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of **ALASKA**  
GOVERNOR MIKE DUNLEAVY

## Department of Fish and Game

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October 30, 2020

Lara Erikson  
International Pacific Halibut Commission  
2320 West Commodore Way  
Salmon Bay, Suite 300  
Seattle, WA 98199-1287

Dear Ms. Erikson:

This letter represents our report on the Alaska recreational halibut fishery in support of the annual IPHC stock assessment. This year's letter provides:

1. Final 2019 estimates of sport fishery harvest and yield by IPHC regulatory area,
2. Preliminary 2020 estimates of harvest and yield by IPHC area,
3. Final 2019 and preliminary 2020 estimates of sport fishery release mortality by IPHC area, and
4. Final 2019 estimates of sport fishery yield prior to the mean IPHC longline survey date in Areas 2C and 3A.

Each section includes a summary of the methods used and basic results. More detailed information on methods can be found in the following project operational plans:

Southeast Region creel sampling: <http://www.adfg.alaska.gov/FedAidPDFs/ROP.SF.1J.2019.05.pdf>

Southcentral Region creel sampling: <http://www.adfg.alaska.gov/FedAidPDFs/ROP.SF.2A.2016.20.pdf>

Statewide halibut estimation: <http://www.adfg.alaska.gov/FedAidPDFs/ROP.SF.4A.2020.04.pdf>

We hope this information satisfies the IPHC's needs. Please feel free to contact us if you require clarification or additional information.

Sincerely;

*(sent via email)*

Sarah Webster, Mike Jaenicke, Diana Tersteeg, Martin Schuster, and Marian Ford  
Fishery Biologists

## **Final Estimates of 2019 Sport Harvest and Yield**

In October 2019 we provided preliminary estimates of the 2019 sport harvest for Areas 2C, 3A, 3B, and 4. This letter provides final estimates of the 2019 sport harvest based on Alaska Department of Fish and Game (ADF&G) saltwater logbook data as of September 17, 2020, and final estimates from the ADF&G Statewide Harvest Survey (SWHS). The final estimates for Area 2C and 3A will also be posted on the North Pacific Fishery Management Council website.

The Area 2C charter fishery regulations for 2019 included a one-fish bag limit and reverse slot (or “protected slot”) limit that allowed harvest of halibut less than or equal to 38 inches and halibut greater than or equal to 80 inches. The Area 3A charter regulations included a two-fish bag limit with a maximum size on one of the fish of 28 inches, a limit of one trip per charter vessel per day (on which halibut are harvested), a limit of one trip per Charter Halibut Permit (CHP) per day, a closure to halibut retention on Wednesdays all year, five Tuesday closures (7/16 thru 8/13), and a 4-fish annual limit with a harvest recording requirement. Charter captains and crew were not allowed to retain halibut while guiding clients in Area 2C or Area 3A under regulations of the North Pacific Fishery Management Council’s Catch Sharing Plan (CSP) for these areas. Charter fishery regulations in the remainder of the state included a bag limit of two fish of any size; there was no prohibition on retention of halibut by captains or crew. Unguided fisheries statewide were managed under a bag limit of two fish of any size.

### Methods:

For Areas 2C and 3A, sport fishery yield was calculated separately for the charter and unguided sectors as the product of the number of fish harvested and average weight of harvested halibut. Yield estimates do not include release mortality (provided later in this document). Estimates were done for six subareas in Area 2C and eight subareas in Area 3A and summed. Charter harvest was based entirely on logbook data, per the provisions of the CSP. Unguided harvest was estimated through the SWHS. Standard errors of the SWHS estimates for the unguided sector were obtained by bootstrapping. Average net weight was estimated by applying the IPHC length-weight relationship to length measurements of harvested halibut sampled at major ports in Areas 2C and 3A. All fish from each vessel-trip selected for sampling were measured. Bootstrapping was used to estimate the standard errors of average weight. The estimate of charter average weight for Homer was stratified to account for differences in sizes of halibut cleaned at sea and cleaned in port. Length measurements from sites in the Glacier Bay subarea included fish caught in Areas 3A and 2C; average weights were calculated separately for each area and sector. All unguided harvest in the Glacier Bay subarea was assumed to have occurred in Area 2C. Charter-caught halibut taken under a Guided Angler Fish (GAF) permit from the National Marine Fisheries Service were not included in charter harvest calculations because the CSP specifies that this harvest accrues toward the commercial catch limit.

Final estimates of sport fishery yield for Areas 3B and 4 are for the charter and unguided sectors combined and are based entirely on the SWHS. Because ADF&G does not sample the sport harvest in these areas, we followed past practices and used the average weight of Kodiak sport harvest as a proxy for average weight in Areas 3B and 4. Specifically, we used the average weight from the unguided sector because it was unaffected by size limits. Use of the Kodiak average weight may bias the yield estimates for these areas.

As has been done historically, harvest from SWHS Area R (Alaska Peninsula and Aleutian Islands south of Cape Douglas) was apportioned to IPHC Areas 3B and 4 using specific locations reported in the survey. In some years, Area R harvest estimates have included harvests for sites that are actually in Area 3A. Since 1991, the estimated harvest of Area 3A halibut included in Area 3B estimates has ranged from 0 to 728 fish per year (average = 116). In 2019, 76 halibut were estimated from Area 3A locations in Area R.

### Results:

The 2019 Area 2C estimated sport harvest (excluding release mortality) was 131,410 fish, for a yield of 1.831 million pounds (Table 1). Charter yield represented 36% of the total. Average net weight was estimated at

13.93 lb overall and was lower for the charter sector due to size limit restrictions. Average weight was estimated from samples of 4,160 charter halibut and 3,771 unguided halibut.

The Area 3A estimated sport harvest was 246,804 fish, for a yield of 3.718 Mlb (Table 1). The charter sector accounted for 55% of the total yield. Average net weight was estimated at 15.06 lb overall and was slightly lower for the charter sector. Average weight was estimated from samples of 4,754 charter halibut and 2,449 unguided halibut.

The final estimates of charter halibut yield were about 4.5% higher than last year's preliminary estimate in Area 2C and 1.8% higher than the preliminary estimate in Area 3A. These differences were largely due to errors in estimating the proportions of harvest taken through July 31, the cutoff date for using logbook data. The final estimates of unguided yield were 2.9% higher than the preliminary estimate in Area 2C and 2.8% higher in Area 3A. The preliminary estimates were derived from simple exponential time series forecasts (SAS ESM procedure) and large forecasting errors are expected due to high interannual variability in the harvest time series.

The final harvest estimates for western areas were 712 halibut in Area 3B and 983 halibut in Area 4 (Table 1). Applying the Kodiak unguided average weight of 16.92 lb resulted in yield estimates of 0.012 Mlb in Area 3B and 0.017 Mlb in Area 4. These final estimates were up from last year's preliminary estimates of 0.004 in Area 3B and 0.014 in Area 4.

## **Preliminary 2020 Estimates of Harvest and Yield**

### Methods:

Sport charter fishery mortality for Areas 2C and 3A is based on numbers of halibut reported harvested and released in ADF&G mandatory charter logbooks. Harvest and release estimates from the SWHS are still used for all unguided fishery estimates as well as total sport fishery estimates for Areas 3B and 4. Neither complete logbook data nor SWHS estimates are available for the current year, and creel sampling is not designed to produce estimates of harvest. A variety of methods were used to provide preliminary estimates of the numbers of fish harvested by each sector or regulatory area.

Charter harvest for Areas 2C and 3A was estimated using partial-year logbook data. Logbook data were entered and available in mid-October for most trips taken through August 31. Harvest data were corrected to account for late logbook submissions and other reporting errors based on past data and assumptions. This adjusted the harvest in Area 2C by 2.6% and in 3A by 2.4%. Harvest and standard errors for the months of September through December were assumed to be the 6-year average of harvest in those months (average since the CSP was implemented). Average harvest in September – December was used due to the disproportionate effort throughout the 2020 season and because known harvest to date exceeded estimates from time series forecasts. Use of averages increased harvest estimates by about 8% in each area.

Unguided harvest in Areas 2C and 3A, and overall sport harvests for Areas 3B and 4 were projected from the existing time series of SWHS estimates using simple exponential smoother forecasts. This likely over estimated harvest in 2020 due to expected changes in effort related to the COVID-19 pandemic, especially with respect to non-resident anglers due to interstate travel mandates. Unguided harvest data for 2020 will be available in the fall of 2021 and estimates will be updated at that time.

Charter and unguided yield were estimated by multiplying the subarea harvest forecasts by the corresponding estimates of average weight. Average weights were estimated by applying the IPHC length-weight relationship to length measurements of harvested halibut obtained through sampling of the recreational harvest. The estimates of charter average weight for Homer, Seward, and Whittier were stratified to account for differences in sizes of halibut cleaned at sea and cleaned in port in 2020. No sampling was conducted in Areas 3B or 4 in 2020, so the Kodiak area average weight from the unguided fishery was again substituted for these areas. Additionally, there were no samples from the charter sector in the 3A portion of SWHS Area G due to the absence of a port sampler in Elfin Cove in 2020, so the Yakutat area (SWHS Area H) average

weight from the charter fishery was substituted for this area; Yakutat was the nearest port in Area 3A from which samples were obtained.

#### Results:

The preliminary estimate of 2020 sport halibut harvest in Area 2C (excluding release mortality) was 99,375 halibut, or 1.622 Mlb (Table 2). Average weight was estimated at 16.32 lbs. The charter average weight was more than 5.7 lbs lower than the unguided average weight due to the charter fishery size limit. Average weights for Area 2C were based on length measurements of 2,272 charter halibut and 3,553 unguided halibut.

The preliminary estimate for Area 3A was 217,677 halibut, for a total sport fishery yield of 3.257 Mlb (Table 2). The estimated average weight in Area 3A was 14.96 lbs overall. Average weights were estimated from samples of 4,663 charter and 1,888 unguided halibut.

The preliminary harvest estimates for 2020 were 595 halibut in Area 3B and 870 halibut in Area 4. Applying the unguided average weight of 18.40 lbs from Kodiak resulted in yield projections of 0.011 Mlb in Area 3B and 0.016 Mlb in Area 4 (Table 2). Although the levels of sport harvest are low, there is large uncertainty in the time series forecasts as well as use of the Kodiak unguided average weight as a proxy for average weight in these areas.

### **Final 2019 and Preliminary 2020 Estimates of Release Mortality**

#### Methods:

Release mortality ( $R$ ) was calculated in pounds net weight for each subarea of Areas 2C and 3A as:

$$R = \hat{N} \cdot DMR \cdot \hat{w}$$

where

$\hat{N}$  = the number of fish released,

$DMR$  = the assumed short-term discard mortality rate due to capture, handling, and release, and

$\hat{w}$  = the estimated average net weight (in pounds) of released fish.

The numbers of halibut released ( $\hat{N}$ ) in the charter sector in 2019 were based on final logbook data. The numbers of halibut released in 2020 used data through August from the charter logbooks and the average number of releases from logbooks since the CSP was implemented. For the unguided fishery and the overall sport fisheries in Areas 3B and 4, the estimated number of fish released in each subarea in 2019 was obtained from the SWHS. The projections for 2020 were simple exponential time series forecasts using previous release numbers from the SWHS. This likely over estimated releases in 2020 due to expected changes in effort related to the COVID-19 pandemic, as mentioned above.

Assumed mortality rates ( $DMRs$ ) were 5% for Area 3A charter-caught halibut, 6% for Area 2C charter and Area 3A unguided, and 7% for Area 2C unguided halibut. These rates were developed by assuming a 3.5% mortality rate for halibut released on circle hooks and a 10% mortality rate for halibut released on all other hook types. The hook type data were collected in 2007 and 2008 in Area 2C, and every year since 2007 in Area 3A. These rates were applied to the reported number of fish released on each hook type to calculate a weighted mean mortality rate for each user group in each subarea. These weighted mean rates were then rounded up to the next whole percentage point to address uncertainty and account for possible cumulative effects of multiple recaptures. A discard mortality rate of 6% was assumed for Areas 3B and 4, as no data on hook use were collected.

For most IPHC regulatory areas, the average weights of released fish in each subarea were estimated using a logistic model of the proportion of catch retained at length, as described in the operational plan for statewide halibut estimation (see cover page for link). The model uses the length composition of the retained fish to

infer the length distribution of released fish and average weight was calculated using the IPHC length-weight relationship.

For the Area 2C charter fishery, additional steps were needed to estimate release mortality due to the reverse slot limits in place in 2019 and 2020. In 2019, charter anglers were prohibited from harvesting fish between 38 and 80 inches in length. This required partitioning the released fish into size categories as follows: the 2019 size classes were U38 ( $\leq 38$  inches), 38-80, and O80 ( $\geq 80$  inches); the 2020 size classes were U45 ( $\leq 45$  inches), 45-80, and O80 ( $\geq 80$  inches)). The proportions of fish in each size class were obtained from creel survey interviews where anglers were asked to report the numbers of released fish by size class. The average weight of released fish in the U38 or U45 size class was estimated using the model described above. The average weights of released fish in the protected slot and above the upper limit were estimated as the average weight of fish in these size ranges in 2010, the most recent year without a charter size limit.

The North Pacific Fishery Management Council's Scientific and Statistical Committee reviewed the logistic modeling approach in 2007 and concluded that it provided "reasonable" estimates of average weight given the lack of data. One problem inherent in this method is that the size distribution of released fish is truncated at the size of the smallest fish measured in the harvest sample. It is likely that some halibut are released that are smaller than the smallest halibut retained and measured. Therefore, the method may in effect underestimate the numbers of small fish released but overestimate average weight. Because the model assumes that the percent of fish kept at length never exceeds 95%, it may also overestimate the numbers of large fish released, but probably has little effect on their average weight.

#### Results:

For 2019, estimated release mortality was 0.050 Mlb in Area 2C, with 0.035 Mlb from the charter fishery. The size class breakdown of the Area 2C charter release mortality indicated that while the majority of fish released were in the U38 length range, the poundage of release mortality was greatest in the O38-U80 range because of the higher average weight (Table 4). Estimated release mortality in Area 3A was 0.042 Mlb, with 0.019 Mlb from the charter fishery (Table 3). Areas 3B and 4 each had negligible amounts of release mortality from the sport fishery.

For 2020, estimated release mortality was 0.037 Mlb in Area 2C, 0.040 Mlb in Area 3A, and virtually zero in Areas 3B and 4 (Table 5). The size class breakdown of the Area 2C charter release mortality indicated that while the majority of fish released were in the U45 length range, the poundage of release mortality was greatest in the 45-80 inch range because of the higher average weight (Table 4).

The 2019 total sport fishery removals, including harvest and all sizes of release mortality, was 1.881 Mlb in Area 2C and 3.759 Mlb in Area 3A. Release mortality made up 2.7% of all Area 2C removals and 1.1% of Area 3A removals in 2019. For 2020, the preliminary estimates of total sport removals are 1.659 Mlb in Area 2C and 3.297 Mlb in Area 3A. Release mortality accounted for 2.3% of Area 2C removals and 1.2% of Area 3A removals in 2020.

#### **Sport Fishery Yield Prior to the Mean IPHC Survey Dates in 2019 (Areas 2C and 3A only)**

This information is provided to aid the IPHC's adjustment to survey CPUE that is used to apportion estimated exploitable biomass among regulatory areas. The mean survey dates for 2019 were July 11 in Area 2C and July 1 in Area 3A.

#### Methods:

The proportions of harvest prior to the mean survey date were calculated separately for the charter and unguided sectors. For the charter sector, the proportion of harvest taken prior to the mean survey date in 2019 was obtained from logbook harvest data. For the unguided sector, the proportions were calculated based on harvest reported in dockside interviews. These proportions were calculated separately for each subarea of Area 2C and 3A and weighted by the 2019 final estimated harvests in each subarea to derive the overall

proportions. The total sport yield taken prior to the mean survey date was calculated by multiplying the charter and unguided proportions by their respective final or projected yields and summing.

Results:

In 2019, an estimated 0.745 Mlb of halibut were taken by the sport fishery in Area 2C prior to July 11, and an estimated 1.324 Mlb were taken in Area 3A prior to July 1 (Table 6).

Table 1. Final estimates of the 2019 sport halibut harvest (numbers of fish), average net weight (pounds), and yield (millions of pounds net weight) in Areas 2C, 3A, 3B, and 4. “NA” indicates no estimate is available.

IPHC Area	Sector	Harvest (no. fish)	Average Net Wt. (lb)	Yield (Mlb)	95% CI for Yield (Mlb)
Area 2C	Charter	70,600	9.38	0.662	0.622 – 0.702
	Unguided	60,810	19.22	1.169	1.022 – 1.315
	Total	131,410	13.93	1.831	1.679 – 1.982
Area 3A	Charter	139,082	14.64	2.036	1.901 – 2.170
	Unguided	107,722	15.62	1.682	1.489 – 1.875
	Total	246,804	15.06	3.718	3.483 – 3.953
Area 3B	Total	712	16.92 <sup>a</sup>	0.012	NA
Area 4	Total	983	16.92 <sup>a</sup>	0.017	NA

<sup>a</sup> – No size data were available from Areas 3B and 4, so the unguided average weight from Kodiak was substituted.

Table 2. Preliminary estimates of the 2020 sport halibut harvest (numbers of fish), average net weight (pounds), and yield (millions of pounds net weight) in Areas 2C, 3A, 3B, and 4. “NA” indicates no estimate is available.

IPHC Area	Sector	Harvest (no. fish)	Average Net Wt. (lb)	Yield (Mlb)	95% CI for Yield (Mlb)
Area 2C	Charter	37,415	12.75	0.477	0.455 – 0.499
	Unguided	61,960	18.47	1.144	0.901 – 1.387
	Total	99,375	16.32	1.622	1.378 – 1.865
Area 3A	Charter	108,379	14.60	1.583	1.493 – 1.673
	Unguided	109,298	15.32	1.674	1.363 – 1.986
	Total	217,677	14.96	3.257	2.933 – 3.581
Area 3B	Total	595	18.40 <sup>a</sup>	0.011	NA
Area 4	Total	870	18.40 <sup>a</sup>	0.016	NA

<sup>a</sup> – No size data were available from Areas 3B and 4, so the unguided average weight from Kodiak was substituted.

Table 3. Final estimates of release mortality for sport fisheries in Areas 2C, 3A, 3B, and 4 in 2019. Some columns may not appear to add correctly due to rounding.

IPHC Area	Sector	Estimated No. Halibut Released	Assumed Mortality Rate	Number Released that Died	Estimated Average Net Weight (lb)	Release Mortality (Mlb)
Area 2C	Charter	33,908	6.0%	2,034	17.26	0.035
	Unguided	30,003	7.0%	2,100	7.07	0.015
	Total	63,911		4,135	12.08	0.050
Area 3A	Charter	55,963	5.0%	2,798	6.68	0.019
	Unguided	57,814	6.0%	3,469	6.59	0.023
	Total	113,777		6,267	6.63	0.042
Area 3B	Total	1,021	6.0%	61	9.08	0.001
Area 4	Total	624	6.0%	37	6.58	0.000

Table 4. Breakdown of Area 2C estimates of charter release mortality by size class for 2019 (final) and 2020 (preliminary). Some columns may not appear to add correctly due to rounding.

Year	Size Class (inches)	Estimated No. Halibut Released	Assumed Mortality Rate	Number Released that Died	Estimated Average Net Weight (lb)	Release Mortality (Mlb)
2019	U38	26,361	6.0%	1,582	6.69	0.011
	O38U80	7,297	6.0%	438	47.66	0.021
	O80	249	6.0%	15	244.70	0.004
	Total	33,908	6.0%	2,034	17.26	0.035
2020	U45	17,803	6.0%	1,068	8.46	0.009
	O45U80	2,775	6.0%	166	62.63	0.010
	O80	195	6.0%	12	244.70	0.003
	Total	20,772	6.0%	1,246	17.91	0.022



Table 5. Preliminary estimates of release mortality for sport fisheries in Areas 2C, 3A, 3B, and 4 in 2020. Some columns may not appear to add correctly due to rounding.

IPHC Area	Sector	Estimated No. Halibut Released	Assumed Mortality Rate	Number Released that Died	Estimated Average Net Weight (lb)	Release Mortality (Mlb)
Area 2C	Charter	20,772	6.0%	1,246	17.91	0.022
	Unguided	30,950	7.0%	2,166	6.99	0.015
	Total	51,722		3,413	10.98	0.037
Area 3A	Charter	38,028	5.0%	1,901	7.28	0.014
	Unguided	65,732	6.0%	3,944	6.53	0.026
	Total	103,760	5.6%	5,845	6.77	0.040
Area 3B	Total	754	6.0%	45	9.53	0.000
Area 4	Total	564	6.0%	34	6.74	0.000

Table 6. Final estimated sport harvest prior to the mean IPHC survey dates in 2019 in Areas 2C and 3A.

Area	Mean Survey Date	Charter		Unguided		Total	
		Percent	Harvest (Mlb)	Percent	Harvest (Mlb)	Percent	Harvest (Mlb)
2C	July 11	36.3%	0.241	43.2%	0.504	40.7%	0.745
3A	July 1	31.4%	0.638	40.8%	0.686	35.6%	1.324