, if 1,000 anglers (actually license

numbers) each harvested five halibut in 2012, then a 4-fish annual limit would reduce the annual harvest of each of these anglers to four fish. The 4-fish annual limit would have no effect on harvest by anglers that harvested four or fewer halibut. Using these assumptions, the annual harvest was calculated over a range of annual limits and the percentage reduction in harvest was calculated by comparison to total harvest without an annual limit. The percentage reductions for each subarea were applied to harvest projections by subarea, and these were summed to obtain the total harvests under each annual limit.

The method used likely underestimates the effects of annual limits for three reasons. First, as noted above, imposition of an annual limit is assumed to have no effect on angler effort, or at least the number of anglers. It is possible that low annual limits could discourage guided angler effort. Second, some anglers (especially nonresidents) obtain more than one license per year. The analysis, however, only looked at harvests associated with each license, so it probably underestimates the effect. For example, if an angler purchased two licenses in 2012 and harvested four halibut on each, the analysis using license numbers would indicate that a four-fish annual limit would not reduce the harvest. However, if the angler abided by the annual limit, his harvest would have been cut in half. Third, some anglers fish in multiple subareas within a year, but the analysis was done by subarea. Again, the expected reduction in harvest would likely be less than the actual reduction. If an angler caught four fish in each of two subareas in 2012, the analysis by subarea would indicate that a four-fish annual limit had no effect in either subarea. If the angler abided by the annual limit, his harvest would have been cut in half relative to 2012. Even if we incorporated subarea locations into the analysis, there would be no way to predict how many fish the angler would be taken from each subarea.

The issue of subarea-based analysis was examined by calculating the percentage reductions for each annual limit using grouped data for each IPHC area, and comparing these to analyses done by subarea. In Area 2C, the harvest reductions associated with each annual limit 1 to 5 fish per year) were 0.4% to 1.3% greater when estimated using area-wide data. The largest difference was for an annual limit of one fish. For Area 3A, harvest reductions were evaluated over a range of annual limits from 1 to 10 fish per year. Harvest reductions were 0.4% to 4.6 greater using area-wide data including crew harvest, and 0.1% to 5.0% greater when using area-wide data excluding crew harvest. In each instance the greatest difference was at an annual limit of two fish. The area-wide estimates are believed to be more realistic expectations of harvest reduction because they include all harvest associated with a license, not just the harvest by subarea.

2.5 Projecting Average Weight under Status Quo Regulations (Areas 2C and 3A)

For Area 2C, the status quo regulations are a one-fish daily bag limit and U45O68 reverse slot limit. The average weight under this slot limit could be projected using a weighted formula, but this method overestimated average weight for 2012 and 2013 (see Section 3.4). Therefore, average weight under the current U45O68 reverse slot limit was also estimated using the mean of the 2012-2013 average weights for each subarea. Average weight decreased from 2012 to 2013 in four of six subareas, but overall decreased less than 0.2 lb.

Average weight projections for Area 3A under the status quo were assumed to equal estimated average weights by subarea from harvest sampling in 2013. Average weights were estimated for each subarea for 2013 based on a sample of 5,725 halibut. Sample sizes ranged from 220 to 1,244 fish per subarea. Average weight has exhibited a slow declining trend over time in most subareas, and in Area 3A overall (Figure 3). The overall Area 3A average weight decreased about 0.54 lb from 2012 to 2013. If average weight continues to decline in 2014, use of last year's average weight would be slightly conservative.

2.6 Projecting Average Weight under a Maximum Size Limit (Area 2C only)

Average weight corresponding with various maximum size limits was projected simply as the average weight of the portion of the charter harvest that was less than or equal to that length during a reference year. The reference years used for prediction were 2010 for Area 2C and 2013 for Area 3A. These were

the most recent years for which there was no size limit in each area. Average weight was predicted for each subarea and the overall average weight for each regulatory area was calculated as a weighted mean, where the predicted harvests in each subarea are the weighting factors.

This prediction method was evaluated by comparing predicted and observed (estimated) average weights for Area 2C for 2011 when the fishery was managed under a 37" maximum size limit. The Area 2C fishery was managed under a U45O68 reverse (or "protected") slot limit in 2012 and 2013. This allowed harvest of halibut less than or equal to 45 inches (U45) and halibut greater than or equal to 68 inches (O68). Because the lower limit essentially functions as a maximum size limit for the majority of harvest, the predicted and observed average weights of U45 halibut were also compared for 2012 and 2013. Small numbers of halibut were harvested each year that were over the maximum size limit, most within 5 inches of the size limit. To account for these fish in the comparison, the predicted average weight of U37 fish was also compared to the estimated average weight of all fish harvested in 2011, and the predicted average weight of U45 fish was also compared to the estimated average weight of all halibut under 50 inches in 2012 and 2013. The predicted average weights each year were 0.8 to 1.0 lb greater than the observed average weights of fish below the size limit, and 0.5 to 0.7 lb greater than the observed average weights including the illegal harvest. Therefore, this prediction method is conservative in that average weights obtained under these limits are likely to be smaller than predicted, at least under recently observed conditions.

2.7 Projecting Average Weight under a Maximum Size Limit on the Second Fish (Area 3A only)

Average weight under a maximum size limit applied to the second fish in the bag limit was predicted using a two-step process. The first step was to tally the proportions of harvest in each subarea composed of "second fish." For example, if three anglers on a charter trip harvest two halibut each and two anglers harvest only one each, then three of the eight halibut kept represented second fish. The second step was to estimate average weights of first and second fish in the harvest. The average weight of first fish (a fish of any size) was simply the 2013 average weight by subarea (same as status quo projections). The average weight applied to the second fish was determined as described above for maximum size limits. These were then combined into a weighted mean for each subarea, where the weighting factors were the proportions of first and second fish in the recent harvest. This approach assumes that the average weight of first fish will not increase due to additional high-grading, and that the distribution of first and second fish will not change if a maximum size limit is applied to the second fish.

2.8 Projecting Average Weight under Reverse Slot Limit (Area 2C only)

Average weight under a reverse slot limit was predicted using a slight modification of the procedure used last year (Meyer 2012). The change was needed because the past method overestimated the proportion of harvest of fish larger than the upper limit (the upper tail). In addition, the past method apportions harvest under various limits to the tails of the distribution (above upper limit and below lower limit) using relative proportions from the source distribution. As the lower limit is dropped, this results in a greater proportion of harvest being assigned to the upper tail, where average weight is much higher because of the exponential length-weight relationship. The proportion of fish assigned to the upper tail can be unrealistically high, as these fish are rare in the population and are already high-graded. The result is that, for a given upper length limit, average weight stays relatively flat or even increases as the lower limit is dropped. This intuitively does not make sense. As the lower limit is dropped, a greater proportion of the harvest should be smaller fish, dragging down the average weight.

The method used this year fixed the proportion of harvest above the upper limit equal to the proportion in the reference year. The proportion of lower harvest was then set as the remainder. This method also overestimated the average weight under the U45O68 reverse slot limit in 2012 and 2013, but to a lesser degree. Some of the difference was due to overestimation of the observed proportion above the upper limit, and some was due to overestimation of average weight below the lower limit. More importantly, the estimates vary over the whole range of candidate size limits in a manner consistent with intuition. This

approach assumes that the length-frequency distribution of lengths in 2010 is representative of what the length-frequency distribution in 2014 in the absence of size limits. It also assumes that the reverse slot limit will have no effect on harvest and that all fish caught that are between the size limits (in the prohibited slot) will be replaced in the harvest by a legal-size fish.

2.9 Accounting for Release Mortality of Halibut Over 26 Inches (O26)

Under the CSP, the charter allocation includes total removals by the charter sector, including directed harvest and estimated release mortality (or waste). Estimation of release mortality requires information on short-term mortality rate from capture, handling, and release in the sport fishery, as well as information on the numbers and size of released halibut. There are no known estimates of the mortality rate of halibut associated with catch-and-release in the sport fishery. The number of released halibut each year is available from three sources: it is recorded for anglers interviewed in dockside sampling, it is estimated indirectly from the SWHS, and it is required to be recorded in charter logbooks. There are no data available on the sizes of individual released fish. However, anglers interviewed by ADF&G creel technicians in Area 2C are asked to report released fish by size class, where the categories are U45, 45-68", and O68.

ADF&G estimated halibut release mortality of O26 halibut in Area 2C and 3A for the first time in 2013 (Meyer et al. 2013). The estimates assumed release mortality rates for the charter fishery of 6% in Area 2C and 5% in Area 3A. The number of released fish was estimated by relating partial-year logbook data to past SWHS estimates using regression. The average weight of released fish was determined for Area 3A by modeling the selective retention of fish as a function of size, similar to the method used by Meyer (2007). This method was also used to obtain average weight for fish under 45 inches in length in Area 2C. For Area 2C fish in the 45-68 and O68 size classes, average weight was estimated from 2010 length data.

The magnitude of O26 release mortality, relative to the harvest, is probably relatively consistent from year to year as long as there is no major change in the regulations or numbers of fish released. The number of halibut reported released through July 2013 in logbooks was up 3% in Area 2C and down 28% in Area 3A relative to 2012. The total number of released halibut in each area in 2013 was estimated by regression using partial and complete-year logbook data. The estimate for Area 2C was 13% higher than the 2006-2012 average, and the Area 3A estimate was 37% lower than the average over the same period. It is unknown whether the changes, particularly in Area 3A, are anomalies or longer term changes.

Release mortality was generally not estimable under multiple alternative regulatory scenarios due to the lack of previous experience with most of the regulatory scenarios. Without data from the fishery, it was not possible to determine whether the management measures under consideration would significantly increase or decrease release mortality. In addition, the accuracy of the current release mortality estimates and underlying assumptions is unknown and cannot be assessed with available data. Therefore, the approach used was to apply assumed values for the percentage of total removals due to release mortality.

Assumed values were determined for various measures based on estimates of release mortality calculated for 2013 and provided to the IPHC (Meyer et al. 2013). These values were very close to estimates made using logbook data. Charter removals were inflated by an assumed value of 5% (multiplied by 1.05) to account for release mortality. Release mortality under a maximum size limit has not been estimated, but was assumed to be similar. Therefore, the 5% inflation factor was also applied to projected yields under the maximum limit in Area 2C in order to estimate total removals. In Area 3A, the maximum size limits considered would only apply to second fish in the bag limit, which in recent years represented about 48% of the harvest. Therefore, a slightly lower release mortality inflation factor of 4% was assumed for Area 3A. Finally, an inflation factor of 2% was assumed for measures in Area 3A that do not involve size limits. This value was rounded up to the nearest whole percentage point from the Area 3A estimates of release mortality for 2013.

3.0 Area 2C Projections

3.1 Status Quo

Status quo measures for Area 2C include a one-fish bag limit, U45O68 reverse slot limit, and prohibition of halibut harvest by skipper and crew while guiding. The 2013 preliminary estimate of Area 2C charter harvest based on logbook data excluding crew was 58,005 halibut (Figure 4). The forecast for 2014 was also 58,005 halibut because the best-fitting ARIMA model for each subarea was simply to use the prior year's estimate. Applying the means of 2012-2013 average weights in each subarea, the yield forecast for 2014 was 0.815 M lb. The estimated total charter removal, after inflation to account for total release mortality, was 0.856 M lb (Table 3).

3.2 Annual Limit

Projected harvests were estimated for annual limits of 1-5 halibut in Area 2C. The percentage harvest reduction associated with annual limits varied substantially by subarea (Table 4). Estimated harvests for Area 2C overall under annual limits ranged from about 28,000 to 57,000 halibut, with corresponding harvest reductions ranging from 51.2% to 1.5%. Annual limits greater than two halibut had a relatively small effect on harvest because few anglers harvested three or more halibut in 2012.

3.3 Maximum Size Limit With and Without Annual Limit

Total charter removals were projected for maximum size limits ranging from 30 to 55 inches. These projections were also done for each level of harvest associated with annual limits ranging from one to five fish. In the case of no annual limit, projected removals ranged from 0.396 M lb under a 30-inch maximum size limit to 1.069 M lb under a 55-inch maximum size limit (Table 5). Combinations of size limits and annual limits that meet the Blue Line alternative are highlighted in this table. The corresponding average weights ranged from 6.5 to 17.6 pounds. Projected removals under any particular size limit vary primarily in proportion to the projected harvest under each annual limit. This is because the analysis did not assume that average weight was directly affected by the choice of annual limit. There was a small effect on average weight under each annual limit from differences in the distribution of harvest among subareas.

3.4 Reverse Slot Limit With or Without Annual Limit

Total charter removals were projected for a range of reverse slot limits with lower limits ranging from 35 to 50 inches and upper limits ranging from 50 to 80 inches. A table of projected total removals was generated for 2014 under no annual limit, and for annual limits ranging from one to five halibut (Table 6). Measures that meet the fishery targets under the Blue Line alternative are highlighted in the table.

The projected removals are likely too high, based on comparison to data from the U45O68 limit in 2012 and 2013. For example, the projected mean weight for a U45O68 reverse slot limit with subarea harvests equal to the 2012 levels by subarea was 15.90 lb. Similarly, the predicted average weight based on 2013 harvests by subarea was 15.94 lb. Observed average weights from the fishery, however, were 14.27 lb in 2012 and 14.12 lb in 2013. Therefore, the projected average weights were high by roughly 11-13%, at least for the U45O68 reverse slot limit. Because projected charter removals are a linear combination of average weight and harvest, projected charter removals would be high by about the same proportions. For example, the projected removal for a U45O68 limit in the absence of an annual limit is 0.953 M lb (Table 6), which is 11% higher than the status quo projection of 0.856 M lb (Table 3).

For comparison purposes, charter removals were also calculated for the U45O68 reverse slot limit and annual limits of one to five halibut using the empirical average weights, or the average of the 2012 and 2013 average weights by subarea (Table 7). This was essentially the same approach used for the Area 2C status quo projection in Table 3. These projections are compared to projections using the standard methodology (Table 6). Projected removals using empirical average weights under annual limits from one to five fish ranged from 0.413 to 0.838 M lb. The corresponding projections using the standard method

ranged from 0.457 to 0.930 M lb. The standard projections were 10.5% to 11.3% higher than the projections based on empirical data across the range of annual limits from zero to five fish.

Therefore, even though predicted removals are likely overestimated using the standard methodology, Table 6 should still have utility for selecting an appropriate length limit. For example, if the target for removals is 0.76 M lb, the measure could be selected from the appropriate table that results in a predicted removal of 0.76 × 1.11, or 0.844 M lb. Therefore, Table 6 also highlights measures that should meet the Blue Line alternative assuming that the table overestimates removals by 11%.

4.0 Area 3A Projections

4.1 Status Quo

The status quo measures analyzed for Area 3A included a two-fish bag limit, no size limit, and no retention of halibut by skipper and crew. Although crew retention was allowed in 2013, it would be prohibited by regulation under the CSP even if there were no other changes to charter management measures. The 2013 preliminary estimate of Area 3A charter harvest based on logbook data excluding crew was 197,182 halibut. The harvest forecast for 2014 was 197,500 halibut (Figure 4). The slight difference between the 2013 estimate and the forecast was due to use of a 2-year lag in the forecast for the Yakutat subarea. The status quo projected yield was 2.493 M lb, and projected total charter removals including release mortality was 2.543 M lb (Table 8).

4.2 Annual Limit

Harvests were projected for annual limits of 1-10 halibut in Area 3A. As in Area 2C, the percentage harvest reduction associated with annual limits varied substantially by subarea (Table 9). Projected annual harvests for Area 3A overall ranged from about 82,000 to nearly 197,000 halibut, with corresponding reductions in harvest (number of fish) ranging from 58.7% to 0.4%. A harvest reduction of at least 10% would not be achieved until the annual limit was set below four fish. Annual limits greater than two halibut had a relatively small effect on harvest because few anglers harvested three or more halibut in 2012. Projected total removals (including release mortality) under annual limits of one to ten halibut ranged from 1.061 M lb to 2.532 M lb (Table 10).

4.3 Maximum Size Limit on Second Fish with and Without Annual Limit

The numbers of first and second fish were tallied for each subarea from 2010-2012 logbook data, excluding crew harvest. The 2010-2012 average proportions of second fish were used in the analysis and ranged from 33% in the Glacier Bay (3A) subarea to 49% in the Central and Lower Cook Inlet subareas (Table 11). Because the maximum size limit only applies to the second fish in each bag limit, and because harvest length distributions vary by subarea (Figure 5), the impact of this regulation would vary by subarea.

Total Area 3A charter removals were projected for maximum size limits on the second fish that ranged from 26 to 50 inches and annual limits ranging from zero to ten fish. Without an annual limit, projected removals ranged from 1.776 M lb with a 26-inch maximum size limit to 2.348 M lb under a 55-inch maximum size limit (Table 12). The corresponding area-wide average weights ranged from 9.0 to 11.9 pounds. For each size limit, there was a small amount of variation (0.1 lb or less) in area-wide average weight across the range of annual limits due to shifts in the distribution of harvest among subareas.

4.4 Limit Vessels to One Trip per Day

This measure was analyzed for the Council in 2012 for Areas 2C and 3A using ADF&G charter logbook data from 2007-2010 (King et al. 2012). This analysis is for Area 3A only, and updated using logbook data through 2012 excluding crew harvest.

The practice of taking more than one trip per day is relatively common in Area 3A. Since 2007, about 28-39% of businesses in Area 3A reported making more than one trip per day where they targeted bottomfish

or harvested halibut (Table 13). The proportions of vessels that made more than one bottomfish trip per day were similar (27-36%). Since 2007, vessels in Area 3A have made 18,452 to 25,491 bottomfish trips annually. Trips beyond the first trip of the day accounted for 4.0 to 6.3% of all bottomfish trips, and the percentage has increased every year since 2009.

Even though one-third or more of the charter vessels in Area 3A make multiple trips per day, the majority of these engage in this practice only a few days per year (Table 14). Even so, the number of businesses that do this on a more frequent basis appears to be increasing. The number and percentage of businesses that make multiple trips per day more than 20 days per year increased from seven (4.9%) in 2009 to 21 (18.8%) in 2012 (Table 14).

The critical information for understanding the effect of a daily trip limit is the amount of halibut harvest that occurs on trips after the first trip of the day (trips that would be prohibited). The fraction of harvest that occurs after the first trip of the day has varied somewhat by year, but varied considerably by subarea. From 2007 to 2012, the Central and Lower Cook Inlet subareas had the highest fractions of harvest after the first trip of the day. Halibut harvest on the second and subsequent trips represented 8.3% to 14.6% of the Lower Cook Inlet halibut harvest and 7.7% to 15.9% of the Central Cook Inlet harvest (Table 15). For Area 3A overall, the percentage of harvest occurring after the first trip of the day was around 6-7% from 2007 to 2009 but has increased every year since 2009 to a high of 9.8% in 2012.

For 2014, we would assume that the effect of limiting vessels to one trip per day with halibut harvest would reduce the charter halibut harvest (in numbers of fish) by a maximum of approximately 10%. This would also represent the potential reduction if the average weight of halibut taken on trips after the first trip of the day was different from first trips. ADF&G creel surveys in Area 3A do not collect trip numbers in association with size data, but halibut caught on half-day trips are suspected to be smaller than the overall average. In Cook Inlet, vessels that routinely conduct half-day trips typically fish closer to port and the emphasis is on filling bag limits in a shorter time frame.

The 10% figure provided above is considered a maximum for the potential reduction in harvest because of the potential for displaced effort to be absorbed by other vessels or other dates. If approved by the IPHC in January, trip limits would be published in the Federal Register in March. Anglers that have already booked a trip may have to re-book alternate dates or book another boat. Anglers that have not yet reserved a trip might find it harder to book a trip during peak use periods. The ability of anglers to re-book would depend on the availability of suitable vessels, their flexibility in their desire for a particular boat or captain, and their flexibility in desired dates.

The only factor that could be examined with available data is the number of available angler days. Charter halibut permits specify the maximum number of anglers that can be carried. Theoretically, the total number of angler endorsements represents the number of anglers that could be fish on a particular day. Endorsement data were obtained from the Area 3A permit information posted in July 2013. Logbook data and charter halibut permit data for 2012 were combined to examine the amount of effort that occurred in relation to the potential effort for major ports of landings in Area 3A. Ports in close proximity to each other (e.g., Anchor Point, Ninilchik, and Deep Creek) were combined on the assumption that they function as a single port in terms of booking. Angler effort either exceeded or came close to the theoretical maximum during July and August in Central Cook Inlet, and at Homer, Seward, Whittier, and Valdez in 2012 (Figure 6).

This graphic analysis likely overestimates the availability of charters for several reasons. First, some permits were probably endorsed for more anglers than the vessels they were being used on were able to carry. Second, some percentage of charter businesses choose not to run at full capacity, both in the number of anglers per trip and the number of trips they are willing to make per year. These operators may be reluctant to book more anglers or trips even if there was demand. Third, some businesses choose to target only salmon, or at least limit the number of trips targeting halibut. Finally, the peak season for halibut harvest in Area 3A is from early July through mid-August (Figure 6). During this time, the peak in

demand combines with the aforementioned factors to create a shortage in the availability of halibut charters, especially at major ports. Unfortunately, the true availability cannot be calculated with available data. The willingness of charter operators to do halibut trips and the flexibility of clients to book alternate vessels, dates, or ports are all unknown. Therefore, there is currently no way to precisely project charter removals under trip limits.

5.0 Implementation Issues

5.1 Size Limits

There are no anticipated implementation issues that would prevent implementation of maximum size limits on the second fish in the bag limit. In order to meet harvest targets for Area 3A, the size limit will likely be set low enough that it will be easy to release oversize halibut with low mortality. The number of released halibut could increase as a result of selecting for fish below the maximum size limit. The number of released fish is captured in logbooks, in SWHS estimates, and in creel survey interviews. The ability of anglers to harvest a second fish below the maximum size limit would likely vary by subarea. That is because length-frequency distributions of harvest vary among subareas.

5.2 Annual Limits

It is envisioned that annual limits would be implemented in the charter fishery for halibut as they are by the State of Alaska for king salmon, and as they are for halibut by the Department of Fisheries and Oceans in Area 2B (British Columbia). That is, all anglers would be required to record, in ink, the species, date, and location immediately upon harvesting a halibut. Recording would be on the back of a State of Alaska fishing license, or, if an angler does not have a paper license or is not required to be licensed, on an ADF&G harvest card available at license vendors and ADF&G offices. Charter anglers would not be required to record any Guided Angler Fish (GAF) taken under the CSP provision. This should not present a problem for enforcement or accounting – under the CSP, GAF are be required to be recorded in the logbook immediately upon capture. When checking anglers at sea or dockside, enforcement personnel should be able to deduct GAF from fish that count toward an angler's annual limit.

The license or harvest card would not be required to be submitted at the end of the year. Halibut harvest accounting by individual angler would continue to be implemented through ADF&G charter logbooks. Logbooks require reporting of the numbers of halibut harvested and released by individual angler, as well as the angler's name and fishing license number. For anglers fishing under the authority of an ADF&G Permanent Identification (PID) or Disabled Veteran (DAV) card, the PID or DAV number must be recorded. No number need be recorded for youth angles not required to be licensed. Under the CSP, all anglers (including youth) will be required to sign the logbook verifying that the catch recorded for them is correct.

A number of concerns have been expressed regarding effective enforcement and compliance with a halibut annual limit. A chief concern is that unscrupulous anglers will obtain duplicate or multiple licenses in order to comply with the reporting requirement yet still violate the annual limit. Although this is likely, the magnitude of cheating that will occur cannot be known in advance. However, ADF&G now has the ability to merge licensing and logbook data to examine the number of fish harvested by individual anglers, regardless of the number of licenses, duplicates, PIDs, or DAVs held. This capability provides a post-season evaluation of compliance by individual charter anglers with annual limits for any species included in the logbook.

This capability was recently tested by examining compliance with the nonresident 4-fish annual limit for king salmon in Southeast Alaska in 2012. Statistical data in the logbooks allowed exclusion of harvests from special use areas or terminal harvest areas where annual limits do not apply. Last year, 13,187 nonresidents that held 13,293 licenses harvested at least one king salmon. Of these anglers, 76 anglers harvested more than four king salmon over 28 inches (annual limit violations). The illegal harvest (in excess of annual limits) of 102 king salmon represented 0.4% of the total harvest of large kings. The low

rate of violations among licensed nonresidents in this popular fishery suggests that enforcement of annual limits through the reporting requirement alone creates an effective incentive for compliance.

Compliance among youth anglers that are not required to be licensed cannot be evaluated post-season using logbook data. However, youth anglers have made up only about 6% of the saltwater angler effort in Area 3A in recent years. As stated earlier, all unlicensed youth anglers would be required to report each halibut on a harvest record. Youth typically fish on charter boats with parents or other adults, who, along with the guide or deck hand, would be expected to remind them of recording requirements. The proportion of youth that would violate annual limits is likely small.

Post-season evaluations of annual harvests per angler cannot be done until license data are finalized, which is usually by March of the year following harvest. This several-month lag may make post-season enforcement impractical, but the data can be used to inform the Council with respect to compliance issues and assist enforcement by identifying individuals, guides, or businesses frequently associated with annual limit violations.

5.3 Trip limits

It is anticipated that implementation of this measure would be a rule that limits charter vessels to one trip per day during which any halibut are harvested. The trip limit would not apply to vessels or trips targeting or catching only salmon or other state-managed species over which the federal government lacks authority. One potential issue may be whether the rule would limit vessels or limited entry permits to one trip per day. For example, if the rule was specified to limit each vessel to one trip per day, businesses with multiple vessels could still make multiple trips per day. On the other hand, limiting the use of a permit to one vessel trip per day may be more effective in terms of achieving the desired harvest reduction. Another potential issue is whether a day is defined as a calendar day or a 24-hour period. There are an unknown number of charter vessels in Area 3A that conduct overnight charters in order to allow anglers to harvest a possession limit of halibut (4 fish) on a single trip. These vessels typically leave port in the evening and return the next morning. To be legal, anglers must not harvest more than a daily bag limit before or after midnight. Vessels doing overnight trips on a daily basis would be conducting portions of two trips in a single calendar day.

Not all businesses that make multiple trips per day are doing so with a different group of clients. Lodges with clients that fish several days in a row likely make up a portion of the businesses that regularly make multiple trips per day. Some may be taking the same clients out several times per day, returning to the lodge for meals or rest. Current logbook reporting rules define a trip as ending when charter clients or fish are offloaded. If multiple trips per day were prohibited, these businesses would have to make sure that all halibut harvest occurred on one trip per day.

There may be enforcement issues associated with trip limits. When contacting a vessel in the field, enforcement personnel would have to be able to determine whether the vessel is engaged in the first trip of the day, or whether it had made another trip earlier in the day. There is no requirement to retain logbook data for completed trips on board the vessel.

6.0 Possible Targets for Charter Removals and Candidate Measures

In order to help frame the decision-making process, this section develops likely targets for charter removals under the CSP and identifies a range of potential options for suitable management measures

Likely alternative targets for total charter removals in Area 2C include:

1. The Blue Line, based on the combined charter-commercial fishery constant exploitation yield (FCEY) announced by the IPHC on December 4. This value is 0.76 M lb, and is calculated by applying the 18.3% allocation defined in the CSP to the combined FCEY of 4.16 M lb.
2. The charter allocation associated with the combined FCEY that results from increasing the commercial catch limit 1/3 of the distance between the 2013 catch limit of 2.97 M lb and the Blue

Line catch limit for 2014 of 4.16 M lb. This commercial catch would be 3.16 M lb, and the resulting charter sector allocation would be 0.71 M lb. Commercial waste was estimated from the waste-to-catch ratio for the Blue Line (0.08 / 3.32 = 0.024).

For Area 3A, the following alternative targets were identified:

1. The Blue Line value of 1.78 M lb, which was determined by applying he CSP allocation of 18.9% to the combined FCEY of 9.43.
2. The fixed charter allocation of 1.89 M lb specified in the CSP when the combined FCEY is between 10.0 and 10.8 M lb.
3. The charter allocation associated with the combined FCEY that results from the commercial catch limit that is halfway between the 2013 catch limit of 11.03 M lb and the Blue Line catch limit of 7.32 M lb. This charter allocation is 2.03 M lb, arrived at by applying the CSP allocation of 17.5% to a combined FCEY of 11.62. The combined FCEY was calculated as for Area 2C, using the waste-to-catch ratio for the Blue Line to estimate commercial waste.

These potential targets and the values used to calculate them are presented in Table 16. The general suite of measures that could potentially meet these targets and the corresponding tales numbers are also listed. This brief list of management options is intended to frame a discussion without assuming that any of these alternatives will necessarily be chosen. The Council may wish to evaluate measures for additional or alternative harvest targets.

8.0 References

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Table 1. Subareas of IPHC Areas 2C and 3A, ports where ADF&G creel surveys and halibut sampling occur, and subarea abbreviations used in tables and figures in this report.

IPHC Area	Subarea (sampled ports)	Ports With Sampling and Angler Interviews	Abbreviations
2C	Ketchikan	Ketchikan	A, Ket
	Prince of Wales Island	Craig, Klawock	B, PWI
	Petersburg/Wrangell	Petersburg, Wrangell	C, Pburg
	Sitka	Sitka	D
	Juneau, Haines, Skagway	Juneau	EF, Jun
	Glacier Bay (2C portion)	Gustavus, Elfin Cove	G2C
3A	Glacier Bay (3A portion)	Gustavus, Elfin Cove	G3A
	Yakutat	Yakutat	H, Yak
	Eastern Prince William Sound	Valdez	EPWS
	Western Prince William Sound	Whittier	WPWS
	North Gulf	Seward	NG
	Lower Cook Inlet	Homer	LCI
	Central Cook Inlet	Anchor Point, Deep Creek	CCI
	Kodiak	Kodiak city	Q, Kod

Table 2. Charter logbook harvest (numbers of halibut) excluding crew, by subarea for IPHC Areas 2C and 3A, 2006-2013. The 2013 numbers are preliminary estimates based on regression using data through July 2013.

Area 2C

	Subarea						
Year	Ket	PWI	Pburg	Sitka	Jun	G2C	**Area 2C**
2006	10,933	38,053	5,505	34,430	9,471	12,468	110,860
2007	11,719	42,044	5,912	34,056	9,325	17,251	120,307
2008	8,595	38,047	5,452	29,465	8,004	17,016	106,579
2009	4,471	13,097	2,246	15,896	4,873	10,433	51,016
2010	4,322	12,403	2,138	14,010	5,051	9,612	47,536
2011	3,746	12,045	1,444	16,022	5,377	9,365	47,999
2012	5,234	13,985	1,748	16,711	4,903	8,175	50,756
2013	6,872	17,282	1,927	17,112	6,684	8,128	58,005

Area 3A:

	Subarea								
Year	G3A	Yak	EPWS	WPWS	NG	LCI	CCI	Kod	**Area 3A**
2006	86	3,266	9,176	3,896	44,888	93,652	65,958	16,624	237,546
2007	150	3,028	9,284	3,674	54,109	98,730	69,708	19,452	258,135
2008	493	3,413	7,032	4,567	50,508	83,165	64,277	17,822	231,277
2009	280	3,042	7,066	4,220	40,165	69,361	52,704	13,934	190,772
2010	142	3,357	7,219	4,843	45,116	75,986	53,074	13,418	203,155
2011	972	2,751	5,925	4,006	45,635	78,572	52,904	14,437	205,202
2012	1,300	3,422	4,953	4,766	45,094	76,381	50,281	13,396	199,593
2013	1,684	3,104	5,544	6,134	45,380	72,636	50,833	11,867	197,182

Table 3. Area 2C projected yield and total removals for 2014 under status quo regulations (one-fish bag limit and U45O68 reverse slot limit).

Subarea	Harvest Forecast	Average Wt (lb)	Yield (M lb)	Release Mortality (5%)	Total Removals (M lb)
Ket	6,872	13.90	0.096	0.005	0.100
PWI	17,282	11.36	0.196	0.010	0.206
Pburg	1,927	20.85	0.040	0.002	0.042
Sitka	17,112	12.91	0.221	0.011	0.232
Jun	6,684	13.09	0.087	0.004	0.092
G2C	8,128	21.51	0.175	0.009	0.184
Area 2C	58,005	14.05	0.815	0.041	0.856

Table 4. Estimated percent change and projected 2014 charter halibut harvests (numbers of fish) in Area 2C under annual limits of one to five halibut. The percentage reductions were calculated from 2012 logbook harvests by licensed anglers excluding crew.

Annual Limit	Subarea						Area 2C
	Ket	PWI	Pburg	Sitka	Jun	G2C	
	Estimated percent change in harvest:						
1	-30.2%	-57.0%	-49.6%	-50.3%	-48.4%	-61.6%	-51.2%
2	-10.0%	-26.9%	-22.8%	-18.8%	-24.6%	-39.5%	-23.9%
3	-2.0%	-7.7%	-7.8%	-3.6%	-10.9%	-24.1%	-8.5%
4	-0.6%	-1.6%	-2.4%	-0.5%	-3.8%	-13.8%	-3.2%
5	-0.1%	-0.5%	-0.3%	-0.1%	-1.2%	-8.4%	-1.5%
	Projected harvest:						
1	4,799	7,429	972	8,505	3,450	3,124	28,279
2	6,184	12,638	1,488	13,895	5,042	4,917	44,165
3	6,733	15,955	1,777	16,496	5,958	6,172	53,092
4	6,833	17,000	1,881	17,025	6,429	7,006	56,173
5	6,862	17,203	1,921	17,092	6,601	7,449	57,128
None	6,872	17,282	1,927	17,112	6,684	8,128	58,005

Table 5. Area 2C projected charter removals including release mortality (A) and projected average net weight of harvested halibut (B) under a range of maximum size limits and annual limits (including no annual limit) for 2014. Shaded values represent candidate measures for implementation under the IPHC Blue Line alternative of 0.76 M lb of total removals for the charter fishery.

A.Projected Total Removals incl. release mortality (M lb)

Size Limit	Annual Limit					
(inches)	1	2	3	4	5	None
30	0.193	0.302	0.363	0.384	0.390	0.396
31	0.208	0.324	0.389	0.412	0.419	0.425
32	0.226	0.352	0.423	0.447	0.455	0.463
33	0.239	0.371	0.445	0.471	0.479	0.487
34	0.253	0.393	0.472	0.499	0.508	0.516
35	0.264	0.410	0.492	0.521	0.530	0.539
36	0.282	0.438	0.525	0.556	0.565	0.575
37	0.293	0.455	0.546	0.578	0.588	0.598
38	0.311	0.482	0.577	0.611	0.622	0.633
39	0.323	0.500	0.599	0.635	0.646	0.658
40	0.334	0.517	0.620	0.656	0.668	0.680
41	0.348	0.538	0.644	0.683	0.695	0.708
42	0.357	0.552	0.662	0.701	0.714	0.728
43	0.367	0.568	0.680	0.721	0.735	0.750
44	0.380	0.589	0.705	0.747	0.762	0.776
45	0.394	0.611	0.731	0.775	0.790	0.806
46	0.404	0.626	0.749	0.794	0.810	0.826
47	0.418	0.647	0.775	0.821	0.838	0.854
48	0.428	0.662	0.792	0.840	0.856	0.874
49	0.443	0.686	0.822	0.872	0.889	0.908
50	0.455	0.705	0.844	0.896	0.914	0.934
51	0.467	0.723	0.866	0.919	0.938	0.958
52	0.484	0.750	0.898	0.953	0.973	0.994
53	0.495	0.766	0.918	0.974	0.994	1.016
54	0.509	0.788	0.944	1.002	1.022	1.045
55	0.521	0.807	0.966	1.025	1.046	1.069

B.Projected Average Weight (lb)

	Annual Limit					
1	2	3	4	5	None
6.52	6.51	6.51	6.51	6.51	6.51
7.00	6.99	6.98	6.98	6.98	6.98
7.61	7.59	7.58	7.58	7.59	7.59
8.03	8.00	7.99	7.99	7.99	8.00
8.52	8.48	8.46	8.46	8.46	8.47
8.90	8.85	8.83	8.83	8.84	8.85
9.50	9.45	9.42	9.42	9.43	9.44
9.88	9.82	9.79	9.79	9.80	9.82
10.46	10.38	10.35	10.36	10.37	10.39
10.88	10.79	10.75	10.76	10.77	10.80
11.25	11.16	11.12	11.13	11.14	11.17
11.70	11.60	11.56	11.57	11.59	11.63
12.01	11.91	11.87	11.89	11.91	11.95
12.35	12.25	12.21	12.23	12.26	12.31
12.80	12.69	12.65	12.67	12.70	12.75
13.28	13.17	13.12	13.14	13.17	13.23
13.61	13.50	13.44	13.47	13.50	13.56
14.08	13.95	13.90	13.93	13.96	14.03
14.40	14.27	14.21	14.24	14.27	14.34
14.93	14.80	14.74	14.78	14.82	14.90
15.33	15.20	15.15	15.19	15.24	15.33
15.73	15.60	15.54	15.58	15.63	15.72
16.31	16.17	16.11	16.16	16.21	16.31
16.66	16.52	16.47	16.51	16.57	16.67
17.14	16.99	16.93	16.98	17.04	17.15
17.54	17.39	17.33	17.38	17.44	17.55

Table 6. Area 2C projected charter removals (including release mortality) under reverse slot limits ranging from U35O50 to U50O80 and annual limits ranging from zero to five fish. Shaded values represent candidate measures under the IPHC Blue Line alternative of 0.76 M lb, and boxed values indicate measures that would meet the Blue Line charter target of 0.76 M lb assuming that projected removals are overestimated by 11%.

No annual limit, harvest = 58,005 halibut

	Upper Length Limit (in)															
Lower Limit (in)	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
35	1.155	1.091	1.034	0.971	0.922	0.874	0.813	0.753	0.722	0.692	0.661	0.644	0.621	0.604	0.601	0.587
36	1.185	1.122	1.066	1.004	0.955	0.908	0.848	0.788	0.757	0.727	0.697	0.680	0.656	0.640	0.637	0.623
37	1.204	1.142	1.086	1.025	0.976	0.930	0.870	0.810	0.779	0.750	0.719	0.702	0.679	0.663	0.660	0.646
38	1.233	1.172	1.117	1.057	1.008	0.963	0.903	0.844	0.813	0.784	0.754	0.737	0.714	0.697	0.695	0.681
39	1.254	1.193	1.139	1.079	1.031	0.986	0.927	0.868	0.837	0.808	0.778	0.761	0.738	0.722	0.719	0.705
40	1.272	1.212	1.158	1.099	1.052	1.007	0.948	0.890	0.859	0.831	0.801	0.784	0.761	0.745	0.742	0.728
41	1.294	1.235	1.183	1.124	1.078	1.033	0.974	0.917	0.886	0.858	0.828	0.811	0.789	0.772	0.770	0.756
42	1.309	1.251	1.199	1.141	1.095	1.051	0.993	0.936	0.905	0.877	0.847	0.831	0.808	0.791	0.789	0.775
43	1.326	1.269	1.217	1.160	1.114	1.070	1.013	0.956	0.926	0.898	0.868	0.851	0.829	0.812	0.810	0.796
44	1.348	1.291	1.241	1.184	1.139	1.096	1.038	0.982	0.952	0.924	0.895	0.878	0.856	0.839	0.837	0.823
45	1.371	1.316	1.266	1.210	1.166	1.123	1.066	1.010	0.981	0.953	0.923	0.907	0.885	0.868	0.866	0.852
46	1.387	1.333	1.284	1.228	1.184	1.142	1.085	1.030	1.000	0.972	0.943	0.927	0.905	0.889	0.886	0.872
47	1.410	1.357	1.308	1.254	1.210	1.168	1.112	1.057	1.028	1.000	0.971	0.955	0.933	0.917	0.914	0.901
48	1.425	1.372	1.325	1.270	1.227	1.185	1.130	1.075	1.046	1.019	0.990	0.974	0.951	0.935	0.933	0.919
49	1.452	1.401	1.354	1.301	1.258	1.217	1.162	1.108	1.079	1.052	1.023	1.007	0.985	0.969	0.967	0.953
50	1.472	1.422	1.376	1.323	1.282	1.241	1.187	1.133	1.104	1.077	1.049	1.033	1.011	0.995	0.993	0.979

5-fish annual limit, harvest = 57,128 halibut

	Upper Length Limit (in)															
Lower Limit (in)	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
35	1.125	1.062	1.006	0.945	0.897	0.852	0.793	0.735	0.704	0.676	0.646	0.629	0.607	0.591	0.588	0.575
36	1.155	1.093	1.038	0.978	0.930	0.885	0.827	0.769	0.738	0.710	0.681	0.664	0.642	0.626	0.623	0.610
37	1.173	1.112	1.058	0.998	0.951	0.906	0.848	0.791	0.760	0.732	0.703	0.687	0.664	0.648	0.646	0.632
38	1.201	1.141	1.088	1.029	0.983	0.938	0.881	0.824	0.794	0.766	0.737	0.720	0.698	0.682	0.680	0.666
39	1.222	1.162	1.110	1.051	1.005	0.961	0.904	0.847	0.817	0.790	0.761	0.744	0.722	0.706	0.704	0.691
40	1.239	1.181	1.129	1.071	1.025	0.982	0.925	0.869	0.839	0.811	0.783	0.766	0.744	0.728	0.726	0.713
41	1.261	1.204	1.152	1.095	1.050	1.007	0.950	0.895	0.865	0.838	0.809	0.793	0.771	0.755	0.753	0.740
42	1.275	1.219	1.168	1.111	1.067	1.024	0.968	0.913	0.883	0.856	0.827	0.811	0.789	0.774	0.771	0.758
43	1.292	1.236	1.186	1.130	1.086	1.043	0.987	0.933	0.903	0.876	0.848	0.832	0.810	0.794	0.792	0.779
44	1.313	1.258	1.209	1.154	1.110	1.068	1.013	0.958	0.929	0.902	0.874	0.858	0.836	0.820	0.818	0.805
45	1.336	1.283	1.234	1.179	1.136	1.095	1.040	0.986	0.957	0.930	0.902	0.886	0.864	0.849	0.846	0.833
46	1.352	1.299	1.251	1.197	1.154	1.113	1.058	1.005	0.976	0.949	0.921	0.905	0.884	0.868	0.866	0.853
47	1.374	1.322	1.275	1.221	1.179	1.139	1.085	1.032	1.003	0.976	0.949	0.933	0.911	0.896	0.893	0.881
48	1.389	1.337	1.291	1.238	1.196	1.156	1.102	1.049	1.021	0.994	0.967	0.951	0.929	0.914	0.911	0.899
49	1.415	1.365	1.319	1.267	1.226	1.186	1.133	1.081	1.053	1.026	0.999	0.983	0.962	0.947	0.944	0.932
50	1.435	1.386	1.341	1.289	1.249	1.210	1.157	1.105	1.077	1.051	1.024	1.008	0.987	0.971	0.969	0.957

(continued)

Table 6. (continued).

4-fish annual limit, harvest = 56,173 halibut

	Upper Length Limit (in)															
Lower Limit (in)	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
35	1.099	1.038	0.983	0.923	0.877	0.833	0.775	0.719	0.688	0.661	0.632	0.616	0.594	0.578	0.576	0.563
36	1.128	1.068	1.014	0.955	0.909	0.866	0.808	0.752	0.722	0.695	0.667	0.650	0.628	0.613	0.611	0.598
37	1.147	1.087	1.034	0.975	0.930	0.886	0.829	0.774	0.744	0.716	0.688	0.672	0.650	0.635	0.632	0.620
38	1.174	1.116	1.063	1.005	0.960	0.918	0.861	0.806	0.776	0.749	0.721	0.705	0.683	0.668	0.666	0.653
39	1.194	1.136	1.085	1.027	0.983	0.940	0.884	0.829	0.800	0.773	0.745	0.729	0.707	0.692	0.689	0.677
40	1.211	1.154	1.103	1.046	1.002	0.960	0.904	0.850	0.821	0.794	0.766	0.750	0.728	0.713	0.711	0.698
41	1.233	1.177	1.126	1.070	1.026	0.985	0.929	0.875	0.846	0.819	0.792	0.776	0.754	0.739	0.737	0.724
42	1.247	1.191	1.142	1.086	1.043	1.001	0.946	0.893	0.864	0.837	0.810	0.794	0.772	0.757	0.755	0.743
43	1.263	1.208	1.159	1.104	1.061	1.020	0.965	0.912	0.883	0.857	0.830	0.814	0.792	0.777	0.775	0.762
44	1.284	1.230	1.182	1.127	1.085	1.044	0.990	0.937	0.908	0.882	0.855	0.839	0.818	0.803	0.801	0.788
45	1.307	1.254	1.206	1.153	1.111	1.070	1.017	0.964	0.936	0.910	0.883	0.867	0.846	0.831	0.828	0.816
46	1.322	1.270	1.223	1.170	1.128	1.088	1.035	0.983	0.954	0.929	0.902	0.886	0.865	0.850	0.848	0.835
47	1.343	1.292	1.246	1.194	1.153	1.113	1.060	1.009	0.981	0.955	0.928	0.913	0.891	0.877	0.874	0.862
48	1.358	1.308	1.262	1.210	1.169	1.130	1.078	1.026	0.998	0.973	0.946	0.930	0.909	0.894	0.892	0.880
49	1.384	1.335	1.290	1.239	1.199	1.160	1.108	1.057	1.029	1.004	0.977	0.962	0.941	0.926	0.924	0.912
50	1.403	1.354	1.310	1.260	1.220	1.182	1.131	1.080	1.053	1.028	1.001	0.986	0.965	0.950	0.948	0.936

3-fish annual limit, harvest = 53,092 halibut

	Upper Length Limit (in)															
Lower Limit (in)	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
35	1.031	0.973	0.921	0.865	0.821	0.781	0.727	0.674	0.645	0.620	0.594	0.579	0.558	0.544	0.542	0.530
36	1.058	1.001	0.951	0.895	0.852	0.812	0.758	0.706	0.678	0.652	0.627	0.611	0.590	0.576	0.574	0.563
37	1.075	1.019	0.969	0.914	0.871	0.831	0.778	0.726	0.698	0.673	0.647	0.632	0.611	0.597	0.595	0.583
38	1.101	1.046	0.997	0.942	0.900	0.861	0.808	0.756	0.728	0.703	0.678	0.663	0.642	0.628	0.626	0.615
39	1.120	1.066	1.017	0.963	0.921	0.882	0.829	0.778	0.750	0.726	0.700	0.685	0.664	0.650	0.648	0.637
40	1.136	1.083	1.035	0.981	0.940	0.901	0.849	0.798	0.770	0.745	0.720	0.705	0.684	0.671	0.669	0.657
41	1.157	1.104	1.056	1.003	0.962	0.924	0.872	0.821	0.794	0.769	0.744	0.729	0.709	0.695	0.693	0.682
42	1.170	1.118	1.071	1.018	0.978	0.939	0.888	0.838	0.810	0.786	0.761	0.746	0.726	0.712	0.710	0.699
43	1.185	1.133	1.087	1.035	0.995	0.957	0.906	0.856	0.829	0.804	0.779	0.765	0.744	0.730	0.728	0.717
44	1.205	1.154	1.108	1.057	1.017	0.980	0.929	0.880	0.852	0.828	0.804	0.789	0.768	0.755	0.753	0.742
45	1.226	1.177	1.132	1.081	1.042	1.005	0.954	0.905	0.878	0.854	0.830	0.815	0.795	0.781	0.779	0.768
46	1.241	1.192	1.147	1.097	1.058	1.021	0.971	0.923	0.896	0.872	0.847	0.833	0.813	0.799	0.797	0.786
47	1.261	1.213	1.169	1.120	1.082	1.045	0.995	0.947	0.921	0.897	0.872	0.858	0.838	0.824	0.822	0.811
48	1.275	1.227	1.184	1.135	1.097	1.061	1.012	0.964	0.937	0.914	0.889	0.875	0.855	0.841	0.839	0.828
49	1.299	1.253	1.210	1.162	1.125	1.089	1.040	0.992	0.966	0.943	0.919	0.904	0.884	0.871	0.869	0.858
50	1.317	1.271	1.230	1.182	1.145	1.110	1.061	1.014	0.988	0.965	0.941	0.926	0.906	0.893	0.891	0.880

(continued)

Table 6. (continued).

2-fish annual limit, harvest = 44,165 halibut

	Upper Length Limit (in)															
Lower Limit (in)	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
35	0.854	0.806	0.763	0.716	0.680	0.647	0.602	0.558	0.535	0.514	0.493	0.480	0.463	0.452	0.450	0.441
36	0.878	0.830	0.788	0.742	0.706	0.673	0.629	0.585	0.562	0.541	0.520	0.508	0.490	0.479	0.478	0.468
37	0.892	0.845	0.803	0.757	0.723	0.690	0.646	0.602	0.579	0.558	0.537	0.525	0.507	0.496	0.495	0.486
38	0.914	0.868	0.827	0.781	0.747	0.714	0.671	0.628	0.605	0.584	0.563	0.551	0.534	0.522	0.521	0.512
39	0.930	0.884	0.844	0.799	0.765	0.732	0.689	0.646	0.623	0.603	0.582	0.570	0.552	0.541	0.540	0.531
40	0.944	0.899	0.858	0.814	0.780	0.748	0.705	0.663	0.640	0.619	0.599	0.586	0.569	0.558	0.557	0.548
41	0.961	0.916	0.877	0.832	0.799	0.767	0.724	0.683	0.660	0.640	0.619	0.607	0.590	0.579	0.577	0.568
42	0.971	0.928	0.889	0.845	0.812	0.780	0.738	0.696	0.673	0.653	0.633	0.621	0.604	0.593	0.591	0.582
43	0.984	0.941	0.902	0.859	0.826	0.795	0.752	0.711	0.688	0.668	0.648	0.636	0.619	0.608	0.606	0.598
44	1.001	0.958	0.920	0.877	0.845	0.814	0.772	0.731	0.708	0.689	0.668	0.656	0.639	0.628	0.627	0.618
45	1.019	0.977	0.940	0.897	0.866	0.835	0.793	0.752	0.730	0.710	0.690	0.678	0.661	0.650	0.649	0.640
46	1.031	0.990	0.953	0.911	0.879	0.849	0.808	0.767	0.745	0.725	0.705	0.693	0.676	0.666	0.664	0.655
47	1.048	1.008	0.972	0.930	0.899	0.869	0.828	0.788	0.766	0.746	0.726	0.714	0.698	0.687	0.685	0.676
48	1.060	1.020	0.984	0.943	0.912	0.882	0.842	0.802	0.780	0.760	0.740	0.729	0.712	0.701	0.699	0.691
49	1.080	1.041	1.006	0.965	0.935	0.905	0.865	0.825	0.804	0.784	0.765	0.753	0.736	0.725	0.724	0.715
50	1.095	1.056	1.022	0.982	0.952	0.923	0.882	0.843	0.822	0.803	0.783	0.771	0.755	0.744	0.742	0.734

1-fish annual limit, harvest = 28,279 halibut

	Upper Length Limit (in)															
Lower Limit (in)	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80
35	0.547	0.515	0.488	0.458	0.436	0.415	0.386	0.358	0.343	0.329	0.316	0.308	0.297	0.290	0.289	0.283
36	0.562	0.531	0.504	0.474	0.453	0.432	0.403	0.375	0.361	0.347	0.334	0.326	0.315	0.308	0.307	0.301
37	0.571	0.541	0.514	0.485	0.463	0.442	0.414	0.386	0.372	0.358	0.345	0.337	0.326	0.319	0.318	0.313
38	0.586	0.556	0.529	0.500	0.479	0.459	0.430	0.403	0.388	0.375	0.362	0.354	0.343	0.336	0.335	0.330
39	0.596	0.566	0.540	0.512	0.491	0.470	0.442	0.415	0.400	0.387	0.374	0.367	0.355	0.349	0.348	0.342
40	0.605	0.576	0.550	0.522	0.501	0.480	0.453	0.426	0.411	0.398	0.385	0.377	0.366	0.360	0.358	0.353
41	0.616	0.587	0.562	0.534	0.513	0.493	0.466	0.439	0.424	0.411	0.398	0.391	0.380	0.373	0.372	0.367
42	0.623	0.595	0.570	0.542	0.521	0.501	0.474	0.447	0.433	0.420	0.407	0.400	0.389	0.382	0.381	0.375
43	0.631	0.603	0.578	0.551	0.530	0.511	0.484	0.457	0.443	0.430	0.417	0.410	0.398	0.392	0.391	0.385
44	0.642	0.615	0.590	0.563	0.543	0.523	0.496	0.470	0.456	0.443	0.430	0.423	0.412	0.405	0.404	0.399
45	0.654	0.627	0.603	0.576	0.556	0.537	0.510	0.484	0.470	0.457	0.444	0.437	0.426	0.419	0.418	0.413
46	0.662	0.635	0.611	0.585	0.565	0.546	0.519	0.493	0.479	0.467	0.454	0.447	0.436	0.429	0.428	0.423
47	0.673	0.647	0.623	0.597	0.578	0.559	0.533	0.507	0.493	0.480	0.468	0.460	0.450	0.443	0.442	0.437
48	0.681	0.655	0.632	0.606	0.587	0.568	0.542	0.516	0.502	0.490	0.477	0.470	0.459	0.452	0.451	0.446
49	0.693	0.668	0.645	0.620	0.601	0.582	0.556	0.531	0.517	0.505	0.492	0.485	0.474	0.468	0.467	0.462
50	0.703	0.678	0.656	0.630	0.612	0.593	0.568	0.543	0.529	0.517	0.504	0.497	0.486	0.480	0.479	0.473

Table 7. Comparison of Area 2C projected charter removals (including release mortality, M lb) using the standard methodology (same as Table 6) and using empirical estimates of average weight from the 2012-2013 fishery.

	Annual Limit					
Method	1	2	3	4	5	None
Standard method based on 2010 data	0.457	0.710	0.854	0.910	0.930	0.953
Empirical – mean of 2012-2013 average weights	0.413	0.642	0.772	0.821	0.838	0.856
Percent difference relative to empirical	10.6%	10.5%	10.6%	10.8%	11.0%	11.3%

Table 8. Area 3A projected yield and total removals for 2014 under status quo regulations (two-fish bag limit, no size limit, crew harvest prohibited).

Subarea	Harvest Forecast	Mean Wt (lb)	Yield (M lb)	Release Mortality (2%)	Total Removals (M lb)
G3A	1,684	42.25	0.071	0.001	0.073
Yak	3,422	27.90	0.095	0.002	0.097
EPWS	5,544	20.59	0.114	0.002	0.116
WPWS	6,134	16.35	0.100	0.002	0.102
NG	45,380	12.27	0.557	0.011	0.568
LCI	72,636	10.73	0.779	0.016	0.795
CCI	50,833	12.60	0.641	0.013	0.653
Kod	11,867	11.38	0.135	0.003	0.138
Area 3A	197,500	12.62	2.493	0.050	2.543

Table 9. Estimated percent change and projected 2014 charter halibut harvests (numbers of fish) in Area 3A under annual limits of one to ten halibut. The percentage reductions were calculated from 2012 logbook harvests by licensed anglers excluding crew.

Annual Limit	Subarea								
	Kod	CCI	LCI	NG	WPWS	EPWS	Yak	G3A	Area 3A
	Estimated percent change in harvest:								
1	-70.3%	-60.0%	-59.8%	-54.7%	-50.3%	-49.3%	-56.8%	-59.1%	-58.7%
2	-44.0%	-20.7%	-20.6%	-14.0%	-11.0%	-9.1%	-25.8%	-29.1%	-20.0%
3	-30.1%	-13.6%	-12.7%	-8.4%	-4.7%	-5.1%	-14.5%	-15.6%	-12.6%
4	-18.8%	-6.7%	-5.1%	-3.7%	-0.7%	-2.0%	-7.0%	-5.9%	-5.8%
5	-11.7%	-4.6%	-3.3%	-2.3%	-0.4%	-1.3%	-3.7%	-2.3%	-3.8%
6	-6.5%	-2.7%	-1.7%	-1.2%	-0.2%	-0.8%	-1.9%	-0.6%	-2.1%
7	-3.8%	-2.0%	-1.1%	-0.8%	-0.1%	-0.5%	-1.0%	-0.1%	-1.4%
8	-2.0%	-1.3%	-0.6%	-0.5%	-0.1%	-0.3%	-0.4%	0.0%	-0.8%
9	-1.2%	-1.1%	-0.5%	-0.4%	-0.1%	-0.2%	0.0%	0.0%	-0.6%
10	-0.7%	-0.8%	-0.3%	-0.3%	0.0%	-0.1%	0.0%	0.0%	-0.4%
	Projected harvest:								
1	3,524	20,357	29,180	20,572	3,049	2,809	1,477	688	81,656
2	6,642	40,323	57,676	39,040	5,462	5,041	2,538	1,193	157,916
3	8,296	43,941	63,424	41,562	5,843	5,259	2,926	1,421	172,672
4	9,638	47,447	68,907	43,705	6,093	5,431	3,184	1,585	185,991
5	10,476	48,476	70,211	44,328	6,108	5,469	3,294	1,645	190,007
6	11,098	49,445	71,406	44,829	6,123	5,501	3,358	1,675	193,436
7	11,417	49,811	71,807	45,001	6,126	5,517	3,389	1,683	194,750
8	11,631	50,152	72,172	45,145	6,129	5,529	3,410	1,684	195,850
9	11,728	50,297	72,291	45,206	6,130	5,535	3,421	1,684	196,291
10	11,784	50,426	72,400	45,258	6,131	5,539	3,422	1,684	196,645
None	11,867	50,833	72,636	45,380	6,134	5,544	3,422	1,684	197,500

Table 10. Estimated total halibut removals (including release mortality) for Area 3A under annual limits of one to ten fish.

Annual Limit	Subarea								
	Kod	CCI	LCI	NG	WPWS	EPWS	Yak	G3A	Area 3A
1	0.041	0.262	0.319	0.257	0.051	0.059	0.042	0.030	1.061
2	0.077	0.518	0.631	0.488	0.091	0.106	0.072	0.051	2.036
3	0.096	0.565	0.694	0.520	0.097	0.110	0.083	0.061	2.228
4	0.112	0.610	0.754	0.547	0.102	0.114	0.091	0.068	2.397
5	0.122	0.623	0.769	0.555	0.102	0.115	0.094	0.071	2.449
6	0.129	0.636	0.782	0.561	0.102	0.116	0.096	0.072	2.492
7	0.133	0.640	0.786	0.563	0.102	0.116	0.096	0.073	2.509
8	0.135	0.645	0.790	0.565	0.102	0.116	0.097	0.073	2.522
9	0.136	0.647	0.791	0.566	0.102	0.116	0.097	0.073	2.528
10	0.137	0.648	0.792	0.566	0.102	0.116	0.097	0.073	2.532
None	0.138	0.653	0.795	0.568	0.102	0.116	0.097	0.073	2.543

Table 11. Percent of Area 3A charter harvest made up of second fish in angler's bag limits, by subarea, 2010-2012. Data are from the ADF&G charter logbook (excluding crew harvest).

Subarea	2010	2011	2012	Average
CCI	49.2%	49.3%	49.3%	49.2%
EPWS	43.7%	45.0%	43.7%	44.1%
G3A	26.1%	33.7%	38.2%	32.7%
Yak	40.4%	38.1%	38.6%	39.0%
LCI	48.7%	49.0%	49.1%	49.0%
NG	47.5%	48.1%	46.9%	47.5%
Kod	41.8%	43.0%	42.7%	42.5%
WPWS	42.7%	42.2%	41.9%	42.2%
Area 3A Overall	47.6%	48.0%	47.7%	47.8%

Table 12. Area 3A projected charter removals including release mortality (A) and projected average net weight of harvested halibut (B) under a range of maximum size limits and annual limits (including no annual limit) for 2014. Shaded values represent candidate measures for implementation under the IPHC Blue Line alternative of 1.78 M lb of total removals for the charter fishery.

A. Projected Total Removals including release mortality (Mlb)

Size Limit on 2nd fish (in)	Annual Limit										
	1	2	3	4	5	6	7	8	9	10	None
26	0.769	1.477	1.617	1.741	1.779	1.811	1.823	1.833	1.837	1.840	1.848
27	0.786	1.510	1.653	1.780	1.819	1.851	1.864	1.874	1.878	1.881	1.889
28	0.812	1.559	1.707	1.838	1.878	1.912	1.924	1.935	1.939	1.943	1.951
29	0.828	1.592	1.742	1.876	1.917	1.951	1.964	1.975	1.979	1.982	1.991
30	0.854	1.642	1.797	1.935	1.977	2.012	2.025	2.036	2.041	2.045	2.053
31	0.872	1.675	1.834	1.974	2.017	2.053	2.067	2.078	2.083	2.086	2.095
32	0.894	1.718	1.880	2.025	2.069	2.105	2.120	2.131	2.136	2.140	2.149
33	0.908	1.745	1.910	2.056	2.101	2.138	2.153	2.164	2.169	2.173	2.182
34	0.923	1.774	1.942	2.091	2.136	2.174	2.189	2.201	2.206	2.210	2.219
35	0.933	1.793	1.963	2.113	2.159	2.198	2.212	2.225	2.230	2.233	2.243
36	0.946	1.818	1.990	2.142	2.189	2.228	2.243	2.255	2.260	2.264	2.274
37	0.952	1.830	2.003	2.156	2.203	2.243	2.258	2.270	2.275	2.279	2.289
38	0.960	1.847	2.021	2.176	2.224	2.263	2.278	2.291	2.296	2.300	2.310
39	0.968	1.861	2.037	2.193	2.241	2.281	2.296	2.309	2.314	2.318	2.328
40	0.974	1.872	2.049	2.206	2.254	2.294	2.309	2.322	2.327	2.331	2.341
41	0.979	1.882	2.060	2.218	2.266	2.306	2.322	2.335	2.340	2.344	2.354
42	0.983	1.891	2.069	2.228	2.276	2.317	2.332	2.345	2.351	2.355	2.365
43	0.989	1.902	2.082	2.241	2.290	2.331	2.347	2.359	2.365	2.369	2.379
44	0.993	1.908	2.088	2.248	2.297	2.338	2.354	2.367	2.372	2.376	2.386
45	0.997	1.917	2.098	2.258	2.307	2.348	2.364	2.377	2.383	2.387	2.397
46	1.000	1.922	2.103	2.264	2.313	2.354	2.370	2.383	2.388	2.393	2.403
47	1.004	1.929	2.111	2.273	2.322	2.364	2.380	2.393	2.398	2.402	2.412
48	1.006	1.933	2.116	2.278	2.327	2.369	2.384	2.398	2.403	2.407	2.417
49	1.012	1.945	2.128	2.291	2.341	2.382	2.398	2.412	2.417	2.421	2.431
50	1.016	1.953	2.137	2.301	2.351	2.392	2.409	2.422	2.427	2.431	2.442

(continued)

Table 12. (continued).

B.Projected Average Weight (lb)

Size Limit on 2nd fish (in)	Annual Limit										
	1	2	3	4	5	6	7	8	9	10	None
26	9.06	9.00	9.01	9.00	9.00	9.00	9.00	9.00	9.00	9.00	8.99
27	9.26	9.19	9.21	9.20	9.21	9.20	9.20	9.20	9.20	9.20	9.20
28	9.56	9.50	9.51	9.50	9.50	9.50	9.50	9.50	9.50	9.50	9.50
29	9.75	9.69	9.70	9.70	9.70	9.70	9.70	9.69	9.69	9.69	9.69
30	10.06	10.00	10.01	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
31	10.26	10.20	10.21	10.21	10.21	10.21	10.20	10.20	10.20	10.20	10.20
32	10.52	10.46	10.47	10.47	10.47	10.47	10.47	10.46	10.46	10.46	10.46
33	10.69	10.62	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.63	10.62
34	10.87	10.80	10.81	10.81	10.81	10.81	10.81	10.81	10.80	10.80	10.80
35	10.98	10.92	10.93	10.92	10.93	10.92	10.92	10.92	10.92	10.92	10.92
36	11.13	11.07	11.08	11.07	11.08	11.07	11.07	11.07	11.07	11.07	11.07
37	11.21	11.14	11.15	11.15	11.15	11.15	11.15	11.15	11.15	11.14	11.14
38	11.31	11.24	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25	11.25
39	11.40	11.33	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.34	11.33
40	11.46	11.40	11.41	11.40	11.41	11.40	11.40	11.40	11.40	11.40	11.40
41	11.53	11.46	11.47	11.46	11.47	11.46	11.46	11.46	11.46	11.46	11.46
42	11.58	11.51	11.52	11.52	11.52	11.52	11.52	11.51	11.51	11.51	11.51
43	11.65	11.58	11.59	11.59	11.59	11.59	11.59	11.58	11.58	11.58	11.58
44	11.69	11.62	11.63	11.62	11.63	11.62	11.62	11.62	11.62	11.62	11.62
45	11.74	11.67	11.68	11.68	11.68	11.67	11.67	11.67	11.67	11.67	11.67
46	11.77	11.70	11.71	11.70	11.71	11.70	11.70	11.70	11.70	11.70	11.70
47	11.82	11.75	11.76	11.75	11.75	11.75	11.75	11.75	11.75	11.75	11.74
48	11.85	11.77	11.78	11.78	11.78	11.77	11.77	11.77	11.77	11.77	11.77
49	11.92	11.84	11.85	11.85	11.85	11.84	11.84	11.84	11.84	11.84	11.84
50	11.97	11.89	11.90	11.90	11.90	11.89	11.89	11.89	11.89	11.89	11.89

Table 13. Number and percent of businesses and vessels that reported at least one day of multiple trips (targeting bottomfish or harvesting halibut), and number and percent of trips in excess of the one trip per day in Area 3A, 2007-2012.

Year	Number of businesses that reported more than one bottomfish trip per day	Total businesses that reported bottomfish effort	Percent of businesses that reported more than one bottomfish trip per day	Number of vessels that reported more than one bottomfish trip per day	Total number of vessels that reported bottomfish effort	Percent of vessels that reported more than one bottomfish trip per day	Number of bottomfish trips in excess of one trip per day (2nd, 3rd, or 4th trip)	Total number of bottomfish trips	Percent of bottomfish trips in excess of one trip per day
2007	189	483	39.1%	230	643	35.8%	1,198	25,491	4.7%
2008	164	459	35.7%	205	604	33.9%	1,077	23,314	4.6%
2009	143	412	34.7%	186	547	34.0%	757	18,981	4.0%
2010	109	397	27.5%	140	523	26.8%	807	19,607	4.1%
2011	120	337	35.6%	155	462	33.5%	976	19,029	5.1%
2012	111	293	37.9%	143	419	34.1%	1,164	18,452	6.3%

Table 14. Frequency of multiple trips per day by Area 3A businesses from 2007 through 2012. The frequency in each cell represents the number of businesses that reported making multiple trips per day on 1 to 5 days, 6 to 20 days, and more than 20 days per year. The total only includes businesses that reporting making multiple trips per day with bottomfish effort or halibut harvest.

Number of Days Made Multiple Trips	Number of Businesses					
	2007	2008	2009	2010	2011	2012
1 to 5 days	153	130	120	83	88	78
6 to 20 days	25	19	16	17	17	13
>20 days	11	15	7	9	15	21
Total	189	164	143	109	120	112
Percent > 20 days	5.8%	9.1%	4.9%	8.3%	12.5%	18.8%

Table 15. Area 3A charter harvest (number of halibut, excluding crew harvest) and percent of harvest on trips after the first trip of the day (bold) by subarea, 2007-2012. The percentages of harvest after the first trip of the day represent the maximum potential reduction in harvest that would accrue by limiting vessels to one trip per day.

		Subarea								
Year	Trip	G3A	Yak	EPWS	WPWS	NG	LCI	CCI	Kod	Area 3A
2007	First	150	2,969	9,206	3,602	53,645	89,120	61,913	19,111	239,716
	After First	0	59	78	72	464	9,610	7,795	341	18,419
	% After	0.0%	1.9%	0.8%	2.0%	0.9%	9.7%	11.2%	1.8%	**7.1%**
2008	First	493	3,310	7,003	4,510	49,818	76,229	57,233	17,570	216,166
	After First	0	103	29	57	690	6,936	7,044	252	15,111
	% After	0.0%	3.0%	0.4%	1.2%	1.4%	8.3%	11.0%	1.4%	**6.5%**
2009	First	280	2,981	7,023	4,190	39,604	62,873	48,620	13,650	179,221
	After First	0	61	43	30	561	6,488	4,084	261	11,528
	% After	0.0%	2.0%	0.6%	0.7%	1.4%	9.4%	7.7%	1.9%	**6.0%**
2010	First	127	3,332	7,210	4,811	45,006	66,536	48,514	13,365	188,901
	After First	15	25	9	32	110	9,450	4,560	53	14,254
	% After	10.6%	0.7%	0.1%	0.7%	0.2%	12.4%	8.6%	0.4%	**7.0%**
2011	First	945	2,706	5,913	3,926	45,295	68,581	46,797	14,351	188,514
	After First	27	45	12	80	340	9,991	6,107	86	16,688
	% After	2.8%	1.6%	0.2%	2.0%	0.7%	12.7%	11.5%	0.6%	**8.1%**
2012	First	1,295	3,388	4,906	4,739	44,877	65,236	42,300	13,318	180,059
	After First	5	34	47	27	217	11,145	7,981	78	19,534
	% After	0.4%	1.0%	0.9%	0.6%	0.5%	14.6%	15.9%	0.6%	**9.8%**

Table 16. Derivation of some example charter harvest targets (bold text) that the Council may wish to consider for recommended management measures for the Area 2C and Area 3A charter fisheries in 2014.

	Area 2C Scenario		**Area 3A Scenario**		
Area	Commercial catch limit is up 1/3 from 2013[a]	Blue Line FCEY	Blue Line FCEY	FCEY is 10.0-10.8 Mlb	Commercial catch limit is 1/2 down from 2013[a]
combined FCEY	3.87	4.16	9.43	--	11.62
Commercial Alloc %	81.7%	81.7%	81.1%	--	82.5%
Commercial Alloc M lb	3.16	3.40	7.65	--	9.59
Commercial Catch Limit	3.09	3.32	7.32	--	**9.17**
Commercial Waste[b]	0.07	0.08	0.33	--	0.41
Charter Alloc %	18.3%	18.3%	18.9%	--	17.5%
Charter Removal Targets	**0.71**	**0.76**	**1.78**	**1.89**	**2.03**
Candidate measures	Maximum size limit with or without annual limit (Table 5). Reverse slot limit with or without annual limit (Table 6).		Annual limit of one fish, no size limit (Table 10). Max size limit on second fish with annual limits from one to five fish (Table 12).	Annual limit of one fish, no size limit (Table 10). Max size limit on second fish with or without annual limits (Table 12).	Annual limit of two fish, no size limit (Table 10). Max size limit on second fish with or without annual limits (Table 12).

[a] - 2013 catch limits were 2.97 Mlb in Area 2C and 11.03 M lb in Area 3A (excluding waste)
[b] - Commercial waste was provided for the Blue Line, scaled for other scenarios based on the Blue Line ratio of waste to catch.

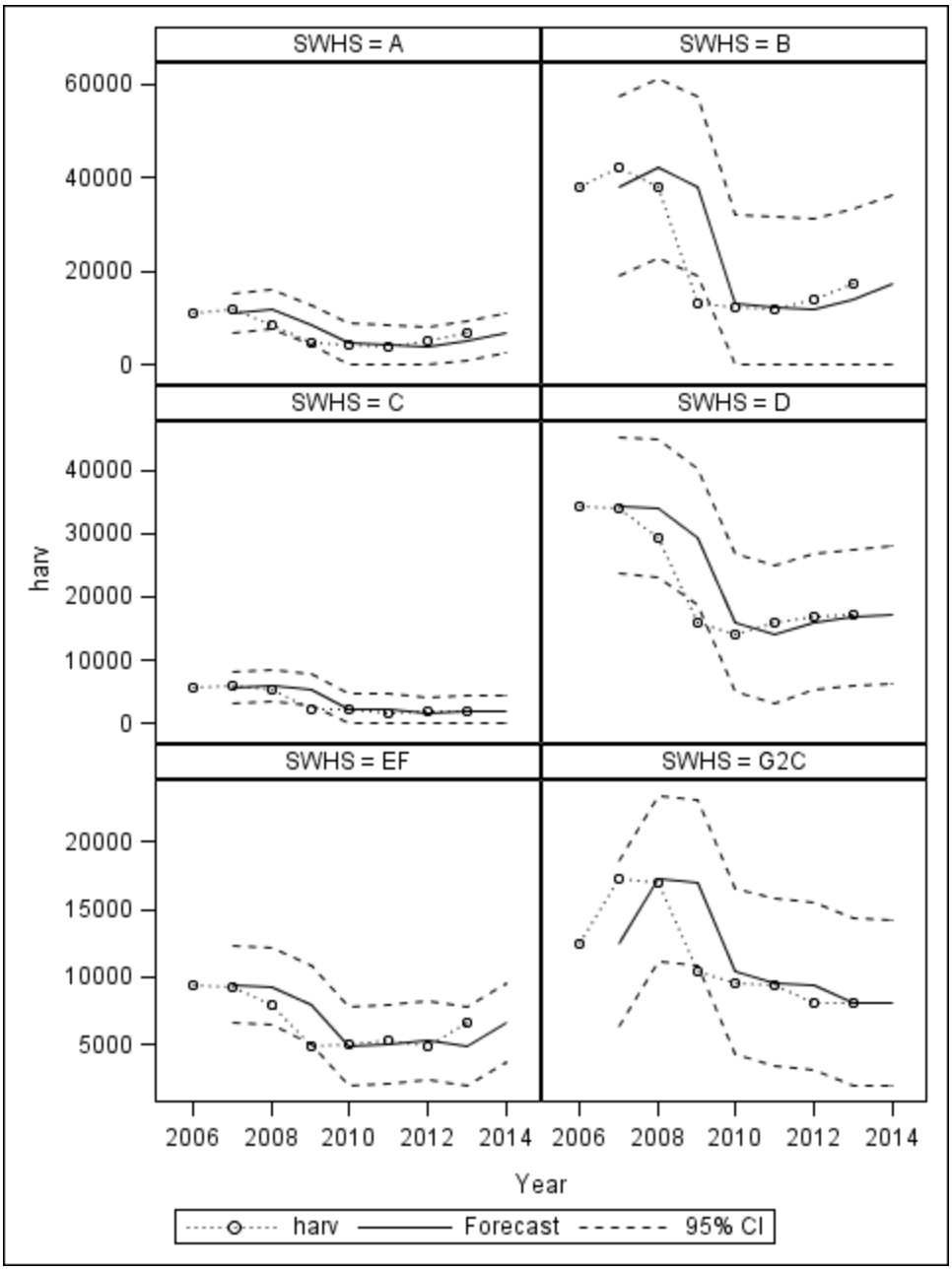


Figure 1. Area 2C halibut harvest (logbook data excluding crew) and ARIMA time series forecasts by subarea. The 2014 subarea forecasts were summed to provide the Area 2C status quo harvest forecast.

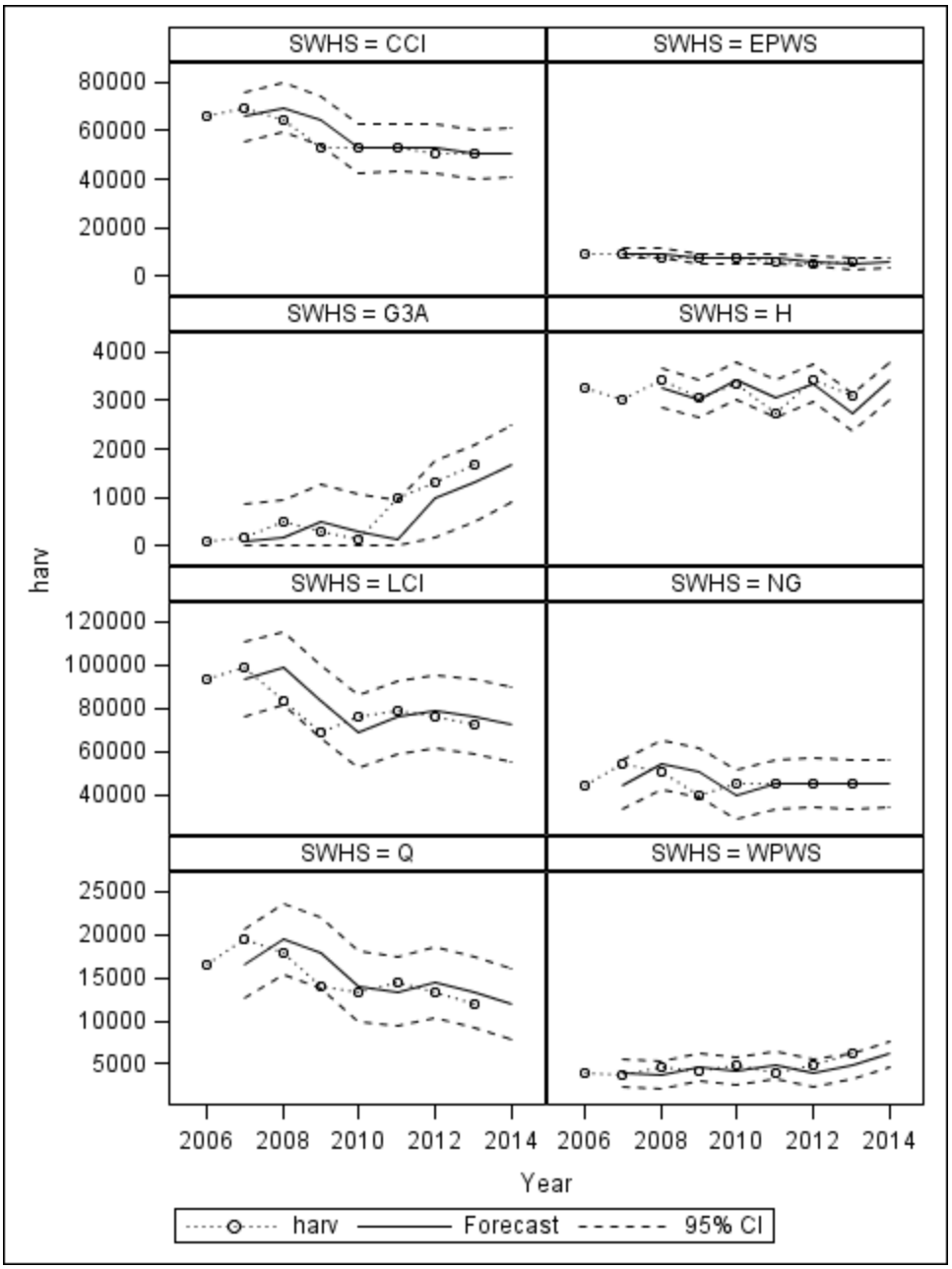
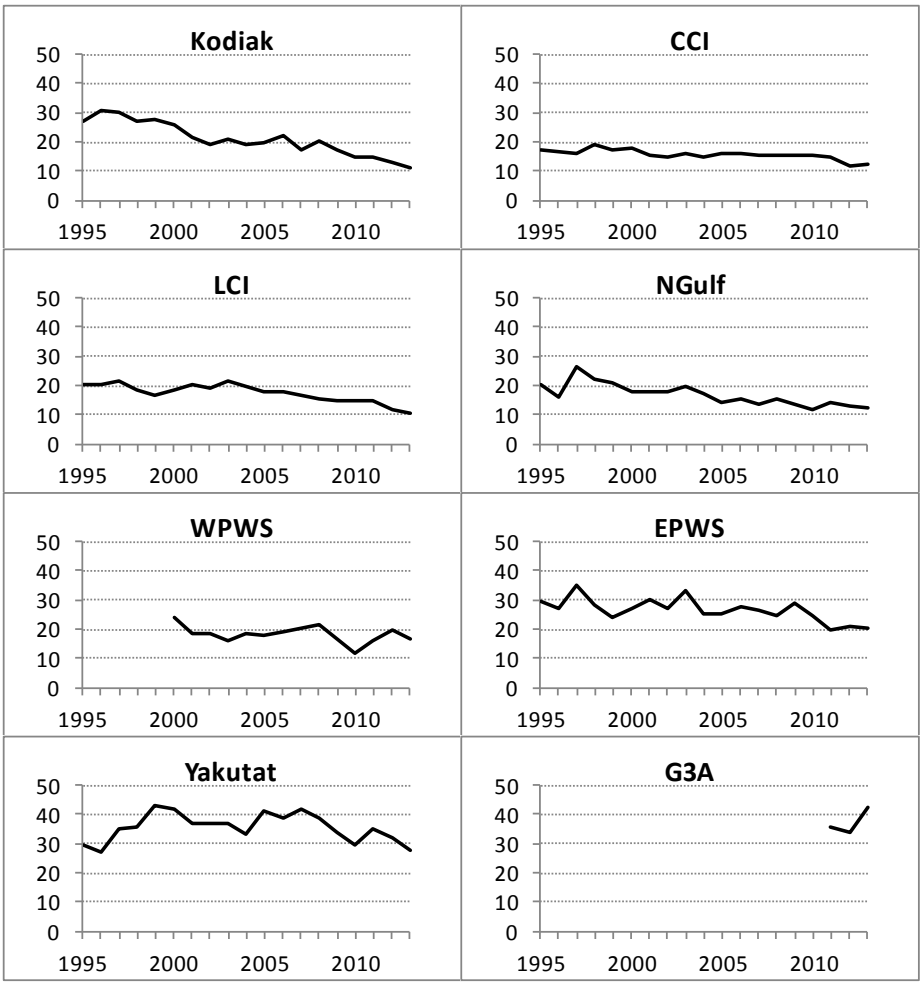


Figure 2. Area 3A halibut harvest (logbook data excluding crew) and ARIMA time series forecasts by subarea. The 2014 subarea forecasts were summed to provide the Area 3A status quo harvest forecast.



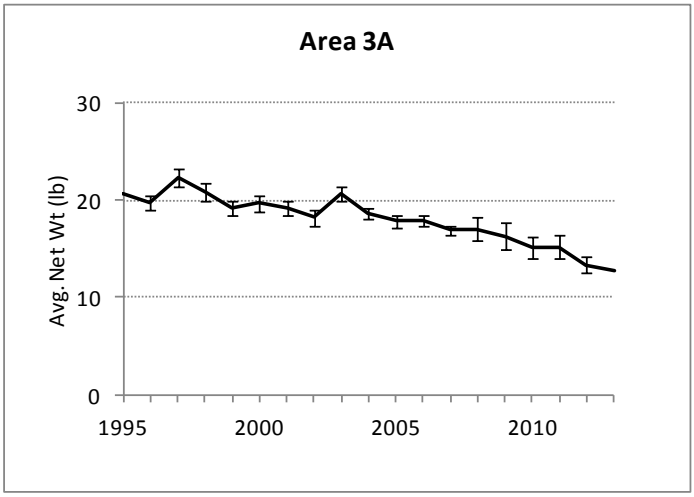


Figure 3. Trends in average weight of charter halibut harvest by subarea and in Area 3A overall, 1995-2013.

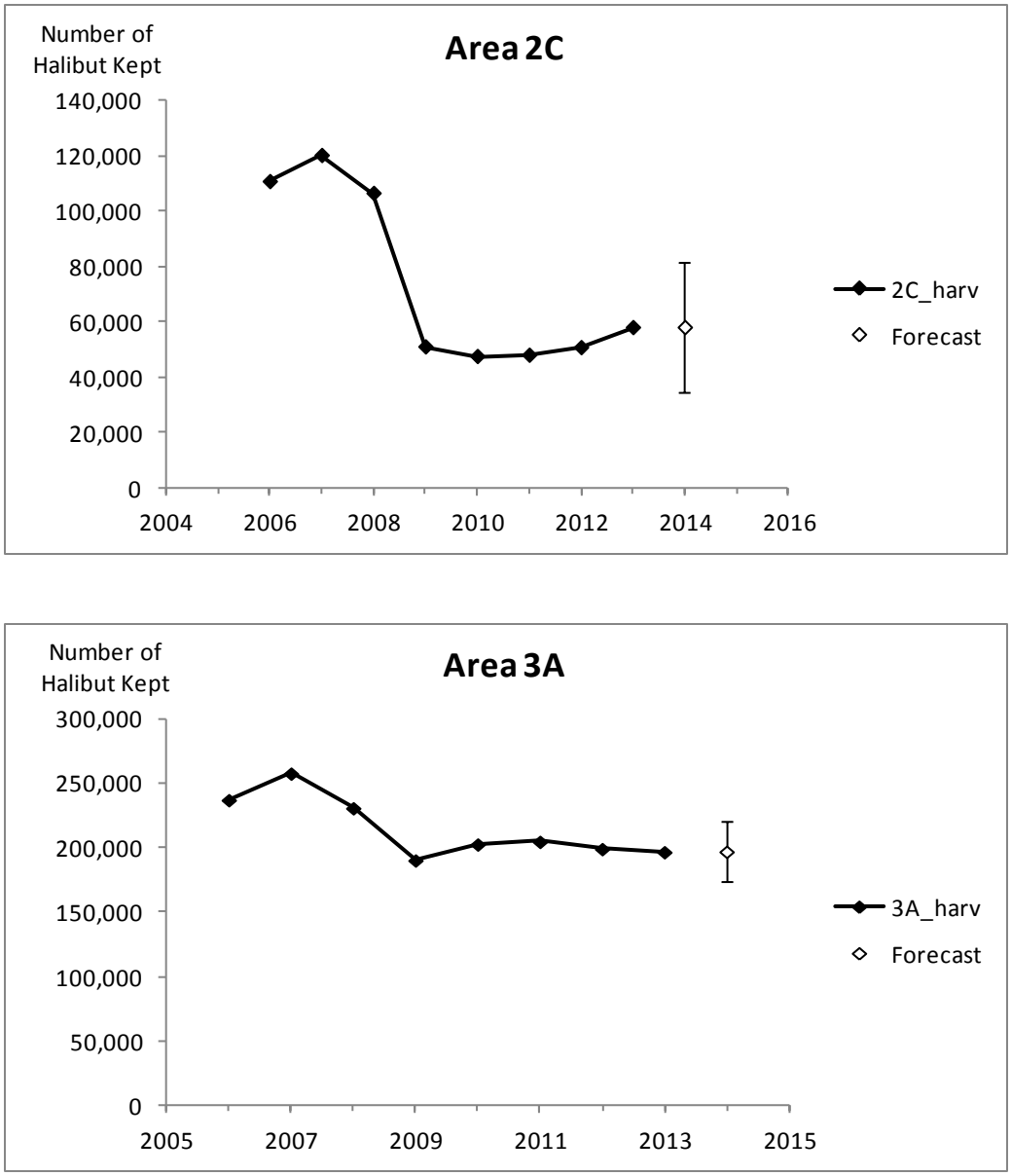


Figure 4. Time series forecasts of charter harvest (logbook data excluding crew), in numbers of halibut, for Area 2C and Area 3A for 2014, with 95% confidence interval.

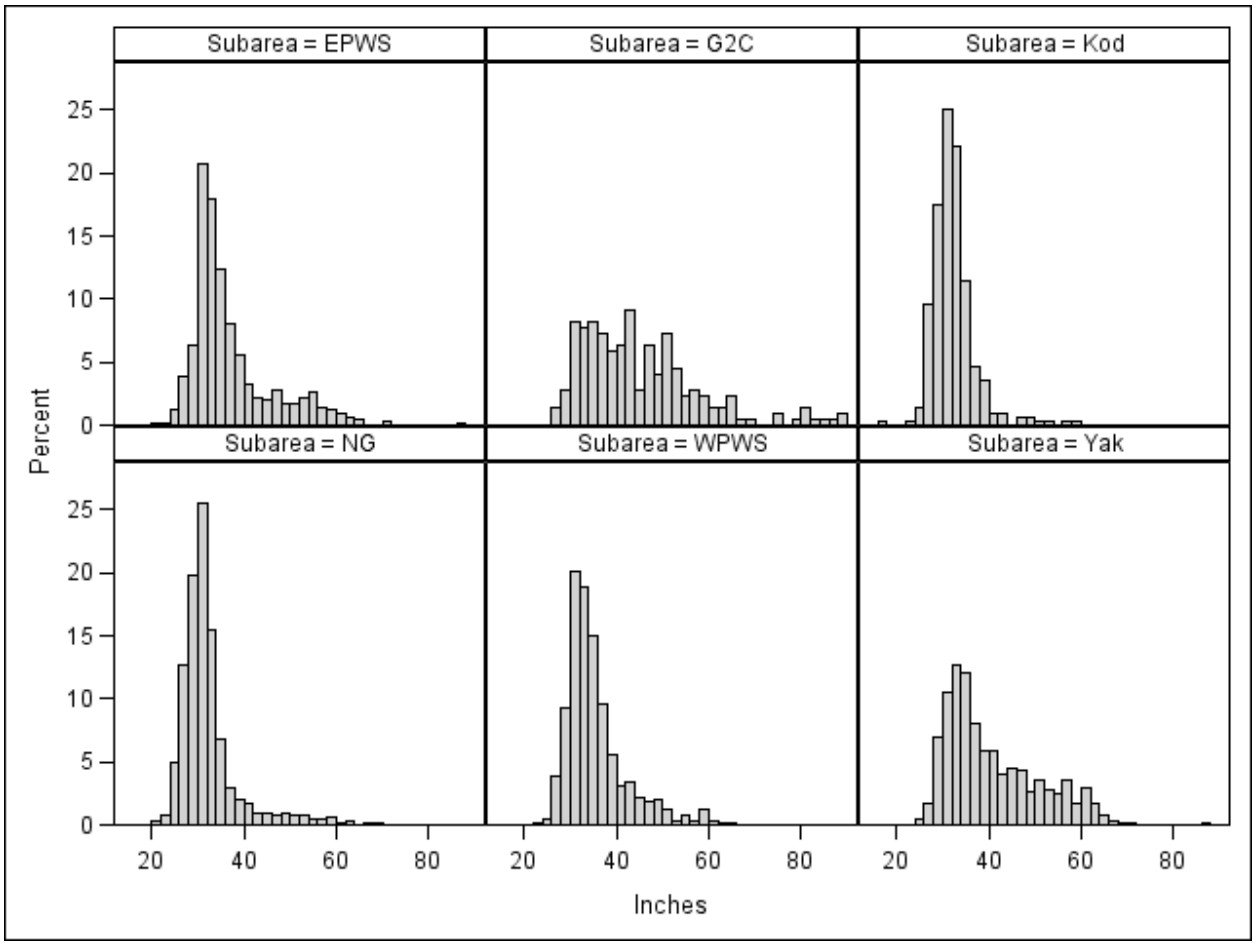


Figure 5. Relative length frequency of Area 3A charter halibut harvest by subarea in 2013.

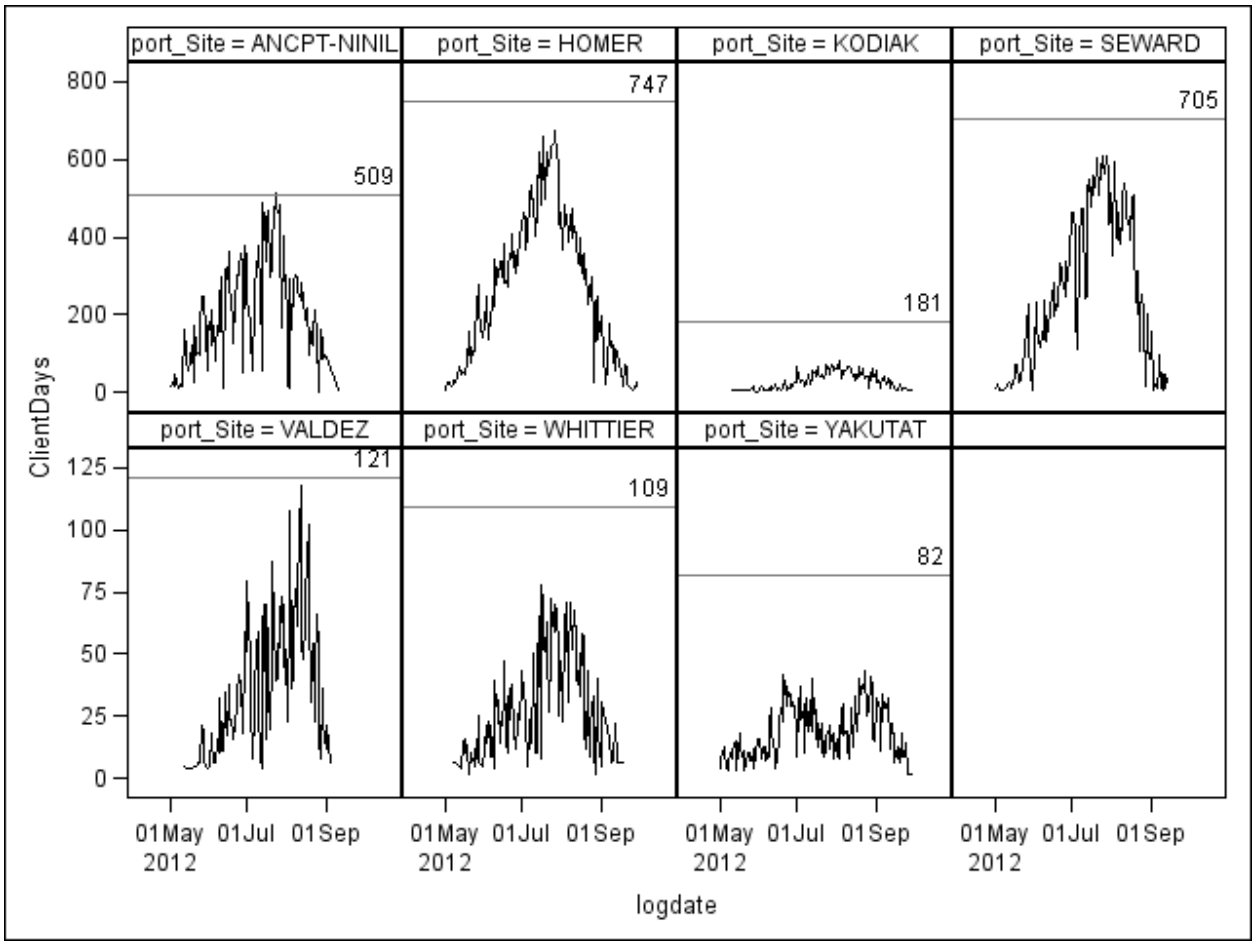


Figure 6. Daily charter client effort (client-days) relative to total angler endorsements at major ports in Area 3A, 2012. Reference lines and values indicate the total angler endorsements for the corresponding vessels.