

# **Analysis of Management Options for the Area 2C and 3A Charter Halibut Fisheries for 2024**

A Report to the North Pacific Fishery Management Council

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## **1.0 Introduction**

The International Pacific Halibut Commission (IPHC) approves catch limits for Pacific halibut each year for Regulatory Areas in Alaska. In IPHC Regulatory Areas 2C and 3A, which roughly correspond with Southeast and Southcentral Alaska, these catch limits are allocated between the commercial longline fishery and the sport charter fishery. The allocations are specified in the North Pacific Fishery Management Council's Halibut Catch Sharing Plan (CSP)<sup>1</sup>. The allocations vary with the magnitude of the overall catch limit, such that the percentage allocated to the charter sector increases slightly as catch limits decrease. The CSP also specifies that release mortality will count toward the sector's allocation. The CSP further specifies that, effective in 2014, charter harvest accounting will be based on numbers of halibut reported harvested in Alaska Department of Fish and Game (ADF&G) saltwater guide logbooks.

The charter fishery in Areas 2C and 3A is managed under regulations reviewed and recommended each year by the North Pacific Fishery Management Council (Council) and approved and published by the IPHC and NOAA as annual management measures. As the first step in this process, the Council's Charter Halibut Management Committee met October 20, 2023, to develop alternative management measures for analysis by the ADF&G for the 2024 season. ADF&G staff provided preliminary estimates of charter harvest and release mortality for the 2023 season to committee members prior to the meeting. In Area 2C, electronic reporting of trips using eLogbook became mandatory in 2021; therefore, logbook data for all trips that were submitted prior to October 3<sup>rd</sup>, 2023, were used for preliminary estimates. In recent years, no harvest was reported in Area 2C after October 15<sup>th</sup>. In Area 3A, where use of paper logbooks is still widespread, the preliminary estimates were based on logbook data for trips through July 31<sup>st</sup>, 2023. Estimates will be finalized by fall of 2024 once all logbook data are entered and edited.

At the time of the October meeting, the 2023 preliminary reported harvest in Area 2C for the charter fishery was 83,605 halibut with an estimated average net weight of 9.41 lb (Bowman et al. 2023). The Area 2C preliminary estimate of charter removals was 0.813 million pounds (Mlb), including an estimated 0.026 Mlb of release mortality. The preliminary estimate of charter removals was 1.6% over the 0.800 Mlb allocation. Charter regulations in 2C included a one-fish bag limit, a reverse slot limit allowing for harvest of fish less than or equal to 40 inches or greater than or equal to 80 inches (U40O80), and Monday closures starting July 24<sup>th</sup>.

In Area 3A, an estimated 153,337 halibut were harvested with an average weight of 10.09 lb (Bowman et al. 2023) when preliminary estimates were reported to the Charter Halibut Management Committee in October. The preliminary estimate of charter removals for Area 3A was 1.556 Mlb, including 0.009 Mlb of release mortality. The preliminary estimate was 17.7% under the allocation of 1.89 Mlb. Charter regulations in 3A included a two-fish bag limit of which one fish could be any size and the second must be less than or equal to 28 inches, no harvest of halibut on Wednesdays, no harvest of halibut on nine Tuesdays, a limit of one trip per vessel per day, and a limit of one trip per Charter Halibut Permit (CHP) per day.

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<sup>1</sup> Catch Sharing Plan regulations are at: <https://www.federalregister.gov/documents/2013/12/12/2013-29598/pacific-halibut-fisheries-catch-sharing-plan-for-guided-sport-and-commercial-fisheries-in-alaska>

The Charter Committee considered the performance of last year's measures, and in light of recent trends in effort, numbers of halibut harvested by charter anglers, average weight of halibut, halibut abundance, and economic considerations, identified the following measures for analysis for 2024:

Area 2C (all options include a one-fish bag limit):

- Reverse Slot ranging from 35 – 50 inches on the low end and 50 – 80 inches on the upper end.
  - a. Additional column at the end of each row showing the amount of removals absorbed by release mortality when upper slot is 80 inches.
- Reverse Slot with day closures with savings in removals displayed for each day of closure.
  - a. Analyzed for each day from May 15 – September 15 or for the entire season
  - b. Analyzed for lower slot limits ranging from 32 inches to 50 inches, and an upper slot limit of 80 inches.
  - c. Include results as an excel workbook so members of the CHMC can select different closure day combinations or date range combinations and determine removals.
- Differential Reverse Slot displayed in removals.
  - a. Analyzed for lower slot limits ranging from 40-45 inches at the beginning of the season, changing to a range of 35-40 inches for the end of the season, and an upper slot limit of 80 inches throughout the season.
  - b. Analyzed to change lower slot limits on July 1, July 15, and August 1.

Area 3A (all options include, unless otherwise noted, a two-fish bag limit with a maximum size limit of 28 inches on one fish and one fish of any size, one trip per vessel and one trip per CHP per day, and all Wednesdays closed to retention of halibut):

- Day of the week closures on Tuesdays from June 1 – August 31 or for the entire season;
- Maximum size limits of 26 – 32 inches on one fish;
- Annual limits of 2 – 4 fish; and
- Any combination of the above management measures.

This analysis provides information to stakeholders and the Council to assist them in selecting management measures likely to keep total charter removals within their allocations. The charter allocations will be derived from catch limits determined by the IPHC at their Annual Meeting in January 2024. The charter allocations will not be known when the Council is expected to make its recommendations in December 2023. It is recommended that the Council include contingencies to accommodate adoption of a range of catch limits.

The IPHC's 2023 stock assessment results were made available to the public on November 20<sup>th</sup>. There are no Regulatory Area TCEYs to use as reference points for the analyses for the 2C and 3A charter management measures; still, there are several reference points that the Council may wish to consider in making recommendations for 2024:

- The Coastwide TCEY in 2023 was 36.97 Milb.
- The 2023 Stock Assessment estimated a 3-year surplus TCEY for of 39.1 Milb;
- The TCEY at the reference fishing intensity ( $F_{43\%}$ ) is estimated to be 48.9 Milb.

Updated estimates of the commercial fishery CPUE in recent years were lower than previously estimated and resulted in an 11% decrease to the spawning biomass compared to what was estimated at the end of 2022. While the time series shifted down, the spawning biomass trend remains relatively stable. The 2012- and 2014-year classes continue to be relatively strong and will likely help maintain stability in the

stock for the foreseeable future. The 2017- and 2018-year classes also appear to be strong, though it is too soon to determine how these year classes will impact the future spawning biomass.

In addition to the Coastwide TCEY the Council may wish to consider changes in the stock distribution as estimated by the IPHC’s Fishery Independent Setline Survey. In 2023, survey results estimated that 26% of the stock was in Region 2, representing the highest proportion of the stock ever to be estimated in this Region. Further, in Regulatory Area 2C, the survey estimated no change in O32 (halibut  $\geq 32$ -inches) CPUE. In 2023, survey results estimated that 45% of stock was in Region 3, representing the lowest proportion of the stock ever to be estimated in this Region. For Regulatory Area 3A, the survey estimated an 8% decrease in O32 CPUE. In recent years, distribution procedures have considered the distribution of O32 biomass among Regulatory Areas, in addition to other factors such as relative harvest rates, socio-economic considerations, international agreements, and both survey and fishery CPUE when determining Regulatory Area TCEYs.

Considering the paucity of information on 2024 catch limits and distribution to Regulatory Areas, we have used the 2023 allocations as reference points for the 2024 charter management measures. Results presented here are within the context of allocations set for 2023:

IPHC Area	2023 Allocation (Mlb)
2C	0.80
3A	1.89

This analysis projects total charter fishery removals under the current (status quo) charter fishery regulations in each Regulatory Area. As shown below, under current regulations the projected charter removal in 2024 for Area 2C is 0.941 Mlb. The projected removal for Area 3A is 1.698 Mlb.

Area	Projected Status Quo Charter Removals (Mlb)	Status Quo TCEY Difference (Mlb) (2023 Allocation – 2024 Projection)
2C	0.865	-0.065
3A	1.695	0.195

For consistency with analyses reported in recent years, the analyses included in this report generally follow previously reported methods (Webster and Powers 2018, 2019, and 2020; Webster, Jevons, and Powers 2021; and King, Webster, and Jevons 2022). The analyses cover a range of alternatives as proposed by the Charter Halibut Management Committee to allow stakeholders, the Council, and the IPHC to select the desired management measures to meet the charter allocation for each Area. Where applicable, results reference candidate measures that result in projected charter removals within the 2023 allocation.

## **2.0 General Methods**

### **2.1 Definitions and Basic Calculations**

Throughout this analysis, the term “harvest” means the number of halibut killed and landed in the charter fishery. “Yield” is the harvest expressed in units of weight. “Release mortality” refers to halibut that die as a result of stress or injury from being caught and then released and is expressed in units of weight. Finally, “removals” refers to all halibut killed in the sport fishery, including harvest and release mortality, and is measured in units of weight. Weight is based on length data from harvested halibut sampled at ports and the length-weight relationship developed by IPHC (Webster and Stewart 2022). Removals are generally projected from harvest, average weight, and release mortality as follows:

$$\text{Harvest}(no. fish) = \text{Effort}(angler days) \times \text{HPUE}(\text{harvest per angler day}),$$

$$\text{Yield}(lb) = \text{Harvest} \times \text{AverageNetWeight}(lb), \text{ and}$$

$$\text{Removals}(lb) = \text{Yield}(lb) \times r(lb)$$

where  $r$  is the release mortality expansion factor.

In prior years, in IPHC Area 2C the release mortality expansion factor was estimated as a function of the lower limit of the reverse slot limit. It was noted that the strength of this correlation has decreased steadily and there no longer appears to be a meaningful relationship between estimated release mortality and the lower reverse slot limit. Therefore, Area 2C and Area 3A release mortality was forecast as the 5-year average ratio of estimated release mortality to estimated yield in each respective area:

$$r(lb) = 1 + [\text{ReleaseMortality}(lb) / \text{Yield}(lb)]$$

which for 2023 is 1.043 in Area 2C and 1.008 in Area 3A.

### **2.2 Calculations by Subarea**

All calculations for Area 2C and Area 3A were done by Subarea and then summed to obtain yield estimates for each Regulatory Area. Analyses were done at the Subarea level because many of the variables analyzed (harvest, effort, average weight, etc.) vary substantially by Subarea.

There are six Subareas in Area 2C and eight Subareas in Area 3A ([Table 2C.1](#) and [Table 3A.7, Figure 1](#)). With few exceptions, the Subareas correspond to ADF&G sport fishery management areas as well as the reporting areas used for the ADF&G Statewide Harvest Survey (SWHS, mail survey of sport fishing). The Juneau and Haines/Skagway Areas were combined because the Haines/Skagway Area is not sampled for average weight and harvests are quite small. 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. These SWHS areas were split into Subareas such that the landings in each Subarea could be matched to estimates of average weight from port sampling. ADF&G obtained length measurements from harvested halibut and interviewed anglers and charter captains in at least one port in each Subarea. In addition, SWHS Area G (Glacier Bay) is divided into the 2C and 3A portions using statistical areas reported during biological sampling and in saltwater guide logbooks.

### **2.3 Harvest Forecasts**

Time series methods are used to forecast harvest per unit effort (HPUE) in both Areas. Effort is measured in angler days; any days when bottomfish hours or bottomfish statistical areas were recorded in the logbook or halibut were harvested are considered days with halibut effort, permitting that day was open to harvest of halibut. Forecasts are inherently uncertain because they rely only on past data, which are not necessarily indicative of future trends. Time series forecasts can't be used in all instances because they assume that the same underlying processes are in place as those that generated the historical data.

Therefore, recent regulation changes or social/economic conditions may bias a forecast or render it unsuitable for other regulatory scenarios. Time series methods used in this report include simple and double exponential smoothing models using SAS/ETS<sup>TM2</sup> software. Simple exponential models have a single parameter representing the level of the estimate and typically fit best to data without a clear trend. Double exponential models have a parameter for level and a parameter for trend, and typically fit best to data with a trend. Both models contain a smoothing weight, the value of which determines how much weight is given to more recent observations. The smoothing weights are optimized to minimize one-step-ahead prediction errors over the entire time series. Generally, the stronger the trend and lower the variability, the higher the smoothing weight and the more emphasis is placed on recent observations. Generally, both simple and double exponential models were run for each time series and the forecasts with the smallest AICc value (Akaike Information Criterion, corrected for small sample size) were selected.

For Area 2C, there was a significant change in how effort is managed when day closures were implemented in 2023. This was the first time that days have been closed in this area. This disruption in the time series, therefore, did not allow us to forecast for effort in 2024 as was done in the past. So, the preliminary estimates of effort for 2023 were used as the best indication of status quo effort for 2024. 2024 harvest forecasts were calculated for each Subarea as the product of the effort and HPUE forecasts.

Simple exponential and double exponential forecasts were generated for 2023 HPUE using logbook data for 2009- 2023. 2020 and 2021 were omitted from all Areas due to the impacts of COVID-19 on recreational fishing practices during that period. Simple exponential models were used for all Areas except for the Area EF HPUE forecast.

In 3A, there were substantial and incremental changes in regulations over recent years that specifically targeted fishing effort including vessel trip limits, CHP trip limits, closing days to fishing, and annual limits. Therefore, the 2023 estimate of effort in 3A was assumed as the status quo effort for 2024 as has been the practice in recent years. In addition, implementation of the first size limits in Area 3A in 2014 resulted in a marked decline in the proportion of the charter halibut harvest made up of second fish in the bag limit ([Figure 4](#)). The largest decreases were in Subareas with the highest average weights (Glacier Bay and Yakutat). In other words, at ports with large halibut available, fewer anglers harvested a second fish, preferring instead to focus on harvesting one large fish. The decrease in retention of a second fish by anglers caused HPUE to decline as well ([Figure 3](#)). However, the areawide proportion of second fish retained continued to decline every year through 2019 even though changes in size limits and annual limits were quite minor. In 2020, the proportion of second fish in the harvest increased in all 3A ports and remained high in 2021. Areawide, HPUE was likely impacted by the regulations implemented in response to the COVID-19 pandemic in both 2020 and 2021, therefore, forecasts were generated for HPUE using logbook data for 2009-2019 and 2022-2023 for all Subareas in Area 3A ([Table 3A.8](#), [Figure 3](#)).

## 2.4 Accounting for Release Mortality of Halibut

Under the CSP, the charter halibut allocation includes total removals by the charter sector, including harvest and release mortality. All sizes of release mortality have been estimated for 2013-2023 for inclusion in the IPHC's annual stock assessment as part of sport fishery removals. Estimation methods are documented in Webster and Buzzee (2020) and in ADF&G's annual reports to the IPHC<sup>3</sup>.

The numbers and average weight of released fish are expected to vary with the regulations (e.g., types of size limits, bag limits, annual limits). For example, anglers would be expected to release more fish under a one-fish bag limit than a two-fish bag limit as they search for the largest fish possible to retain. The average weight of released fish would be expected to be higher under maximum size limits or reverse slot

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<sup>2</sup> SAS/ETS<sup>TM</sup> software, Version 9.4, SAS System for Windows, Copyright © (2002-2012), SAS Institute, Inc.

<sup>3</sup> The ADF&G annual reports to the IPHC are available for download at <https://www.npfmc.org/fisheries-issues/fisheries/halibut-fisheries/halibut-recreation/>

limits than under a minimum size limit, because more of the released fish would be large. On the other hand, the number of fish released is likely to be higher under a minimum than maximum size limit because smaller fish are relatively more abundant and more likely to be caught. Under reverse slot limits, the amount of release mortality would be expected to vary with the sizes and range of the protected slot. A wide protected slot would likely result in more released fish than a narrow slot, and a higher protected slot would result in a higher average weight of released fish. Under annual limits, both the number of fish and average weight of released fish would likely increase as annual limits are made more restrictive. Seasonal or daily closures will also increase the total number of released fish.

Previously in Area 2C, under reverse slot limits, the ratio of release mortality to charter yield (in pounds) showed a strong correlation to the lower bound of the reverse slot limit, and a linear regression model was used to determine release mortality inflation factors. Recently, however, the strength of the correlation has decreased. For 2024, a 5-year average of the ratio of release mortality to charter yield. Under status quo regulations, the predicted 2024 ratio of release mortality to harvested halibut is 0.043.

In Area 3A, the ratio of release mortality to charter yield has generally decreased over time, mostly due to a decrease in the number of released fish rather than to changes in the average weight of released fish. The ratio was 0.018 in 2013, and then decreased steadily from 0.022 in 2014 to 0.006 in 2023. For 2024 projections, the 5-year average of 0.008 was applied to yield to account for release mortality under the status quo management measures.

### **3.0 Area 2C Management Measures**

#### **3.1 Status Quo Forecast of the Number of Fish Harvested**

Status quo measures for Area 2C include a one-fish bag limit, aU40O80 reverse slot size limit, and closed Mondays beginning on July 24. The best forecast for effort in 2C in 2024 is the status quo management measures is the current year's effort. HPUE is predicted to increase slightly in all ports ([Table 3A.8](#)). The 2024 status quo effort forecast for Area 2C is 114,695 angler-days, the weighted average HPUE forecast is 0.73 halibut per angler-day, and the harvest forecast is 83,487 halibut, with a 95% margin of error ( $\pm 2$  standard errors) of  $\pm 2,449$  fish ([Table 2C.3](#)). This is a slight decrease from the updated preliminary harvest for 2023 of 84,920 halibut.

#### **3.2 Reverse Slot Limit**

##### **3.2.1 Approach**

Reverse slot size limits have been used to manage the Area 2C charter fishery since 2012. The goal of the reverse slot limit is to control the average weight of the harvest by requiring retained fish to be either below a lower size limit or above an upper size limit. The reverse slot size limit functions mostly as a maximum size limit, while still preserving the opportunity for anglers to retain exceptionally large fish. The charter industry and the Council have recommended reverse slot size limits because they effectively control average weight without severely impacting angler demand under a one-fish bag limit, thus preserving charter revenues in the face of restrictions.

Average weight under reverse slot limits was predicted using the same methods used for 2014-2023. Briefly, this procedure fixes the proportion of harvest above the upper size limit equal to the proportion in 2010, the last year without a size limit. The proportion of harvest below the lower size limit is assigned the remainder. Average weight is then estimated as a weighted mean of the average weight of fish above and below the upper and lower limits in 2010, where the weighting factors are the respective proportions of harvest above and below those limits. All estimates of average weight were adjusted to account for the updated length-weight relationship in all 2C analyses.

Average weights estimated from the fishery in 2019-2023 were compared to the 2010 predicted average weights for the size limits that were in place at the time. The average weights estimated from the fishery included any illegally harvested fish in the protected size slot between the lower and upper size limits (illegal-size fish made up an estimated 0.3% to 1.6% of the Area 2C harvest each year). Errors in predicted average weights since 2019 ranged from -9.2% to +73.7% for individual Subareas. Predicted average weight errors were highly variable among years and among Subareas. Correction factors were developed for the predicted average weights for each Subarea. The correction factors were based on the average ratio of the predicted and observed average weights from all years and ranged from 0.64 to 1.01 among Subareas.

This analysis assumes that there are no day of the week closures for 2024. To add the harvest from closed Mondays back in, the proportional reduction of harvest by Subarea was determined for days of the week closed in 2022. 2022 was used because it is the most recent year with finalized data with all days open. This proportional reduction of harvest by Subarea for nine Mondays was then added back in to the 2024 status quo forecast of harvest.

Total charter removals were projected for 2024 under a range of reverse slot limits with lower limits ranging from 32 to 50 inches and upper limits ranging from 50 to 80 inches. Projections of charter removals include the correction factors for bias in estimation of average weight as well as an inflation factor for predicted release mortality based on the lower slot limit.

##### **3.2.2 Results**

The projected charter removal under the status quo size limit of U40O80 is 0.943 Milb ([Table 2C.4](#)). Projections ranged from 0.664 to 1.868 Milb. Several options for reverse slot limits were below the 2023

allocation of 0.80 Mlb with lower slot limits of 32 – 35 inches and upper limits of 68 to 74 inches. The status quo size limit of U40O80 would not be within the 2023 allocation. The most liberal combinations of reverse slot limits that were below the 2023 allocation are shaded in [Table 2C.4](#).

### **3.3 Reverse Slot Limit with Day of the Week Closures (presented as Savings Per Day)**

#### ***3.3.1 Approach***

Harvest was projected with day of the week closures in Area 2C with reverse slot limits ranging from a lower limit of 32 to 50 inches and with the upper limit fixed at 80 inches. The potential effect of closing days on each day from May 12<sup>th</sup> through September 14<sup>th</sup> was estimated ([Table 2C.5](#)). This year, to give decision makers more flexibility, the information is presented as savings per day. Removals can be calculated by subtracting the amount saved by closing each individual day from the estimated removals with no days closed at a given lower slot limit. The analysis relied on complete logbook data for 2022. Generally speaking, the analysis proceeded by estimating the proportional effect of each day closure in 2022 and applying those to the harvest forecast for 2024, adjusted to assume all days are open to fishing, as described in section 3.2.1. 2022 data was used because it was the most recent year with complete data that had the same or fewer closed days than 2023.

The first step was to identify dates that would be closed in 2024. Once the specific closed dates were identified, the corresponding dates were identified from the 2022 data set for analyses, assuming the same day of the week. The analysis assumed that the proportion of harvest occurring on each day in 2022 would be eliminated if those days were closed. In other words, the harvest that occurred on those days represented the maximum potential change in harvest if those days were closed. All analyses were done by Subarea to account for differences in the structure of the charter fleet among Subareas. The total annual harvest under each scenario of closed days was compared to the harvest scenario of no closed days (2022) to estimate the proportional change in harvest for 2024.

A day of the week closure would be unlikely to achieve the estimated maximum reductions in halibut harvest because of the potential for displaced clients to book on alternate dates. We do not have sufficient information to accurately estimate the effect of a day of the week closure; we can only say that it would reduce halibut harvest by no more than the presented maximum reductions, and that the reduction would likely be less.

#### ***3.3.2 Results***

Implementation of a daily closure on a single day of the week could be used to bring the projected removals below an allocation of 0.80 Mlb ([Table 2C.5](#)). Under the status quo reverse slot limit of U40O80, the total removals without day closures is estimated to be 0.943 Mlb. The maximum savings from one individual day closure at this slot limit is 0.012 Mlb. At minimum, all Thursdays would need to be closed to bring removals within the 2023 allocation. Alternatively, all days of a different day of the week, as well as additional closed days on a second day of the week will bring the 2C removals below the 2023 allocation.

### **3.4 Differential Reverse Slot Limit**

This management measure would allow for a mid-season change to the lower limit in the reverse slot limit.

#### ***3.4.1 Approach***

This management measure would allow for a mid-season change to the lower limit in the reverse slot limit. Three dates for changing the size limits were evaluated: July 1, July 15, and August 1. The analysis evaluated a range of initial lower slot limits of 40-45 inches and ending lower slot limits of 35-40 inches. All analyses assumed an upper limit of 80 inches for the entire season.



The analysis used harvest data from 2022 and evaluated the proportion of harvest prior to the requested date of regulation change in each area. 2022 was used as the base year because it is the most recent year with complete data. Further, the proportion of harvest occurring in the early part of the season has declined, likely from a reduction in overall sport fishing effort due to changes in regulations in other fisheries that limit opportunities during the early part of the season. The proportion of harvest before and after each date in 2022 was used to estimate the harvest during that portion of the season in 2024; this was done by Subarea to account for differences in timing of the fishery. Mean weights were estimated using the same methods as described in section 3.2.1.

All projections include an inflation factor for predicted release mortality and a correction for average weight as described in previous sections.

Such a management measure could have an impact on the effort and proportion of harvest before and after the date of regulation change. It is possible that there would be an increase in effort before the date of regulation change, shifting in the distribution of effort within the year. The scale of this impact cannot be predicted with available data.

### ***3.4.2 Results***

The lowest removal forecast uses a U40O80 reverse slot progressing to a U35O80 reverse slot limit on July 1 and would result in 0.820 Milb of removals. It's noted that this is not within the 2C 2023 allocation. Removals under this analysis ranged from 0.820 to 1.043 Milb.

## **4.0 Area 3A Management Measures**

### **4.1 Status Quo Forecast of the Number of Fish Harvested**

The status quo measures for Area 3A included a two-fish bag limit with a maximum size limit of 28 inches on one fish, no retention of halibut on Wednesdays, no retention of halibut on nine Tuesdays, and limits of one trip per vessel and one trip per CHP per day. The status quo effort forecast for Area 3A for 2024 is 105,276 angler-days, with a weighted average HPUE of 1.505 halibut per angler-day, and the harvest forecast is 158,160 halibut with a 95% margin of error ( $\pm 2$  standard errors) of 4,782 fish ([Table 3A.10](#)). This is a slight increase from the updated preliminary harvest estimate for 2023 of 157,715 halibut.

### **4.2 Forecast of the Average Weight in each Subarea**

#### ***4.2.1 Approach***

Average weight was calculated as a weighted mean of the fish of any size and the fish subject to a maximum size limit. Calculations were done for each Subarea, then aggregated to Area 3A. The average weight for the fish of any size was assumed to be the overall average weight in 2013, the last year without a size limit in Area 3A. The average weight for size-restricted fish was calculated as the average weight of fish less than or equal to the specified size limit in 2013 (28 inches under status quo, size limits from 26 to 32 inches were all evaluated). These average weights were then weighted by the 2024 projected proportions of harvest made up of “first” and “second” fish in an angler’s bag limit. These terms do not refer to the order in which the fish were caught, but rather to whether the fish came from limits of one or two fish. For example, if an angler kept only one halibut on a trip, the fish was designated a “first” fish. If an angler kept two halibut, one was designated “first” and the other “second.” The proportions of “second” fish in the harvest were forecasted for 2024 from 2010-2019 and 2022-2023 logbook data using the exponentially weighted time series models described in Section 2.3. Data from 2020 and 2021 were excluded to mimic the methods used to forecast HPUE and because the substantial increase seen in second fish in 2020 and 2021 was likely a result of regulations reflective of pandemic conditions. These forecasted proportions ranged from 47% in Cook Inlet Subareas down to 2% in the Glacier Bay Subarea, with a weighted average of 44% for Area 3A overall ([Figure 4](#)).

The average weights predicted using this method for each size limit differed from average weights observed under those size limits in past years. Factors contributing to those differences include changes since 2013 in the size distribution of the population, changes in the sizes of fish anglers are willing to keep given annual limits, and changes in the proportions of first and second fish in the harvest. Therefore, the predicted average weights were corrected, or adjusted to match current average weights. Bias corrections were based on the difference between predicted and estimated (observed) average weights for 2019-2023. Predicted average weights for past years tended to be underestimated for most Subareas, ranging from 40.5% below to 58.6% above observed values across all Subareas and years. Correction factors, based on the average ratio of the predicted and observed average weights, ranged from 0.830 to 1.233 among Subareas.

#### ***4.2.2 Results***

The status quo forecast of average weight in 3A is 10.63 lbs. Status quo is based on a two fish bag limit with one fish of any size and a maximum size limit of 28 inches on one fish, Wednesday closures, and nine closed Tuesdays. This is above the 2023 preliminary average weight estimate of 10.09 lbs. Estimated removals, including yield and release mortality, under status quo regulations is 1.695 Milb and is below the 2023 allocation of 1.890 Milb.

## **4.3 Maximum Size Limit on One Fish Combined with Tuesday closures**

### **4.3.1 Approach**

Charter removals were projected under maximum size limits ranging from 26 to 32 inches on the second fish and Tuesday closures from May through August or for the entire season were explored for flexibility in recommending management measures. Projected removals include a 0.8% inflation factor to account for release mortality and a correction for the average weight as described above. These projections incorporate all other status quo measures.

The analysis for Tuesday closures relied on complete logbook data for 2021, the last year in which the fishery was open on all Tuesdays and closed on Wednesdays. The analysis proceeded by estimating the proportional effect of each Tuesdays in 2021 and applying those proportional effects to the harvest forecast for 2024. The first step was to identify the dates of specific Tuesdays that would be closed in 2024 under each possible number of closed days. A range of 13 Tuesday closures during the period June 4<sup>th</sup> – August 27<sup>th</sup>, 2024, and all Tuesdays from February – December 2024 were evaluated ([Table 3A.11](#)). Once the specific closed Tuesdays were identified, the corresponding Tuesday to each of those dates was identified from 2021. The analysis assumed the proportions of harvest occurring on each Tuesday in 2021 would be added or eliminated if those days were opened or closed, respectively. Closing all Tuesdays beyond the June 4<sup>th</sup> – August 27<sup>th</sup> period would only reduce harvest another 2.1% ([Table 3A.10](#)), reflecting the relatively low levels of harvest in the shoulder seasons.

As outlined in the 2C analysis of daily closures, the harvest reductions (relative to all Tuesdays open) under each scenario represent the maximum expected reduction in the number of fish harvested. A day of the week closure would be unlikely to achieve the maximum reduction in halibut harvest because of the potential for displaced anglers to book on alternate dates. We do not have sufficient information to accurately estimate the effect of a day of the week closure; we can only say it would reduce halibut harvest by no more than the presented maximum reductions, and that the reduction would likely be less.

Average weight under each size limit from 26 to 32 inches was calculated as a weighted mean of the fish of any size and the fish subject to a maximum size limit as outlined in section 4.2.1.

### **4.3.2 Results**

Removal estimates for combinations of closed Tuesdays and size limits on one fish ranged from 1.513 Mlb for a 26-inch fish with all Tuesdays closed to 2.045 Mlb for a 32-inch fish with no Tuesdays closed ([Table 3A.11](#)). Combinations of size limits and closed days that were below the 2023 allocation of 1.89 Mlb ranged from 28 to 32 inches and zero to seven closed Tuesdays.

## **4.4 Maximum Size Limit on One Fish Combined with Annual Limits**

### **4.4.1 Approach**

Combinations of other size limits and annual limits were explored to provide the Council flexibility in recommending management measures. Charter removals were projected under maximum size limits ranging from 26 to 32 inches on the second fish and annual limits of two to four fish. Projected removals include a 0.8% inflation factor to account for release mortality. These projections incorporate all other status quo measures, including the charter vessel trip limit, permit trip limit, nine closed Tuesdays, and a Wednesday closure for the entire year.

Average weight under each size limit was calculated as described in section 4.2.1.

The effects of various annual limits on harvest were estimated using preliminary charter logbook data that summarized the distribution of annual harvests by individual licensed anglers from 2022. Calculations of annual harvests could not be done for youth anglers because they are not required to be licensed, and therefore harvest cannot be assigned to individuals. Youth accounted for 5.6% of charter effort in Area

3A in 2022. Because the proportion of youth effort was relatively low, we assume that leaving youth anglers out of the calculations did not bias estimates of the effects of implementing annual limits.

For each Subarea, harvests under each proposed annual limit were estimated by truncating the annual harvest of each angler during 2022 at the given annual limit. For example, if 500 anglers harvested four fish each in 2022 (2,000 fish total), then under an annual limit of three fish, that group of 500 anglers would only harvest 1,500 fish. The number of anglers that would be affected by each annual limit was calculated as the number of anglers that harvested more than the given annual limit in 2022. In the example above, all 500 anglers harvested more than three fish and would be affected by a three-fish annual limit, but anglers that harvested three or fewer fish would be unaffected. Using this approach, the annual harvest by licensed anglers was calculated over a range of annual limits and the percentage reduction in harvest was calculated by comparison to their total harvest with no annual limit. All calculations were done by Subarea and summed to obtain the harvests under each annual limit in Area 3A.

Doing the calculations by Subarea slightly underestimates the harvest reductions associated with annual limits because some anglers fish in multiple Subareas within a year. For example, if an individual angler caught two fish in each of two Subareas in the base year, the analysis by Subarea would indicate that a three-fish annual limit would have no effect on that angler's annual harvest in either Subarea. In reality, the limit would cut that angler's annual harvest by 25 percent. The degree of underestimation depends on how many anglers fished multiple Subareas in a year. The magnitude of this error was evaluated by comparing the percentage harvest reductions estimated from Subarea and areawide data. The Subarea method underestimated the reductions in harvest by 3.5% to 0.5% percentage points for annual limits from two to four fish, respectively. The underestimation caused by anglers fishing multiple Subareas was considered negligible. Furthermore, because this underestimated the reduction of harvest, results are considered conservative estimates.

#### **4.4.2 Results**

The effects of annual limits varied by Subarea, with the largest effects in the Kodiak Subarea ([Table 3A.12](#)). Areawide, application of annual limits to the harvest would result in harvest reductions of 3.4% to 15.3% with four to two fish annual limits. With all other status quo measures in effect (and all Tuesdays open), implementing a four-fish annual limit is estimated to reduce the harvest from 158,160 to 152,846 halibut ([Table 3A.12](#)).

A 32-inch size limit on the second fish combined with a four-fish annual limit is forecast to constrain removals to well below 2023's allocation of 1.89 Mlb; options for smaller size limits and more restrictive annual limits are also available ([Table 3A.13](#)).

### **4.5 Maximum Size Limit on One Fish Combined with Annual Limits and Tuesday Closures**

#### **4.5.1 Approach**

Combinations of other size limits, annual limits, and Tuesday closures were explored to provide the Council flexibility in recommending management measures. Charter removals were projected under maximum size limits ranging from 26 to 32 inches, one to thirteen Tuesday closures or a Tuesday closure for the entire season and annual limits of two to four fish. Projected removals include a 0.8% inflation factor to account for release mortality. These projections incorporate other status quo measures, including the charter vessel trip limit, permit trip limit, a Wednesday closure for the entire year, and nine closed Tuesdays.

Average weight under each size limit was calculated as described in section 4.2.1. Effects of annual limits were calculated as described in section 4.4.1. These were applied prior to the effect of Tuesday closures as annual limits are expected to have a more definitive effect on harvest. Effects of Tuesday closures were then applied following the methods outlined in section 4.3.1.

#### **4.5.2 Results**

Combinations of 26-to-32-inch size limits with a four-fish annual limit and zero to nine closed Tuesdays are forecast to constrain removals below the 2023 allocation of 1.89 Mlb; more restrictive annual limits allow for larger size limits with fewer closed days ([Table 3A.14](#)).

## **5.0 Implementation Considerations**

### **5.1 Size Limits**

There are no anticipated problems associated with implementation of a reverse slot limit in Area 2C or maximum size limit on the second fish in Area 3A. Size limits have been used successfully in both Regulatory Areas for several years. Maximum size limits and reverse slot limits are implemented for the charter halibut fishery to control the average weight of harvested fish. This type of regulation increases the number of fish released thereby increasing removals associated with release mortality. Not only do these size limits generate additional regulatory (versus voluntary) release of halibut, but they also increase the average weight of released fish. The relative impact of size limits, in terms of release mortality and angler satisfaction, is expected to vary by Subarea due to variation in the availability of large fish caught. For example, clients fishing in Subareas where large fish are commonly caught would likely end up releasing relatively more fish above the maximum size limit or in the protected slot, and those fish would likely be larger. Although release mortality is likely higher under size limits, it is included in the estimates of removals and is accounted for in the charter sector allocation.

### **5.2 Annual Limits**

Annual limits were implemented in Area 3A in 2015–2019. If annual limits are recommended for the charter fishery, it is crucial for enforcement purposes to ensure that the regulation is accompanied by a recording requirement like that implemented in past years. Specifically, immediately upon retaining a halibut, charter anglers must record, in ink, the date, location (IPHC area), and species (halibut) on their harvest record. Enforcement of the annual limit consists of checking anglers with halibut to make sure the harvest is recorded. It is expected that Guided Angler Fish (GAF) taken under the CSP would be exempt from the recording requirement as these harvests accrue toward the IFQ fishery allocation.

Halibut harvest accounting by individual anglers would be implemented through ADF&G charter logbooks as was done in past years. Logbooks require reporting the number of halibut kept and released by individual anglers, as well as the angler's name and fishing license/ID number. No number can be recorded for youth anglers as they are not required to be licensed. Under the CSP, all anglers (including youth) are required to certify in the logbook that the reported number of halibut kept and released is correct.

Another concern with annual limits is that compliance may be low among youth anglers. Youth anglers are not required to be licensed but are still required to complete a harvest record upon harvesting halibut. Although enforcement in the field would be no different for youth anglers, their annual harvests cannot be evaluated post-season using logbook data. However, youth anglers comprised only 5.5% of angler-days in Area 3A in 2023, so harvest by youth anglers beyond the annual limit is unlikely to be substantial.

### **5.3 Daily Closures**

As mentioned earlier, the primary issue with daily closures is that the effect cannot be accurately predicted or evaluated. Daily closures are expected to reduce effort, and therefore their effect is confounded with any factors that affect effort (e.g., trip limits, economic trends). This analysis could only estimate the maximum potential change in halibut harvest but cannot predict possible changes in angler behavior, such as anglers booking alternate days. Closure of days during the peak season (June through August) may be more effective than closure of a day or two here and there. With each additional day closed, there would be fewer days available to rebook and fewer charters available to take the displaced anglers. The effectiveness of day of the week closures in Area 2C is expected to be similar to those seen in Area 3A. However, differences in business models and angler behavior between the Areas may impact the effectiveness of this management measure.

Another impact of daily closures is the potential increase in the harvest of other species such as salmon, rockfishes, sablefish, and lingcod. Some charter businesses are able to book anglers to catch other species, particularly salmon. Increases in harvest may intensify conservation concerns for these stocks.

#### **5.4 Mid-season Changes**

A mid-season change from a higher to lower slot limit could potentially encourage fishers to shift their effort to the beginning of the season prior to the date when the slot limit changes. Additionally, anglers may shift their effort towards other species later in the season. The issues in anticipating changes in effort outlined under section 5.4 above could possibly be applied to a mid-season change management measure.

This could also result in an increase in releases later in the season once the lower slot limit is decreased. Similar issues regarding release mortality outlined in section 5.1 may apply to a mid-season change management measure. It's possible that a shift in effort combined with increased releases later on in the season could negate savings calculated, but by what magnitude is difficult to determine.

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**Analysis of Management Options for the Area 2C and 3A  
Charter Halibut Fisheries for 2024**

Table 2C.1: Subareas of IPHC Areas 2C, ports where ADF&G halibut sampling occurs, and Subarea abbreviations used in tables and figures in this report.

IPHC Area	Subarea	Ports with Sampling and Angler Interviews	Abbreviations
2C	Ketchikan	Ketchikan	Ketch, A
	Prince of Wales Island	Craig, Klawock	PWalesI, PWI, B
	Petersburg/Wrangell	Petersburg, Wrangell	Pburg, C
	Sitka	Sitka	D
	Juneau, Haines, Skagway	Juneau	Jun, E, EF
	Glacier Bay (2C portion)	Gustavus, Elfin Cove	GlacB, GlacB-2C, G2C

Table 2C.2: Charter logbook effort, harvest per unit effort, and harvest of halibut in IPHC Area 2C, 2014 - 2023. Preliminary numbers for 2023 (in italics) are based on logbook data for charter trips entered as of November 8<sup>th</sup>, 2023.

Year	Subarea						Total 2C
	Ketch	PWI	Pburg	Sitka	Jun	GlacB-2C	
<b>Effort (angler-days)*</b>							
2014	14,680	21,491	2,839	28,638	10,375	12,390	90,413
2015	16,685	21,931	3,071	31,113	11,391	10,613	94,804
2016	16,595	23,440	3,373	31,093	12,069	9,694	96,264
2017	18,678	25,466	3,133	33,481	13,729	9,786	104,273
2018	21,661	25,708	3,538	32,394	13,993	11,396	108,690
2019	20,998	24,412	3,194	33,057	14,674	10,414	106,749
2020	4,521	12,644	1,934	16,605	4,089	5,133	44,926
2021	13,536	26,082	3,303	33,689	12,112	12,618	101,340
2022	21,223	28,486	3,293	37,044	12,965	4,718	107,729
2023	<i>25,038</i>	<i>27,324</i>	<i>3,304</i>	<i>33,388</i>	<i>12,613</i>	<i>13,028</i>	<i>114,695</i>
<b>Halibut Harvest per Angler-Day (HPUE)</b>							
2014	0.486	0.801	0.729	0.761	0.678	0.789	0.719
2015	0.465	0.744	0.691	0.759	0.675	0.768	0.693
2016	0.507	0.725	0.621	0.789	0.633	0.667	0.687
2017	0.460	0.753	0.630	0.777	0.592	0.692	0.677
2018	0.440	0.729	0.606	0.751	0.572	0.637	0.644
2019	0.439	0.742	0.523	0.766	0.615	0.699	0.661
2020	0.776	0.771	0.768	0.834	0.854	0.783	0.804
2021	0.674	0.794	0.668	0.806	0.718	0.786	0.768
2022	0.480	0.794	0.610	0.807	0.689	0.706	0.714
2023	<i>0.539</i>	<i>0.827</i>	<i>0.635</i>	<i>0.833</i>	<i>0.748</i>	<i>0.729</i>	<i>0.740</i>
<b>Harvest (number of halibut)</b>							
2014	7,138	17,214	2,071	21,798	7,034	9,781	65,036
2015	7,762	16,322	2,121	23,611	7,687	8,153	65,656
2016	8,414	16,999	2,095	24,528	7,642	6,469	66,147
2017	8,590	19,173	1,975	26,018	8,123	6,769	70,648
2018	9,530	18,731	2,143	24,327	7,998	7,255	69,984
2019	9,217	18,105	1,672	25,306	9,020	7,280	70,600
2020	3,507	9,750	1,485	13,848	3,490	4,020	36,100
2021	9,125	20,706	2,206	27,155	8,692	9,919	77,803
2022	10,177	22,608	2,009	29,693	8,928	9,721	83,136
2023	<i>13,500</i>	<i>22,589</i>	<i>2,097</i>	<i>27,809</i>	<i>9,431</i>	<i>9,494</i>	<i>84,920</i>

\*Effort is defined as an angler-day on open days with recorded bottomfish hours or harvest of at least one halibut.

Table 2C.3. Forecasts of effort, halibut harvest per unit effort (HPUE), and harvest (numbers of halibut) for Area 2C in 2024 under status quo regulations, with associated standard errors. Status quo regulations include a one-fish bag limit, a U40O80 reverse slot size limit, and Mondays closed beginning on July 24<sup>th</sup> and continuing through December 31<sup>st</sup>.

Subarea	Effort (angler-days)**	HPUE	Std Error	Harvest (no. halibut)	Std Error
Ketch	25,038	0.539	0.044	13,494	1,113
PWI	27,324	0.769	0.044	21,026	1,192
Pburg	3,304	0.632	0.046	2,089	152
Sitka	33,388	0.823	0.047	27,490	1,570
Jun	12,613	0.797	0.046	10,053	582
GlacB-2C	13,028	0.717	0.055	9,335	715
Area 2C	114,695	0.728	*	83,487	2,449

\*This SE cannot be calculated because unlike effort and harvest, HPUE is not expected to additive across subareas.

\*\*2C regulations changed in 2023 in that for the first time since a 1-fish bag limit was implemented in 2009 management measures aimed at reducing effort through day closures. For this year, preliminary effort data for 2023 was used in the 2024 forecasts.

Table 2C.4. Projected charter removals (Mlb, includes release mortality) for Area 2C in 2024 under reverse slot limits ranging from U32O50 to U50O80 with a 1-fish bag limit. Shaded cells represent projections for the most liberal combinations that do not exceed the 2023 allocation of 0.80 Mlb. All values in the table include corrections for errors in estimation of average weight and inflation factors for release mortality. The harvest projection is for all days open throughout the season. The last column is the discard mortality estimate (Mlb) for the O80 removal estimates.

Harvest = 90,936

Lower Limit (in)	Upper Length Limit (in)																Amount of discard mortality at uXo80
	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	
32	1.384	1.283	1.207	1.123	1.062	1.007	0.930	0.856	0.814	0.781	0.749	0.728	0.697	0.680	0.678	0.664	0.027
33	1.412	1.312	1.237	1.153	1.092	1.038	0.961	0.887	0.846	0.813	0.781	0.760	0.729	0.712	0.710	0.696	0.029
34	1.444	1.345	1.271	1.188	1.128	1.074	0.998	0.924	0.883	0.851	0.819	0.797	0.767	0.750	0.748	0.734	0.030
35	1.468	1.371	1.297	1.215	1.155	1.101	1.026	0.953	0.912	0.879	0.848	0.826	0.796	0.779	0.777	0.763	0.031
36	1.508	1.412	1.340	1.259	1.200	1.146	1.071	0.999	0.958	0.926	0.895	0.873	0.843	0.826	0.824	0.810	0.033
37	1.532	1.437	1.366	1.285	1.227	1.174	1.099	1.027	0.987	0.955	0.923	0.902	0.872	0.855	0.853	0.839	0.035
38	1.568	1.475	1.405	1.325	1.268	1.215	1.141	1.070	1.029	0.998	0.966	0.945	0.915	0.898	0.896	0.883	0.036
39	1.595	1.504	1.434	1.355	1.298	1.245	1.172	1.101	1.061	1.029	0.998	0.977	0.947	0.930	0.928	0.915	0.038
40	1.618	1.527	1.458	1.380	1.324	1.272	1.199	1.128	1.088	1.057	1.026	1.005	0.975	0.958	0.956	0.943	0.039
41	1.645	1.556	1.488	1.411	1.355	1.303	1.231	1.161	1.121	1.090	1.059	1.038	1.009	0.991	0.989	0.976	0.040
42	1.663	1.575	1.508	1.431	1.376	1.325	1.253	1.183	1.143	1.113	1.082	1.061	1.032	1.015	1.012	0.999	0.041
43	1.683	1.596	1.530	1.454	1.399	1.348	1.276	1.207	1.168	1.137	1.106	1.086	1.056	1.039	1.037	1.024	0.042
44	1.712	1.627	1.561	1.486	1.431	1.381	1.310	1.241	1.202	1.172	1.141	1.120	1.091	1.074	1.072	1.059	0.044
45	1.743	1.659	1.595	1.520	1.466	1.417	1.346	1.278	1.239	1.209	1.178	1.158	1.129	1.112	1.110	1.097	0.045
46	1.764	1.681	1.618	1.544	1.491	1.441	1.371	1.304	1.265	1.235	1.204	1.184	1.155	1.138	1.136	1.123	0.046
47	1.792	1.711	1.648	1.576	1.523	1.474	1.405	1.338	1.299	1.269	1.239	1.218	1.190	1.173	1.171	1.158	0.048
48	1.812	1.733	1.671	1.598	1.546	1.498	1.429	1.362	1.323	1.293	1.264	1.243	1.214	1.198	1.196	1.183	0.049
49	1.845	1.767	1.706	1.635	1.583	1.535	1.467	1.401	1.362	1.333	1.303	1.283	1.254	1.237	1.235	1.222	0.050
50	1.868	1.792	1.731	1.661	1.610	1.563	1.495	1.429	1.391	1.362	1.332	1.312	1.283	1.267	1.265	1.252	0.052

Table 2C.5. Projected charter **savings per day** (Mlb) for Area 2C in 2024 under reverse slot limits with lower limits of the protected slot ranging from 32 to 50 inches and an upper limit of 80 inches with **days closed throughout the season**. All values in the table include corrections for errors in estimation of average weight and inflation factors for release mortality. To determine removals from a closed day(s), take the total removals for a given lower slot limit and subtract the savings from a date(s) in that row.

**a. Sunday closures**

	Sunday Closures																		Projected total harvest/removals	
	September 8	September 1	August 25	August 18	August 11	August 4	July 28	July 21	July 14	July 7	July 30	June 23	June 16	June 9	June 2	May 26	May 19	May 12		
32	0.001	0.003	0.005	0.007	0.007	0.007	0.007	0.007	0.005	0.005	0.004	0.007	0.007	0.006	0.003	0.004	0.002	0.001	0.000	0.664
33	0.001	0.003	0.005	0.007	0.007	0.007	0.007	0.007	0.005	0.006	0.004	0.007	0.007	0.007	0.004	0.004	0.002	0.001	0.000	0.696
34	0.001	0.003	0.005	0.007	0.007	0.007	0.008	0.008	0.006	0.006	0.005	0.008	0.008	0.007	0.004	0.004	0.003	0.001	0.000	0.734
35	0.001	0.003	0.006	0.008	0.007	0.008	0.008	0.008	0.006	0.006	0.005	0.008	0.008	0.007	0.004	0.004	0.003	0.001	0.000	0.763
36	0.001	0.004	0.006	0.008	0.008	0.008	0.008	0.009	0.006	0.006	0.005	0.009	0.009	0.008	0.004	0.005	0.003	0.001	0.000	0.810
37	0.001	0.004	0.006	0.008	0.008	0.009	0.009	0.009	0.007	0.007	0.005	0.009	0.009	0.008	0.004	0.005	0.003	0.001	0.000	0.839
38	0.001	0.004	0.007	0.009	0.009	0.009	0.009	0.009	0.007	0.007	0.006	0.009	0.009	0.008	0.005	0.005	0.003	0.001	0.000	0.883
39	0.001	0.004	0.007	0.009	0.009	0.009	0.010	0.010	0.007	0.007	0.006	0.010	0.010	0.009	0.005	0.005	0.003	0.002	0.000	0.915
40	0.001	0.004	0.007	0.009	0.009	0.010	0.010	0.010	0.007	0.007	0.006	0.010	0.010	0.009	0.005	0.006	0.003	0.002	0.000	0.943
41	0.002	0.005	0.007	0.010	0.010	0.010	0.010	0.010	0.008	0.008	0.006	0.010	0.010	0.009	0.005	0.006	0.003	0.002	0.000	0.976
42	0.002	0.005	0.008	0.010	0.010	0.010	0.010	0.010	0.008	0.008	0.007	0.010	0.010	0.009	0.005	0.006	0.004	0.002	0.000	0.999
43	0.002	0.005	0.008	0.010	0.010	0.010	0.010	0.011	0.008	0.008	0.007	0.011	0.011	0.010	0.005	0.006	0.004	0.002	0.000	1.024
44	0.002	0.005	0.008	0.011	0.010	0.011	0.011	0.011	0.008	0.008	0.007	0.011	0.011	0.010	0.005	0.006	0.004	0.002	0.000	1.059
45	0.002	0.005	0.008	0.011	0.011	0.011	0.011	0.011	0.008	0.008	0.007	0.011	0.011	0.010	0.006	0.006	0.004	0.002	0.000	1.097
46	0.002	0.005	0.009	0.011	0.011	0.011	0.012	0.012	0.009	0.009	0.007	0.012	0.011	0.011	0.006	0.007	0.004	0.002	0.000	1.123
47	0.002	0.006	0.009	0.011	0.011	0.011	0.012	0.012	0.009	0.009	0.008	0.012	0.012	0.011	0.006	0.007	0.004	0.002	0.000	1.158
48	0.002	0.006	0.009	0.012	0.011	0.012	0.012	0.012	0.009	0.009	0.008	0.012	0.012	0.011	0.006	0.007	0.004	0.002	0.001	1.183
49	0.002	0.006	0.009	0.012	0.012	0.012	0.013	0.013	0.009	0.009	0.008	0.012	0.012	0.011	0.006	0.007	0.004	0.002	0.001	1.222
50	0.002	0.006	0.010	0.012	0.012	0.012	0.013	0.013	0.010	0.009	0.008	0.013	0.013	0.012	0.007	0.007	0.004	0.002	0.001	1.252

Table 2C.5. (continued)

**b. Monday closures**

		Monday Closures																	Projected total harvest/removals		
		September 9	September 2	August 26	August 19	August 12	August 5	August 29	July 22	July 15	July 8	July 1	June 24	June 17	June 10	June 3	May 27	May 20		May 13	
Lower Limit (in)	32	0.001	0.003	0.004	0.006	0.008	0.008	0.008	0.009	0.007	0.005	0.006	0.007	0.007	0.006	0.004	0.003	0.001	0.001	0.664	
	33	0.001	0.003	0.005	0.006	0.008	0.009	0.008	0.009	0.007	0.006	0.007	0.008	0.007	0.006	0.004	0.003	0.001	0.001	0.696	
	34	0.001	0.003	0.005	0.007	0.008	0.009	0.009	0.009	0.010	0.007	0.006	0.007	0.008	0.008	0.006	0.004	0.003	0.001	0.001	0.734
	35	0.001	0.003	0.005	0.007	0.009	0.009	0.009	0.009	0.010	0.008	0.006	0.007	0.009	0.008	0.007	0.004	0.003	0.001	0.001	0.763
	36	0.001	0.003	0.005	0.007	0.009	0.010	0.010	0.010	0.011	0.008	0.007	0.008	0.009	0.008	0.007	0.004	0.004	0.001	0.001	0.810
	37	0.001	0.004	0.006	0.008	0.010	0.010	0.010	0.010	0.011	0.009	0.007	0.008	0.009	0.009	0.007	0.005	0.004	0.001	0.001	0.839
	38	0.002	0.004	0.006	0.008	0.010	0.011	0.011	0.011	0.012	0.009	0.007	0.008	0.010	0.009	0.008	0.005	0.004	0.002	0.001	0.883
	39	0.002	0.004	0.006	0.008	0.010	0.011	0.011	0.011	0.012	0.009	0.007	0.009	0.010	0.009	0.008	0.005	0.004	0.002	0.001	0.915
	40	0.002	0.004	0.006	0.009	0.011	0.011	0.011	0.011	0.012	0.010	0.008	0.009	0.011	0.010	0.008	0.005	0.004	0.002	0.001	0.943
	41	0.002	0.004	0.007	0.009	0.011	0.012	0.012	0.012	0.013	0.010	0.008	0.009	0.011	0.010	0.008	0.005	0.004	0.002	0.001	0.976
	42	0.002	0.004	0.007	0.009	0.011	0.012	0.012	0.012	0.013	0.010	0.008	0.009	0.011	0.010	0.009	0.006	0.004	0.002	0.001	0.999
	43	0.002	0.004	0.007	0.009	0.012	0.012	0.012	0.012	0.013	0.010	0.008	0.009	0.011	0.010	0.009	0.006	0.005	0.002	0.001	1.024
	44	0.002	0.005	0.007	0.010	0.012	0.013	0.013	0.013	0.014	0.011	0.009	0.010	0.012	0.011	0.009	0.006	0.005	0.002	0.001	1.059
	45	0.002	0.005	0.007	0.010	0.012	0.013	0.013	0.013	0.014	0.011	0.009	0.010	0.012	0.011	0.010	0.006	0.005	0.002	0.001	1.097
	46	0.002	0.005	0.008	0.010	0.013	0.014	0.013	0.013	0.015	0.011	0.009	0.010	0.013	0.011	0.010	0.006	0.005	0.002	0.001	1.123
	47	0.002	0.005	0.008	0.011	0.013	0.014	0.014	0.014	0.015	0.012	0.009	0.011	0.013	0.012	0.010	0.007	0.005	0.002	0.001	1.158
	48	0.002	0.005	0.008	0.011	0.013	0.014	0.014	0.014	0.015	0.012	0.010	0.011	0.013	0.012	0.010	0.007	0.005	0.002	0.001	1.183
	49	0.002	0.005	0.008	0.011	0.014	0.015	0.014	0.014	0.016	0.013	0.010	0.011	0.014	0.012	0.011	0.007	0.006	0.002	0.001	1.222
	50	0.002	0.005	0.009	0.012	0.014	0.015	0.015	0.015	0.016	0.013	0.010	0.011	0.014	0.013	0.011	0.007	0.006	0.002	0.001	1.252

Table 2C.5. (continued)

**c. Tuesday closures**

	Tuesday Closures																		Projected total harvest/removals	
	September 10	September 3	August 27	August 20	August 13	August 6	August 30	July 23	July 16	July 9	July 2	June 25	June 18	June 11	June 4	May 28	May 21	May 14		
Lower Limit (in)	32	0.001	0.002	0.005	0.006	0.007	0.007	0.007	0.008	0.008	0.008	0.007	0.007	0.008	0.005	0.004	0.003	0.002	0.000	0.664
	33	0.001	0.002	0.005	0.007	0.007	0.008	0.007	0.009	0.009	0.009	0.007	0.007	0.008	0.006	0.005	0.003	0.002	0.001	0.696
	34	0.001	0.003	0.006	0.007	0.008	0.008	0.008	0.009	0.009	0.009	0.007	0.007	0.009	0.006	0.005	0.003	0.002	0.001	0.734
	35	0.001	0.003	0.006	0.007	0.008	0.008	0.008	0.010	0.009	0.009	0.007	0.008	0.009	0.006	0.005	0.004	0.002	0.001	0.763
	36	0.001	0.003	0.006	0.008	0.009	0.009	0.009	0.010	0.010	0.010	0.008	0.008	0.010	0.007	0.005	0.004	0.002	0.001	0.810
	37	0.001	0.003	0.006	0.008	0.009	0.009	0.009	0.011	0.010	0.010	0.008	0.008	0.010	0.007	0.006	0.004	0.002	0.001	0.839
	38	0.002	0.003	0.007	0.008	0.009	0.010	0.009	0.011	0.011	0.011	0.009	0.009	0.010	0.007	0.006	0.004	0.002	0.001	0.883
	39	0.002	0.003	0.007	0.009	0.010	0.010	0.010	0.012	0.011	0.011	0.009	0.009	0.011	0.008	0.006	0.004	0.002	0.001	0.915
	40	0.002	0.003	0.007	0.009	0.010	0.010	0.010	0.012	0.012	0.012	0.009	0.009	0.011	0.008	0.006	0.005	0.002	0.001	0.943
	41	0.002	0.003	0.007	0.009	0.010	0.011	0.010	0.012	0.012	0.012	0.010	0.010	0.012	0.008	0.007	0.005	0.002	0.001	0.976
	42	0.002	0.004	0.008	0.009	0.011	0.011	0.010	0.013	0.012	0.012	0.010	0.010	0.012	0.008	0.007	0.005	0.003	0.001	0.999
	43	0.002	0.004	0.008	0.010	0.011	0.011	0.011	0.013	0.013	0.013	0.010	0.010	0.012	0.008	0.007	0.005	0.003	0.001	1.024
	44	0.002	0.004	0.008	0.010	0.011	0.012	0.011	0.013	0.013	0.013	0.010	0.010	0.012	0.009	0.007	0.005	0.003	0.001	1.059
	45	0.002	0.004	0.009	0.010	0.012	0.012	0.011	0.014	0.013	0.013	0.011	0.011	0.013	0.009	0.007	0.005	0.003	0.001	1.097
	46	0.002	0.004	0.009	0.011	0.012	0.012	0.012	0.014	0.014	0.014	0.011	0.011	0.013	0.009	0.008	0.006	0.003	0.001	1.123
	47	0.002	0.004	0.009	0.011	0.012	0.013	0.012	0.015	0.014	0.014	0.011	0.011	0.014	0.010	0.008	0.006	0.003	0.001	1.158
	48	0.002	0.004	0.009	0.011	0.013	0.013	0.012	0.015	0.014	0.014	0.011	0.012	0.014	0.010	0.008	0.006	0.003	0.001	1.183
	49	0.002	0.004	0.010	0.012	0.013	0.013	0.013	0.015	0.015	0.015	0.012	0.012	0.014	0.010	0.008	0.006	0.003	0.001	1.222
	50	0.002	0.005	0.010	0.012	0.013	0.014	0.013	0.016	0.015	0.015	0.012	0.012	0.015	0.011	0.009	0.006	0.003	0.001	1.252

Table 2C.5. (continued)

**d. Wednesday closures**

	Wednesday Closures																		Projected total harvest/removals	
	September 11	September 4	August 28	August 21	August 14	August 7	July 31	July 24	July 17	July 10	July 3	June 26	June 19	June 12	June 5	May 29	May 22	May 15		
Lower Limit (in)	32	0.001	0.003	0.005	0.007	0.005	0.007	0.008	0.008	0.007	0.007	0.007	0.008	0.007	0.006	0.004	0.003	0.002	0.001	0.664
	33	0.001	0.003	0.005	0.007	0.005	0.008	0.008	0.008	0.007	0.007	0.007	0.008	0.008	0.006	0.004	0.003	0.002	0.001	0.696
	34	0.001	0.003	0.005	0.007	0.005	0.008	0.009	0.009	0.007	0.008	0.008	0.009	0.008	0.006	0.004	0.003	0.002	0.001	0.734
	35	0.001	0.003	0.006	0.008	0.006	0.008	0.009	0.009	0.008	0.008	0.008	0.009	0.009	0.007	0.004	0.003	0.002	0.001	0.763
	36	0.001	0.004	0.006	0.008	0.006	0.009	0.010	0.010	0.008	0.009	0.008	0.009	0.009	0.007	0.005	0.003	0.002	0.001	0.810
	37	0.001	0.004	0.006	0.008	0.006	0.009	0.010	0.010	0.008	0.009	0.009	0.010	0.009	0.007	0.005	0.003	0.002	0.001	0.839
	38	0.001	0.004	0.007	0.009	0.006	0.010	0.011	0.010	0.009	0.009	0.009	0.010	0.010	0.008	0.005	0.004	0.002	0.001	0.883
	39	0.001	0.004	0.007	0.009	0.007	0.010	0.011	0.011	0.009	0.010	0.009	0.011	0.010	0.008	0.005	0.004	0.003	0.001	0.915
	40	0.001	0.004	0.007	0.010	0.007	0.010	0.011	0.011	0.009	0.010	0.010	0.011	0.011	0.008	0.005	0.004	0.003	0.002	0.943
	41	0.001	0.004	0.007	0.010	0.007	0.011	0.012	0.012	0.010	0.010	0.010	0.011	0.011	0.008	0.006	0.004	0.003	0.002	0.976
	42	0.001	0.005	0.008	0.010	0.007	0.011	0.012	0.012	0.010	0.011	0.010	0.012	0.011	0.009	0.006	0.004	0.003	0.002	0.999
	43	0.001	0.005	0.008	0.010	0.007	0.011	0.012	0.012	0.010	0.011	0.010	0.012	0.012	0.009	0.006	0.004	0.003	0.002	1.024
	44	0.001	0.005	0.008	0.011	0.008	0.011	0.013	0.013	0.010	0.011	0.011	0.012	0.012	0.009	0.006	0.004	0.003	0.002	1.059
	45	0.001	0.005	0.008	0.011	0.008	0.012	0.013	0.013	0.011	0.012	0.011	0.013	0.012	0.009	0.006	0.005	0.003	0.002	1.097
	46	0.001	0.005	0.009	0.011	0.008	0.012	0.014	0.013	0.011	0.012	0.011	0.013	0.013	0.010	0.007	0.005	0.003	0.002	1.123
	47	0.001	0.005	0.009	0.012	0.008	0.012	0.014	0.014	0.011	0.012	0.012	0.013	0.013	0.010	0.007	0.005	0.003	0.002	1.158
	48	0.001	0.005	0.009	0.012	0.008	0.013	0.014	0.014	0.012	0.013	0.012	0.014	0.013	0.010	0.007	0.005	0.004	0.002	1.183
	49	0.001	0.006	0.009	0.012	0.009	0.013	0.015	0.014	0.012	0.013	0.012	0.014	0.014	0.011	0.007	0.005	0.004	0.002	1.222
	50	0.001	0.006	0.010	0.013	0.009	0.013	0.015	0.015	0.012	0.013	0.013	0.015	0.014	0.011	0.007	0.005	0.004	0.002	1.252



Table 2C.5. (continued)

**e. Thursday closures**

		Thursday Closures																		Projected total harvest/removals	
		September 12	September 5	August 29	August 22	August 15	August 8	August 1	July 25	July 18	July 11	July 4	June 27	June 20	June 13	June 6	May 30	May 23	May 16		
Lower Limit (in)	32	0.001	0.003	0.004	0.006	0.007	0.008	0.008	0.008	0.008	0.007	0.008	0.008	0.008	0.006	0.005	0.003	0.002	0.001	0.664	
	33	0.001	0.003	0.004	0.006	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.008	0.009	0.007	0.005	0.004	0.002	0.001	0.696	
	34	0.001	0.003	0.005	0.007	0.008	0.009	0.009	0.009	0.009	0.008	0.009	0.009	0.009	0.007	0.005	0.004	0.002	0.001	0.734	
	35	0.001	0.003	0.005	0.007	0.008	0.009	0.009	0.009	0.009	0.008	0.009	0.009	0.010	0.007	0.005	0.004	0.003	0.001	0.763	
	36	0.001	0.003	0.005	0.007	0.009	0.009	0.010	0.010	0.010	0.009	0.010	0.009	0.010	0.008	0.006	0.004	0.003	0.001	0.810	
	37	0.001	0.003	0.005	0.007	0.009	0.010	0.010	0.010	0.010	0.009	0.010	0.010	0.010	0.008	0.006	0.004	0.003	0.001	0.839	
	38	0.001	0.003	0.006	0.008	0.009	0.010	0.010	0.010	0.010	0.010	0.011	0.010	0.011	0.008	0.006	0.005	0.003	0.002	0.883	
	39	0.001	0.004	0.006	0.008	0.010	0.011	0.011	0.011	0.011	0.010	0.011	0.011	0.011	0.009	0.007	0.005	0.003	0.002	0.915	
	40	0.001	0.004	0.006	0.008	0.010	0.011	0.011	0.011	0.011	0.010	0.011	0.011	0.011	0.012	0.009	0.007	0.005	0.003	0.943	
	41	0.001	0.004	0.006	0.009	0.010	0.011	0.011	0.011	0.012	0.011	0.012	0.011	0.012	0.009	0.007	0.005	0.003	0.002	0.976	
	42	0.002	0.004	0.007	0.009	0.011	0.012	0.012	0.012	0.012	0.011	0.012	0.012	0.012	0.010	0.007	0.005	0.003	0.002	0.999	
	43	0.002	0.004	0.007	0.009	0.011	0.012	0.012	0.012	0.012	0.011	0.012	0.012	0.013	0.010	0.008	0.006	0.004	0.002	1.024	
	44	0.002	0.004	0.007	0.009	0.011	0.012	0.012	0.012	0.012	0.012	0.013	0.012	0.013	0.010	0.008	0.006	0.004	0.002	1.059	
	45	0.002	0.004	0.007	0.010	0.012	0.013	0.013	0.013	0.013	0.012	0.013	0.013	0.013	0.014	0.011	0.008	0.006	0.004	0.002	1.097
	46	0.002	0.004	0.008	0.010	0.012	0.013	0.013	0.013	0.013	0.012	0.013	0.013	0.013	0.014	0.011	0.008	0.006	0.004	0.002	1.123
	47	0.002	0.005	0.008	0.010	0.012	0.013	0.013	0.013	0.014	0.013	0.014	0.013	0.014	0.011	0.009	0.006	0.004	0.002	1.158	
	48	0.002	0.005	0.008	0.010	0.013	0.014	0.014	0.014	0.014	0.013	0.014	0.014	0.014	0.015	0.011	0.009	0.007	0.004	0.002	1.183
	49	0.002	0.005	0.008	0.011	0.013	0.014	0.014	0.014	0.014	0.013	0.015	0.014	0.015	0.012	0.009	0.007	0.004	0.002	1.222	
	50	0.002	0.005	0.008	0.011	0.013	0.014	0.015	0.014	0.015	0.014	0.015	0.015	0.015	0.012	0.009	0.007	0.004	0.002	1.252	

Table 2C.5. (continued)

**f. Friday closures**

		Friday Closures																		Projected total harvest/removals
		September 13	September 6	August 30	August 23	August 16	August 9	August 2	July 26	July 19	July 12	July 5	June 28	June 21	June 14	June 7	May 31	May 24	May 17	
Lower Limit (in)	32	0.001	0.002	0.002	0.007	0.007	0.008	0.007	0.008	0.008	0.009	0.008	0.007	0.008	0.006	0.003	0.003	0.002	0.001	0.664
	33	0.001	0.002	0.002	0.007	0.008	0.008	0.008	0.008	0.008	0.009	0.009	0.007	0.009	0.007	0.003	0.004	0.002	0.001	0.696
	34	0.001	0.002	0.002	0.007	0.008	0.009	0.008	0.009	0.009	0.010	0.009	0.008	0.009	0.007	0.003	0.004	0.003	0.001	0.734
	35	0.001	0.002	0.002	0.008	0.008	0.009	0.008	0.009	0.009	0.010	0.009	0.008	0.009	0.007	0.004	0.004	0.003	0.001	0.763
	36	0.001	0.002	0.003	0.008	0.009	0.010	0.009	0.009	0.010	0.011	0.010	0.009	0.010	0.008	0.004	0.004	0.003	0.001	0.810
	37	0.001	0.002	0.003	0.008	0.009	0.010	0.009	0.010	0.010	0.011	0.010	0.009	0.010	0.008	0.004	0.005	0.003	0.001	0.839
	38	0.001	0.002	0.003	0.009	0.009	0.011	0.009	0.010	0.011	0.011	0.011	0.009	0.011	0.009	0.004	0.005	0.003	0.001	0.883
	39	0.001	0.002	0.003	0.009	0.010	0.011	0.010	0.011	0.011	0.012	0.011	0.010	0.011	0.009	0.004	0.005	0.003	0.002	0.915
	40	0.001	0.002	0.003	0.009	0.010	0.011	0.010	0.011	0.011	0.012	0.012	0.010	0.012	0.009	0.004	0.005	0.003	0.002	0.943
	41	0.001	0.002	0.003	0.010	0.010	0.012	0.010	0.011	0.012	0.013	0.012	0.011	0.012	0.009	0.005	0.005	0.003	0.002	0.976
	42	0.001	0.003	0.003	0.010	0.011	0.012	0.011	0.012	0.012	0.013	0.012	0.011	0.012	0.010	0.005	0.006	0.004	0.002	0.999
	43	0.001	0.003	0.003	0.010	0.011	0.012	0.011	0.012	0.012	0.013	0.013	0.011	0.013	0.010	0.005	0.006	0.004	0.002	1.024
	44	0.001	0.003	0.003	0.011	0.011	0.013	0.011	0.012	0.013	0.014	0.013	0.011	0.013	0.010	0.005	0.006	0.004	0.002	1.059
	45	0.001	0.003	0.004	0.011	0.012	0.013	0.012	0.013	0.013	0.014	0.013	0.012	0.014	0.011	0.005	0.006	0.004	0.002	1.097
	46	0.001	0.003	0.004	0.011	0.012	0.013	0.012	0.013	0.013	0.015	0.014	0.012	0.014	0.011	0.005	0.006	0.004	0.002	1.123
	47	0.001	0.003	0.004	0.012	0.012	0.014	0.012	0.014	0.014	0.015	0.014	0.013	0.014	0.011	0.005	0.007	0.004	0.002	1.158
	48	0.001	0.003	0.004	0.012	0.012	0.014	0.012	0.014	0.014	0.015	0.014	0.013	0.015	0.011	0.006	0.007	0.004	0.002	1.183
	49	0.001	0.003	0.004	0.012	0.013	0.014	0.013	0.014	0.014	0.016	0.015	0.013	0.015	0.012	0.006	0.007	0.004	0.002	1.222
	50	0.001	0.003	0.004	0.012	0.013	0.015	0.013	0.015	0.015	0.016	0.015	0.014	0.015	0.012	0.006	0.007	0.005	0.002	1.252

Table 2C.5. (continued)

**g. Saturday closures**

	Saturday Closures																		Projected total harvest/removals	
	September 14	September 7	August 31	August 24	August 17	August 10	August 3	July 27	July 20	July 13	July 6	June 29	June 22	June 15	June 8	June 1	May 25	May 18		
Lower Limit (in)	32	0.000	0.002	0.003	0.005	0.007	0.006	0.005	0.008	0.008	0.008	0.007	0.006	0.008	0.006	0.004	0.003	0.002	0.001	0.664
	33	0.000	0.002	0.003	0.005	0.008	0.006	0.005	0.008	0.008	0.008	0.007	0.007	0.008	0.007	0.004	0.003	0.002	0.001	0.696
	34	0.000	0.002	0.003	0.005	0.008	0.007	0.005	0.009	0.009	0.009	0.008	0.007	0.009	0.007	0.004	0.003	0.002	0.001	0.734
	35	0.000	0.002	0.004	0.006	0.008	0.007	0.006	0.009	0.009	0.009	0.008	0.007	0.009	0.007	0.004	0.003	0.003	0.001	0.763
	36	0.001	0.002	0.004	0.006	0.009	0.007	0.006	0.009	0.010	0.010	0.008	0.008	0.010	0.008	0.005	0.003	0.003	0.001	0.810
	37	0.001	0.002	0.004	0.006	0.009	0.008	0.006	0.010	0.010	0.010	0.009	0.008	0.010	0.008	0.005	0.003	0.003	0.001	0.839
	38	0.001	0.002	0.004	0.006	0.010	0.008	0.006	0.010	0.010	0.010	0.009	0.009	0.011	0.008	0.005	0.003	0.003	0.001	0.883
	39	0.001	0.002	0.004	0.007	0.010	0.008	0.007	0.011	0.011	0.011	0.010	0.009	0.011	0.009	0.005	0.004	0.003	0.001	0.915
	40	0.001	0.002	0.005	0.007	0.010	0.009	0.007	0.011	0.011	0.011	0.010	0.009	0.011	0.009	0.006	0.004	0.003	0.002	0.943
	41	0.001	0.003	0.005	0.007	0.010	0.009	0.007	0.011	0.011	0.011	0.010	0.009	0.012	0.009	0.006	0.004	0.003	0.002	0.976
	42	0.001	0.003	0.005	0.007	0.011	0.009	0.007	0.012	0.012	0.012	0.010	0.010	0.012	0.009	0.006	0.004	0.003	0.002	0.999
	43	0.001	0.003	0.005	0.007	0.011	0.009	0.007	0.012	0.012	0.012	0.011	0.010	0.012	0.010	0.006	0.004	0.004	0.002	1.024
	44	0.001	0.003	0.005	0.008	0.011	0.010	0.008	0.012	0.012	0.012	0.011	0.010	0.012	0.010	0.006	0.004	0.004	0.002	1.059
	45	0.001	0.003	0.005	0.008	0.012	0.010	0.008	0.013	0.013	0.013	0.011	0.011	0.013	0.010	0.007	0.004	0.004	0.002	1.097
	46	0.001	0.003	0.006	0.008	0.012	0.010	0.008	0.013	0.013	0.013	0.012	0.011	0.013	0.011	0.007	0.004	0.004	0.002	1.123
	47	0.001	0.003	0.006	0.008	0.012	0.010	0.008	0.013	0.013	0.013	0.012	0.011	0.014	0.011	0.007	0.004	0.004	0.002	1.158
	48	0.001	0.003	0.006	0.009	0.013	0.011	0.008	0.014	0.014	0.014	0.012	0.011	0.014	0.011	0.007	0.005	0.004	0.002	1.183
	49	0.001	0.003	0.006	0.009	0.013	0.011	0.009	0.014	0.014	0.014	0.013	0.012	0.014	0.011	0.007	0.005	0.004	0.002	1.222
	50	0.001	0.003	0.006	0.009	0.013	0.011	0.009	0.014	0.014	0.014	0.013	0.012	0.015	0.012	0.007	0.005	0.004	0.002	1.252

Table 2C.6. Projected removals (Mlb) for changing the lower slot limit from a range of 40-45 inches at start of the season to 35-40 inches after July 1, July 15, and August 1. All analyses assume an upper slot limit of 80 inches and all days of the season open to fishing and include corrections for errors in estimation of average weight and inflation factors for release mortality.

Starting Lower Slot Limit	Ending Lower Slot Limit	Removals		
		1-Jul	15-Jul	1-Aug
40	35	0.820	0.846	0.880
	36	0.852	0.871	0.896
	37	0.872	0.887	0.906
	38	0.902	0.911	0.922
	39	0.924	0.928	0.933
	40	0.943	0.943	0.943
41	35	0.831	0.861	0.901
	36	0.863	0.887	0.918
	37	0.883	0.902	0.928
	38	0.912	0.926	0.943
	39	0.934	0.943	0.955
	40	0.953	0.958	0.964
42	35	0.838	0.872	0.916
	36	0.870	0.898	0.933
	37	0.890	0.913	0.943
	38	0.920	0.937	0.958
	39	0.942	0.954	0.970
	40	0.961	0.969	0.979
43	35	0.846	0.884	0.932
	36	0.878	0.909	0.949
	37	0.898	0.925	0.959
	38	0.928	0.948	0.974
	39	0.950	0.966	0.986
	40	0.969	0.980	0.995
44	35	0.857	0.900	0.955
	36	0.890	0.926	0.972
	37	0.909	0.941	0.982
	38	0.939	0.965	0.997
	39	0.961	0.982	1.009
	40	0.980	0.997	1.018
45	35	0.870	0.918	0.980
	36	0.902	0.943	0.996
	37	0.922	0.959	1.006
	38	0.952	0.982	1.022
	39	0.974	0.999	1.033
	40	0.992	1.014	1.043

**Analysis of Management Options for the Area 3A  
Charter Halibut Fisheries for 2023**

Table 3A.7: Subareas of IPHC Area 3A, ports where ADF&G halibut sampling occurs, and Subarea abbreviations used in tables and figures in this report.

IPHC Area	Subarea	Ports with Sampling and Angler Interviews	Abbreviations
3A	Glacier Bay (3A portion)	Gustavus, Elfin Cove	GlacB, GlacB-3A, G3A
	Yakutat	Yakutat	Yak, H
	Eastern Prince William Sound	Valdez	EPWS
	Western Prince William Sound	Whittier	WPWS
	North Gulf	Seward	NGulf, NGC
	Lower Cook Inlet	Homer	LCI
	Central Cook Inlet	Anchor Point, Deep Creek	CCI
	Kodiak	Kodiak	Kod, QR

Table 3A.8. Charter logbook effort, harvest per unit effort, and harvest of halibut in IPHC Area 3A, 2013 - 2023. Preliminary estimates for 2023 (in italics) are based on logbook data for charter trips through August 31, 2023, entered as of November 8<sup>th</sup>, 2023.

Year	Subarea								Tot 3A
	GlacB-3A	Yak	EPWS	WPWS	NGulf	CCI	LCI	Kod	
<b>Effort (angler-days)</b>									
2014	1,424	3,315	3,576	3,435	29,613	20,633	37,111	9,927	109,034
2015	1,852	3,267	3,527	3,484	30,864	19,882	33,011	8,756	104,643
2016	1,887	3,382	4,126	4,094	33,007	16,865	36,978	8,427	108,766
2017	2,211	3,405	3,579	3,679	27,934	17,330	35,426	7,899	101,463
2018	2,739	4,412	4,045	3,955	27,535	16,871	33,723	8,476	101,756
2019	2,094	4,365	4,653	4,764	29,889	15,184	33,663	8,961	103,573
2020	958	1,994	3,495	3,770	20,694	10,773	24,250	5,851	71,745
2021	1,282	4,220	4,940	4,721	32,297	17,284	46,506	12,628	123,878
2022	1,130	4,130	4,718	4,597	30,120	15,897	42,965	12,385	115,942
2023	<i>1,042</i>	<i>2,758</i>	<i>3,993</i>	<i>4,368</i>	<i>26,671</i>	<i>13,049</i>	<i>41,495</i>	<i>11,705</i>	<i>105,081</i>
<b>Halibut Harvest per Angler-Day (HPUE)</b>									
2014	0.791	1.034	1.225	1.314	1.430	1.866	1.824	1.245	1.599
2015	0.746	0.983	1.218	1.330	1.501	1.802	1.791	1.010	1.564
2016	0.757	0.964	1.149	1.096	1.294	1.705	1.741	1.001	1.455
2017	0.728	0.939	1.143	1.016	1.166	1.665	1.718	0.983	1.406
2018	0.688	0.980	1.187	1.088	1.056	1.670	1.668	0.883	1.340
2019	0.755	0.985	1.103	1.094	1.143	1.660	1.642	0.916	1.343
2020	0.899	1.157	1.379	1.296	1.212	1.779	1.744	1.227	1.486
2021	0.981	1.116	1.431	1.138	1.177	1.831	1.759	1.154	1.489
2022	0.662	0.888	1.364	0.936	1.225	1.795	1.746	1.129	1.463
2023	<i>0.597</i>	<i>0.995</i>	<i>1.238</i>	<i>1.149</i>	<i>1.290</i>	<i>1.823</i>	<i>1.758</i>	<i>1.120</i>	<i>1.498</i>
<b>Harvest (number of halibut)*</b>									
2014	1,126	3,429	4,379	4,514	42,337	38,504	67,701	12,358	174,348
2015	1,381	3,210	4,296	4,635	46,321	35,834	59,110	8,845	163,632
2016	1,428	3,259	4,742	4,487	42,721	28,747	64,392	8,438	158,214
2017	1,609	3,196	4,090	3,737	32,576	28,850	60,845	7,761	142,664
2018	1,884	4,322	4,803	4,302	29,068	28,183	56,262	7,488	136,312
2019	1,582	4,301	5,132	5,214	34,171	25,200	55,274	8,208	139,082
2020	861	2,308	4,882	4,887	25,078	19,094	42,299	7,180	106,589
2021	1,257	4,709	7,070	5,371	38,000	31,640	81,825	14,569	184,441
2022	748	3,668	6,437	4,304	36,909	28,534	75,015	13,977	169,592
2023	<i>622</i>	<i>2,743</i>	<i>4,942</i>	<i>5,020</i>	<i>34,392</i>	<i>23,790</i>	<i>72,968</i>	<i>13,104</i>	<i>157,715</i>

\*Effort is defined as an angler-day on open days with recorded bottomfish hours or harvest of at least one halibut.

Table 3A.9. Forecasts of effort (angler-days), halibut harvest per unit effort (HPUE), and harvest (numbers of halibut) for Area 3A in 2024 under status quo regulations, with associated standard errors. Status quo regulations include a two-fish bag limit with a maximum size limit of 28 inches on one of the fish, no retention of halibut on Wednesdays and on nine Tuesdays, CHP trip limits, and vessel trip limits.

Subarea	Effort		HPUE	Std Error	Harvest	
	(angler-days)	Std Error			(no. halibut)	Std Error
CCI	13,049	NA	1.820	0.121	23,749	1,585
EPWS	3,993	NA	1.256	0.140	5,013	560
GlacB	1,042	NA	0.598	0.164	623	170
Yak	2,758	NA	0.989	0.143	2,727	407
LCI	41,495	NA	1.766	0.074	73,279	3,160
NGulf	26,671	NA	1.279	0.103	34,110	2,775
Kod	11,705	NA	1.204	0.111	14,092	1,322
WPWS	4,368	NA	1.045	0.146	4,567	647
Area 3A	105,276	NA	1.505	NA	158,160	4,782

Table 3A.10. Area 3A projected harvest, change in harvest, and specified dates with status quo management measures combined with Tuesday closures.

Number of Closed Tuesdays	Beginning and Ending Dates	Percentage change in harvest	Projected Harvest (no. Fish	Projected Removals (Mlb) (Size limit of 2nd fish is 28")
0	NA	11.0%	175,597	1.880
1	July 30	9.6%	173,312	1.856
2	July 30 - Aug 6	8.2%	171,102	1.833
3	July 23 - Aug 6	6.6%	168,557	1.806
4	July 16 - Aug 6	5.1%	166,255	1.781
5	July 16 - Aug 13	4.7%	165,637	1.774
6	July 9 - Aug 13	3.6%	163,774	1.754
7	July 2 - Aug 13	2.4%	161,891	1.734
8	July 2 - Aug 20	1.4%	160,270	1.718
9 (SQ)	June 25 - Aug 20	0.0%	158,160	1.695
10	June 18 - Aug 20	-1.3%	156,120	1.673
11	June 18 - Aug 27	-2.1%	154,856	1.660
12	June 11 - Aug 27	-3.1%	153,242	1.642
13	June 4 - Aug 27	-4.0%	151,867	1.627
48	Feb 01 - Dec 31	-6.1%	148,522	1.590



Table 3A.11. Area 3A projected harvest (upper table) and removals (lower table) for 2024 under a range of maximum size limits on one fish in the bag limit and **Tuesday closures**. Projected removals assume the following status quo measures: two fish bag limit – one of any size, one under 28 inches, limit of one trip per vessel and one trip per permit per day, Wednesday closure all year, and nine closed Tuesdays. All values in the table include corrections for errors in estimation of average weight and inflation factors for release mortality. Shaded cells represent projections that do not exceed the 2023 allocation of 1.89 Mlb.

**Projected Harvest (number of fish)**

	Number of Tuesday Closures														
	0	1	2	3	4	5	6	7	8	9 (SQ)	10	11	12	13	All
Harvest	175,597	173,312	171,102	168,557	166,255	165,637	163,774	161,891	160,270	158,160	156,120	154,856	153,242	151,867	148,522

**Projected Charter Removals (Mlb)**

Size limit	Number of Closed Tuesdays														
	0	1	2	3	4	5	6	7	8	9 (SQ)	10	11	12	13	All
26	1.789	1.766	1.744	1.718	1.694	1.687	1.669	1.650	1.634	1.613	1.592	1.579	1.562	1.548	1.513
27	1.824	1.800	1.778	1.751	1.727	1.720	1.701	1.682	1.666	1.644	1.623	1.610	1.593	1.578	1.542
28	1.880	1.856	1.833	1.806	1.781	1.774	1.754	1.734	1.718	1.695	1.673	1.660	1.642	1.627	1.590
29	1.915	1.890	1.867	1.839	1.813	1.807	1.786	1.766	1.750	1.726	1.704	1.690	1.673	1.657	1.620
30	1.966	1.941	1.917	1.888	1.862	1.855	1.834	1.813	1.796	1.772	1.750	1.735	1.717	1.702	1.663
31	2.000	1.974	1.950	1.921	1.894	1.887	1.866	1.845	1.827	1.803	1.780	1.765	1.747	1.731	1.692
32	2.045	2.019	1.994	1.964	1.937	1.929	1.908	1.886	1.868	1.844	1.820	1.805	1.786	1.770	1.730

Table 3A.12. Estimated effects of **annual limits of two to four halibut** on Area 3A anglers and projected harvest for 2024 under status quo measures. Status quo regulations include a two-fish bag limit with a maximum size limit of 28 inches on one of the fish, no retention of halibut on Wednesdays and on nine Tuesdays, CHP trip limits, and vessel trip limits. The percent of affected anglers is the portion of individual anglers that harvested more than each specified annual limit in 2023.

Annual Limit	Subarea								Area 3A	
	CCI	EPWS	GlacBay	Yak	LCI	NGulf	Kod	WPWS		
<b>Estimated percent of anglers affected by an annual limit:</b>										
2	14.6%	8.0%	16.2%	21.5%	14.3%	8.7%	42.9%	2.7%	14.3%	
3	12.4%	4.1%	3.7%	10.5%	11.2%	5.4%	30.4%	1.0%	10.4%	
4	3.1%	1.6%	0.2%	4.6%	2.6%	1.5%	15.6%	0.3%	3.1%	
<b>Estimated percent change in harvest relative to no annual limit:</b>										
2	-16.2%	-8.3%	-12.7%	-21.1%	-14.2%	-9.3%	-37.8%	-3.0%	-14.9%	
3	-9.7%	-3.9%	-2.4%	-9.9%	-7.6%	-4.6%	-22.7%	-1.0%	-8.3%	
4	-4.2%	-1.6%	-0.1%	-4.4%	-2.5%	-1.7%	-12.0%	-0.3%	-3.3%	
<b>Projected harvest (number of halibut):</b>										
2	19,907	4,599	544	2,152	62,883	30,952	8,770	4,430	134,236	
3	21,446	4,818	608	2,458	67,689	32,534	10,898	4,520	144,970	
4	22,753	4,931	622	2,607	71,453	33,518	12,407	4,554	152,846	
No Annual Limit	23,749	5,013	623	2,727	73,279	34,110	14,092	4,567	158,160	

Table 3A.13. Area 3A projected harvest (upper table) and removals (lower table) for 2024 under a range of maximum size limits on one fish in the bag limit and for **annual limits ranging from two to four fish** per year. Projected removals assume the following status quo measures: two fish bag limit, limit of one trip per vessel and one trip per permit per day, nine closed Tuesdays, and a Wednesday closure all year. All values in the table include corrections for errors in estimation of average weight and inflation factors for release mortality.

<b>Projected Harvest (number of fish)</b>			
Year	Annual Limit (number of halibut)		
	2	3	4
2024	134,236	144,970	152,846

<b>Projected Charter Removals (Mlb)</b>			
Size Limit (in)	Annual Limit (number of halibut)		
	2	3	4
26	1.366	1.478	1.557
27	1.392	1.506	1.587
28	1.436	1.553	1.637
29	1.462	1.582	1.667
30	1.501	1.624	1.712
31	1.527	1.652	1.741
32	1.562	1.689	1.780

Table 3A.14. Area 3A projected harvest and removals for 2023 under annual limits with a range of maximum size limits on one fish in the bag limit and Tuesday closures. Projected removals assume the following status quo measures: two fish bag limit – one of any size, limit of one trip per vessel and one trip per permit per day, Wednesday closure all year. All values in the table include corrections for errors in estimation of average weight and inflation factors for release mortality. Shaded cells represent projections that do not exceed the 2023 allocation of 1.89 Mlb.

**a. Four-fish annual limit**

		Number of Tuesday Closures														
		0	1	2	3	4	5	6	7	8	9 (SQ)	10	11	12	13	All
Size Limit (in)	Harvest	169,830	167,617	165,477	163,010	160,779	160,189	158,382	156,556	154,994	152,943	150,959	149,743	148,172	146,835	143,608
	26	1.728	1.705	1.684	1.659	1.636	1.630	1.611	1.593	1.578	1.557	1.537	1.524	1.508	1.495	1.460
	27	1.761	1.738	1.717	1.691	1.667	1.661	1.643	1.624	1.609	1.587	1.567	1.554	1.538	1.524	1.489
	28	1.816	1.793	1.770	1.744	1.720	1.713	1.694	1.675	1.659	1.637	1.616	1.602	1.586	1.571	1.535
	29	1.850	1.826	1.803	1.776	1.751	1.745	1.725	1.706	1.690	1.667	1.646	1.632	1.615	1.600	1.564
	30	1.899	1.874	1.851	1.823	1.798	1.791	1.771	1.751	1.735	1.712	1.689	1.676	1.658	1.643	1.605
	31	1.932	1.907	1.883	1.855	1.829	1.822	1.802	1.781	1.765	1.741	1.719	1.705	1.687	1.671	1.633
	32	1.975	1.950	1.925	1.897	1.870	1.863	1.842	1.821	1.804	1.780	1.757	1.743	1.725	1.709	1.670

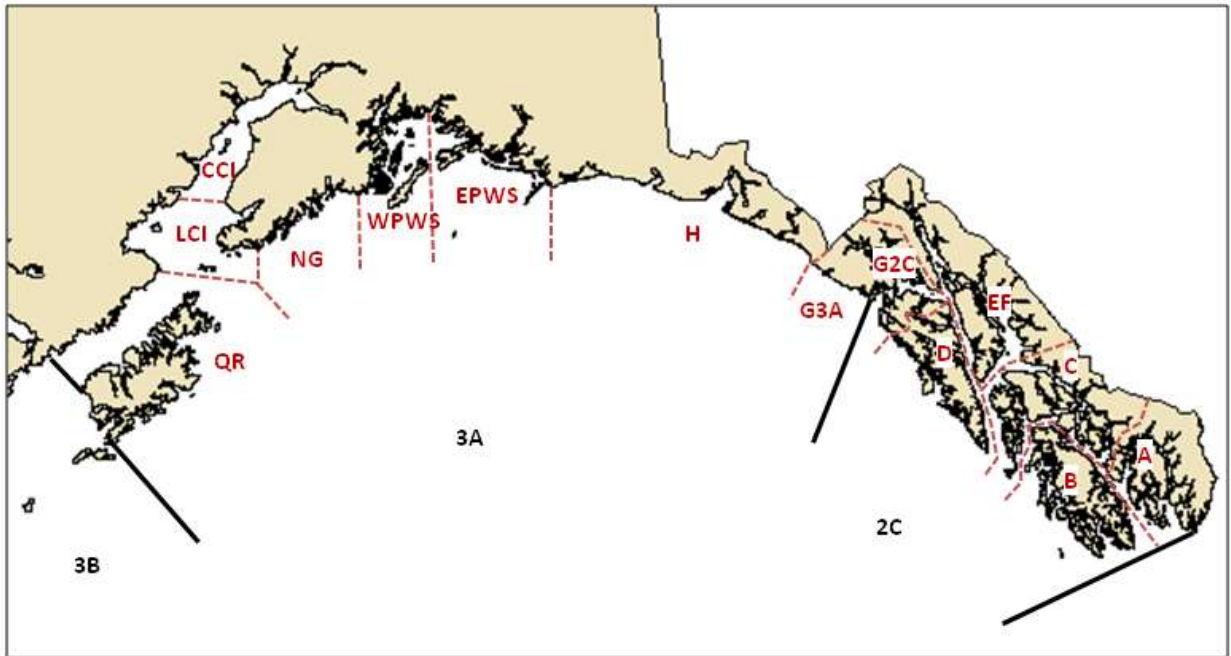
**b. Three-fish annual limit**

		Number of Tuesday Closures														
		0	1	2	3	4	5	6	7	8	9 (SQ)	10	11	12	13	All
Size Limit (in)	Harvest	161,092	158,989	156,957	154,611	152,492	151,937	150,219	148,482	147,008	145,055	143,166	142,017	140,519	139,246	136,191
	26	1.640	1.619	1.599	1.575	1.552	1.547	1.529	1.512	1.498	1.478	1.459	1.447	1.432	1.418	1.386
	27	1.672	1.650	1.629	1.605	1.582	1.577	1.559	1.541	1.527	1.506	1.487	1.475	1.459	1.446	1.413
	28	1.724	1.701	1.680	1.655	1.632	1.626	1.608	1.589	1.575	1.553	1.533	1.521	1.505	1.491	1.457
	29	1.756	1.733	1.711	1.686	1.662	1.656	1.637	1.618	1.604	1.582	1.562	1.549	1.532	1.518	1.484
	30	1.802	1.779	1.757	1.730	1.706	1.700	1.681	1.662	1.646	1.624	1.603	1.590	1.573	1.559	1.523
	31	1.834	1.810	1.787	1.760	1.736	1.729	1.710	1.690	1.675	1.652	1.631	1.618	1.600	1.586	1.550
	32	1.875	1.850	1.827	1.800	1.775	1.768	1.748	1.728	1.712	1.689	1.667	1.654	1.636	1.621	1.585

Table 3A.14. (continued)

**c. Two-fish annual limit**

		Number of Tuesday Closures														
		0	1	2	3	4	5	6	7	8	9 (SQ)	10	11	12	13	All
Size Limit (in)	Harvest	149,557	147,599	145,710	143,525	141,554	141,045	139,448	137,828	136,464	134,640	132,874	131,815	130,415	129,224	126,403
	26	1.516	1.496	1.478	1.455	1.435	1.430	1.414	1.397	1.385	1.366	1.348	1.337	1.323	1.310	1.281
	27	1.545	1.525	1.506	1.483	1.462	1.457	1.441	1.424	1.411	1.392	1.374	1.363	1.348	1.336	1.305
	28	1.593	1.573	1.553	1.530	1.508	1.503	1.486	1.469	1.455	1.436	1.417	1.405	1.390	1.378	1.346
	29	1.623	1.602	1.582	1.558	1.536	1.530	1.513	1.496	1.482	1.462	1.443	1.431	1.416	1.403	1.371
	30	1.666	1.645	1.624	1.600	1.577	1.571	1.554	1.536	1.522	1.501	1.482	1.470	1.454	1.441	1.408
	31	1.695	1.673	1.652	1.627	1.605	1.599	1.581	1.563	1.548	1.527	1.507	1.495	1.479	1.465	1.432
	32	1.733	1.711	1.689	1.664	1.640	1.634	1.616	1.598	1.583	1.562	1.541	1.529	1.512	1.498	1.465




 - Subareas for halibut harvest accounting

Figure 1. Subareas of IPHC Areas 2C and 3A used for analysis and reporting. A – Ketchikan; B - Prince of Wales (Craig, Klawock); C - Petersburg, Wrangell; D – Sitka; EF - Juneau, Haines, Skagway; G2C - Glacier Bay, Elfin Cove (2C areas); G3A - Glacier Bay, Elfin Cove (3A Areas); H – Yakutat; EPWS - Eastern Prince William Sound (Valdez, Cordova); WPWS - Western Prince William Sound (Whittier); NG - North Gulf (Seward); CCI - Central Cook Inlet (Deep Creek, Anchor Point); LCI - Lower Cook Inlet (Homer); QR – Kodiak.

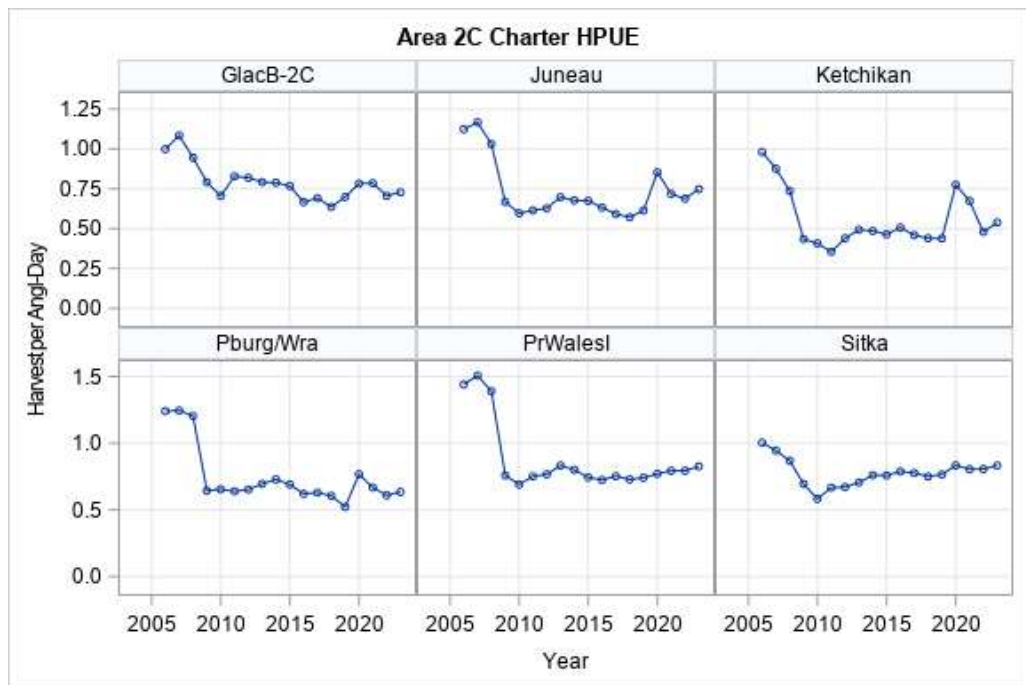
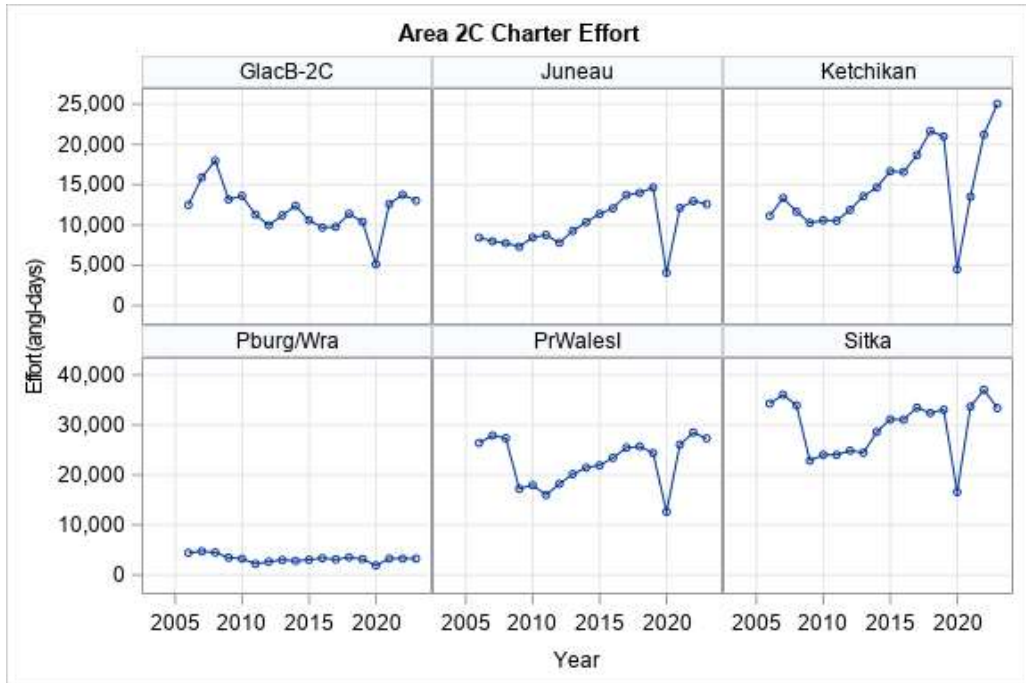


Figure 2 Time series of charter effort (upper) and HPUE (lower) by subarea of Area 2C, with predicted values and 2024 forecasts of HPUE only. No time series forecasts were made for effort. Shaded bands indicate 95% confidence intervals for the 2023 HPUE forecasts. (Source: ADF&G charter logbook).

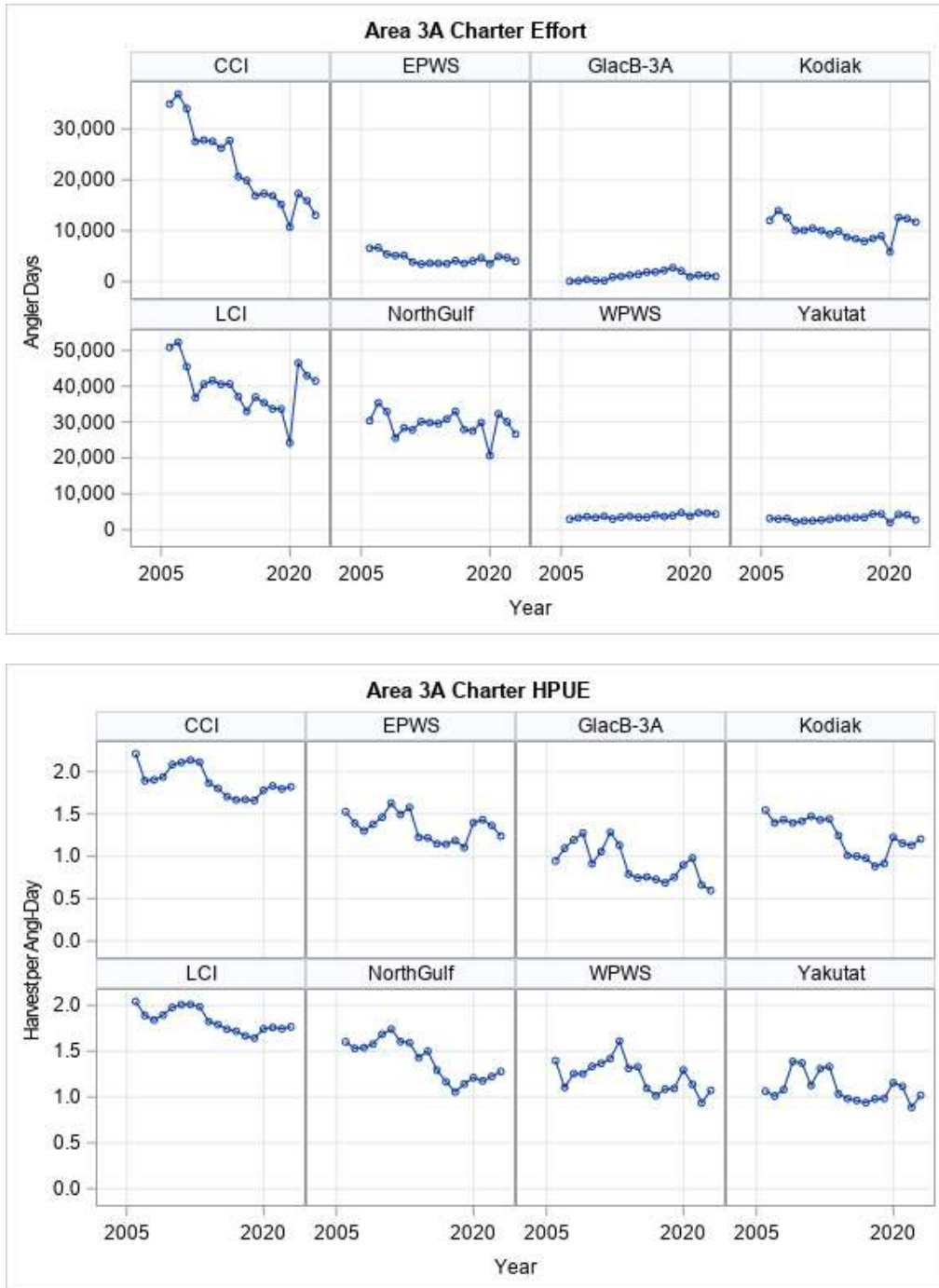


Figure 3 Time series of charter effort (upper) and HPUE (lower) by subarea of Area 3A, with predicted values and 2024 forecasts of HPUE only. No time series forecasts were made for effort. Shaded bands indicate 95% confidence intervals for the 2023 HPUE forecasts. (Source: ADF&G charter logbook).



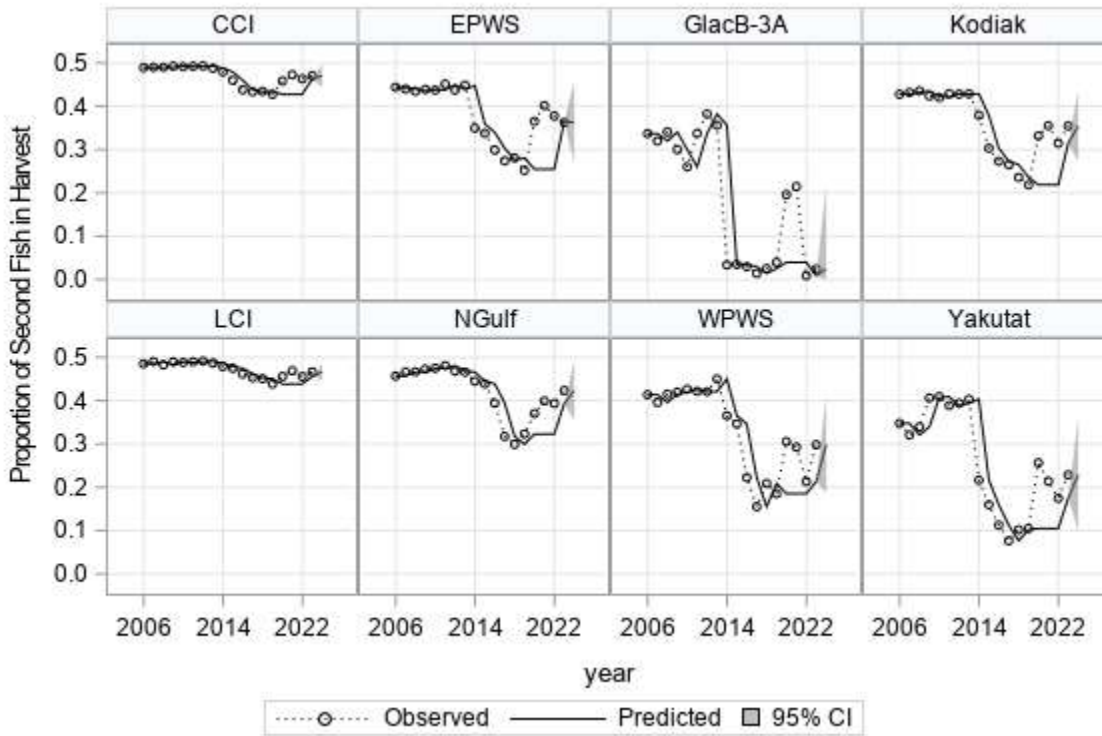


Figure 4 Time series of the proportion of second fish retained by anglers in each subarea of Area 3A, 2010-2024, with predicted values and forecasts for 2024. Shaded bands indicate 95% confidence intervals for the 2024 forecasts. (Source: ADF&G charter logbook).