IPHC Fishery-Independent Setline Survey (FISS) design and implementation in 2019

PREPARED BY: IPHC SECRETARIAT (L. ERIKSON AND R. WEBSTER; 26 OCTOBER 2019)

PURPOSE

To provide preliminary results of the IPHC Fishery-Independent Setline Survey (FISS) expansions in IPHC Regulatory Areas 3A and 3B in 2019, a general overview of FISS results, and a discussion of the Pacific halibut weight sampling undertaken on the FISS in 2019.

BACKGROUND

The annual IPHC Fishery-Independent Setline Survey (FISS) of the Pacific halibut stock has been augmented each year since 2014 with expansion stations that fill in gaps in coverage in the annual FISS. Typically, expansions have taken place in one or two IPHC Regulatory Areas each year, with IPHC Regulatory Areas 2A and 4A undertaken in 2014, the eastern Bering Sea flats in 2015, the IPHC Regulatory Area 4CDE shelf edge in 2016, IPHC Regulatory Areas 2A and 4B in 2017, IPHC Regulatory Areas in 2B and 2C in 2018 and IPHC Regulatory Areas in 3A and 3B in 2019.

Prior to 2019, only fixed gear was used to fish FISS sets. With increasing use of snap gear in the commercial fishery, this restriction has limited the number of vessels available for the FISS. Further, any differences between snap and fixed gears (including catch rate differences and differences in fishing locations) may affect our understanding of trends in commercial fishery indices. This has motivated the need for a study comparing the two gear types.

Data from IPHC collections from commercial landings and other sources have provided evidence that the current standard length-net weight curve used for estimating Pacific halibut weights on the FISS may be over-estimating weights on average in most IPHC Regulatory Areas, and that the relationship between weight and length may vary spatially. Prior to 2019, the FISS depended on the standard curve for estimation of all Pacific halibut weights, and therefore questions have arisen regarding the accuracy of estimates that depend on these weights, including weight per unit effort (WPUE) indices of density.

Interactive views of some of the FISS results were provided via the IPHC website and can be found here:

https://www.iphc.int/data/setline-survey-catch-per-unit-effort

INTRODUCTION

In most IPHC Regulatory Areas, the standard, annual FISS grid is fished in waters within the 37-503 m (20-275 fm) depth range. Information from commercial fishery data and other fishery-independent sources showed the presence of Pacific halibut down to depths of 732 m (400 fm) and in waters shallower than 37 m. Further, most IPHC Regulatory Areas had significant gaps in coverage within the standard 37-503 m depth range. The incomplete coverage of Pacific halibut habitat by the FISS had the potential to create bias in estimates of the weight per unit effort and numbers per unit effort (NPUE) density indices used in the stock assessment modelling and for stock distribution estimation. For this reason, the IPHC has been undertaking a sequence of FISS expansions since 2014 (following a 2011 pilot), with stations added to the

standard grid to cover habitat not previously sampled on the FISS. The expansions involve adding stations to one or two IPHC Regulatory Areas each year, and reverting to the standard annual grid for those areas in subsequent years. In 2019, FISS expansions took place in IPHC Regulatory Areas 3A and 3B.

In addition, a comparison of the use of snap gear to the use of fixed gear on the FISS was conducted in IPHC Regulatory Area 2C. The design featured each station being fished twice, once with fixed gear and once with snap gear, with randomisation of the order of the two gear types for each station. The comparison will provide data on any differences between catch (e.g. Pacific halibut catch rates, age and size distribution, bycatch species) on the two gears.

In 2019, weighing of Pacific halibut at sea throughout the FISS was introduced in order to improve the quality of estimates based on Pacific halibut weight. The use of direct weight measurements will lead to more accurate estimates of WPUE and other quantities based on weights, allow estimation of length-weight curves based on all sizes available to longline gear (whereas collections from commercial landings only measure fish greater than or equal to 81.3 cm in length) and provide additional information on biases in the standard curve and spatial differences in the length-weight relationship.

MATERIALS AND METHODS

The IPHC's FISS design encompasses nearshore and offshore waters of the IPHC Convention Area (Figure 1). The current FISS station layout has been in place since 1998 (with some additions in 2006 (Bering Sea), and in 2011 (IPHC Regulatory Area 2A).

The IPHC Regulatory Areas are divided into 31 regions, each requiring between 10 and 46 charter days to survey. FISS stations were located at the intersections of a 10 nmi by 10 nmi square grid within the depth range occupied by Pacific halibut during summer months (20-275 fm [37-503 m] in most areas). Figure 2 depicts the 2019 FISS station positions (including expansion stations), charter region divisions, and IPHC Regulatory Areas surveyed.

Thirteen extra stations in southeast Alaska and eight rockfish (*Sebastes spp*.) index stations in the Washington charter region are fished on a different layout than the FISS and are included in the IPHC stock assessment dataset.

Fishing vessels are chosen through a competitive bid process each year where up to 3 regions per vessel are awarded and typically 10-15 vessels are chosen.

The 2019 FISS chartered eighteen (18) commercial longline vessels (eight Canadian and ten USA) during a combined 97 trips and 939 charter days. Of the 1,439 FISS stations planned for the 2019 FISS season, 1,369 (95%) were effectively completed. Twenty-three expansion stations were not fished because they were either too deep or too shallow once prospected. The remaining 54 stations were rated ineffective because of whale depredation (n=41), sand flea damage (n=7), gear soak time exceeded 24 hours (n=2), shark depredation (n=1), and setting and gear issues (n=4). Otoliths were removed from 18,210 fish coastwide. Approximately 390 tonnes (860,000 pounds) of Pacific halibut, 70 tonnes (130,000 pounds) of Pacific cod, and 34 tonnes (75,000 pounds) of rockfish were landed from the FISS stations.

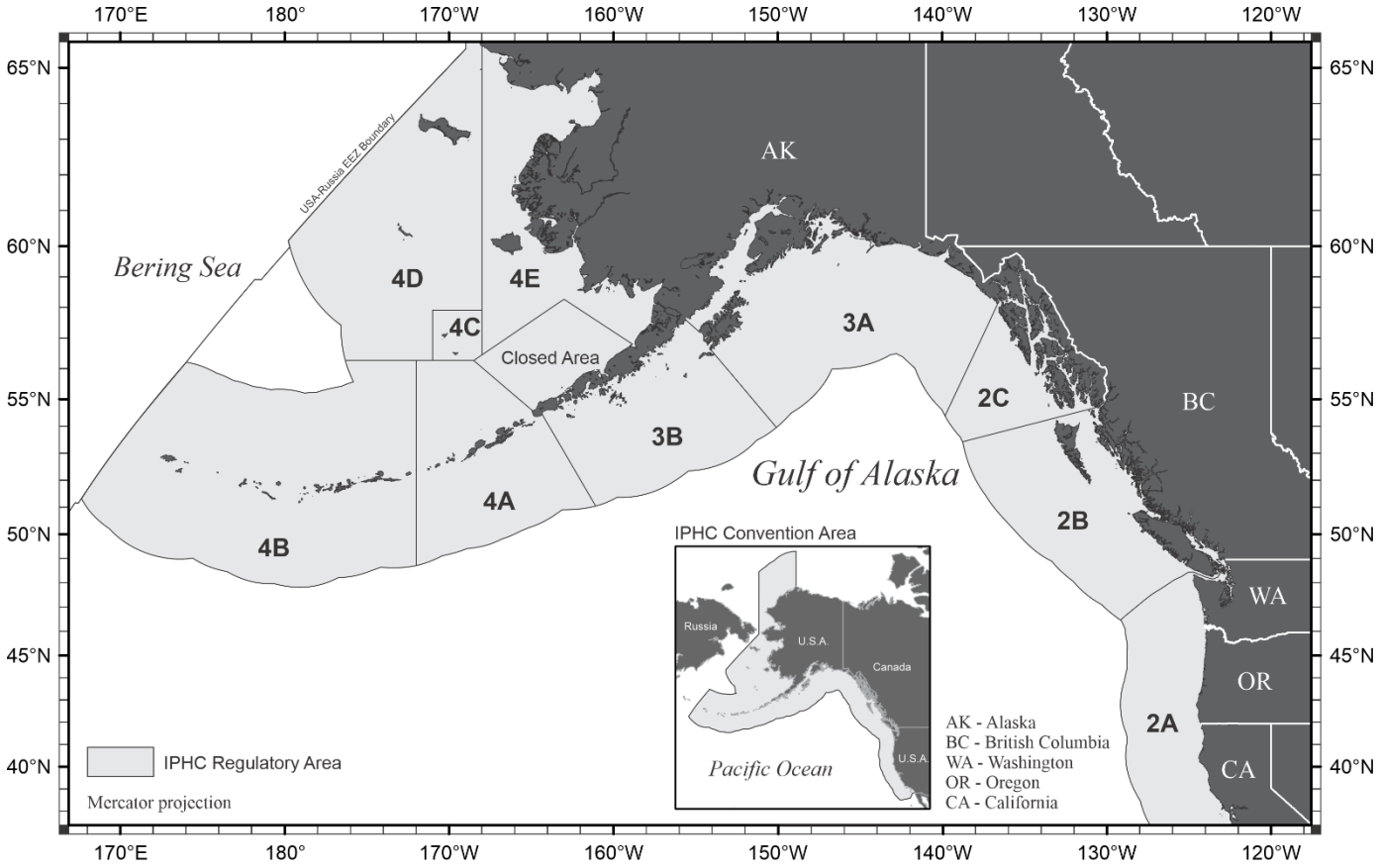

Figure 1. Map of the IPHC Convention Area (insert) and IPHC Regulatory Areas.

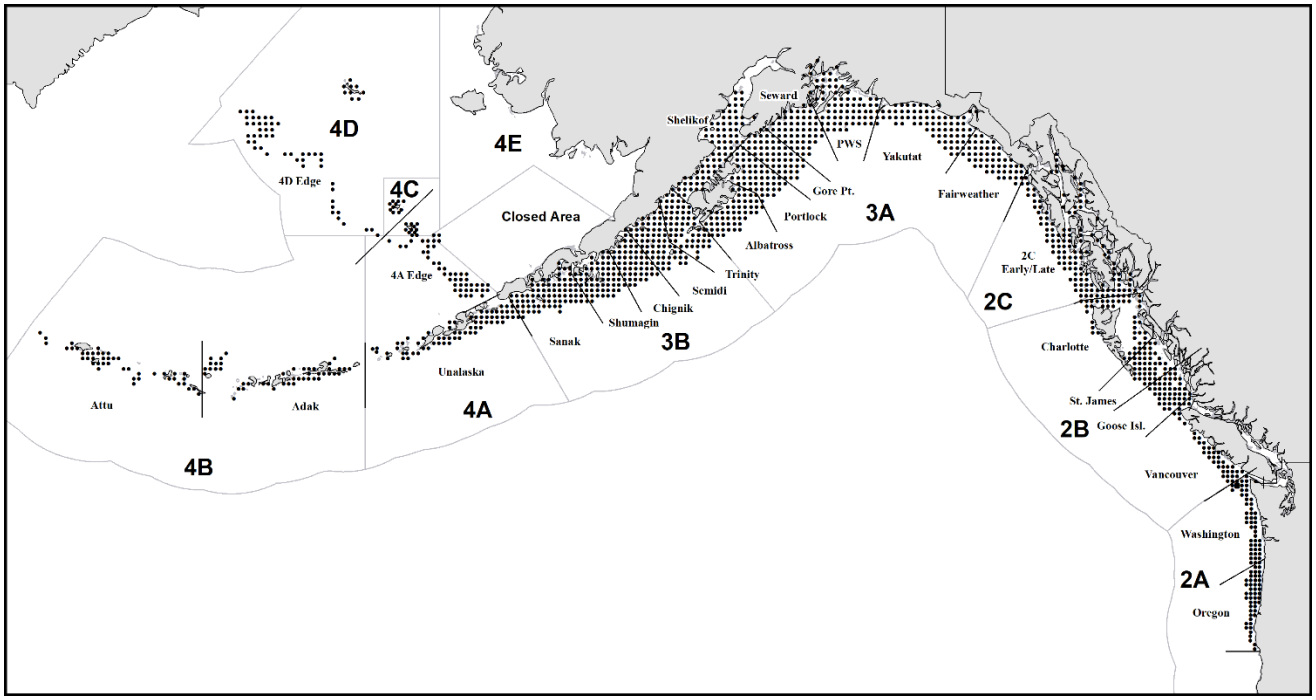

Figure 2. 2019 FISS station positions, charter region divisions, and IPHC Regulatory Areas.

Expansion stations

Since 2014, the IPHC has been sampling expansion FISS stations in one or two IPHC Regulatory Areas each year (Figure 3). Commercial fishery data and other sources have shown the presence of Pacific halibut down to depths of 732 m (400 fm) and in waters shallower than 37 m (20 fm). The IPHC has been undertaking a sequence of expansions since 2014 (following a 2011 pilot), with FISS stations added to the standard grid to cover habitat not previously sampled.

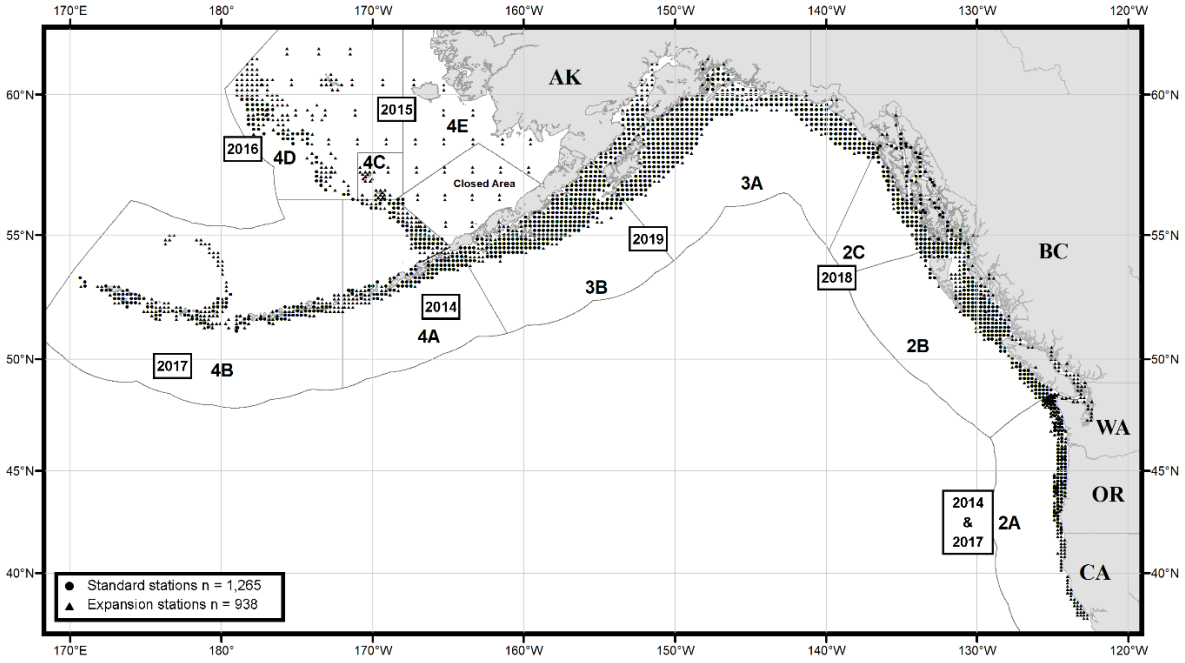

Figure 3. FISS expansion stations planned for 2014-19.

2019 Expansion in IPHC Regulatory Area 3A

The FISS expansion in IPHC Regulatory Area 3A included an additional 89 stations that were added to the existing 374 FISS stations (standard) in IPHC Regulatory Area 3A. These included stations as shallow as 9 fathoms (17 m) and as deep as 399 fathoms (732 m) (Figure 4).

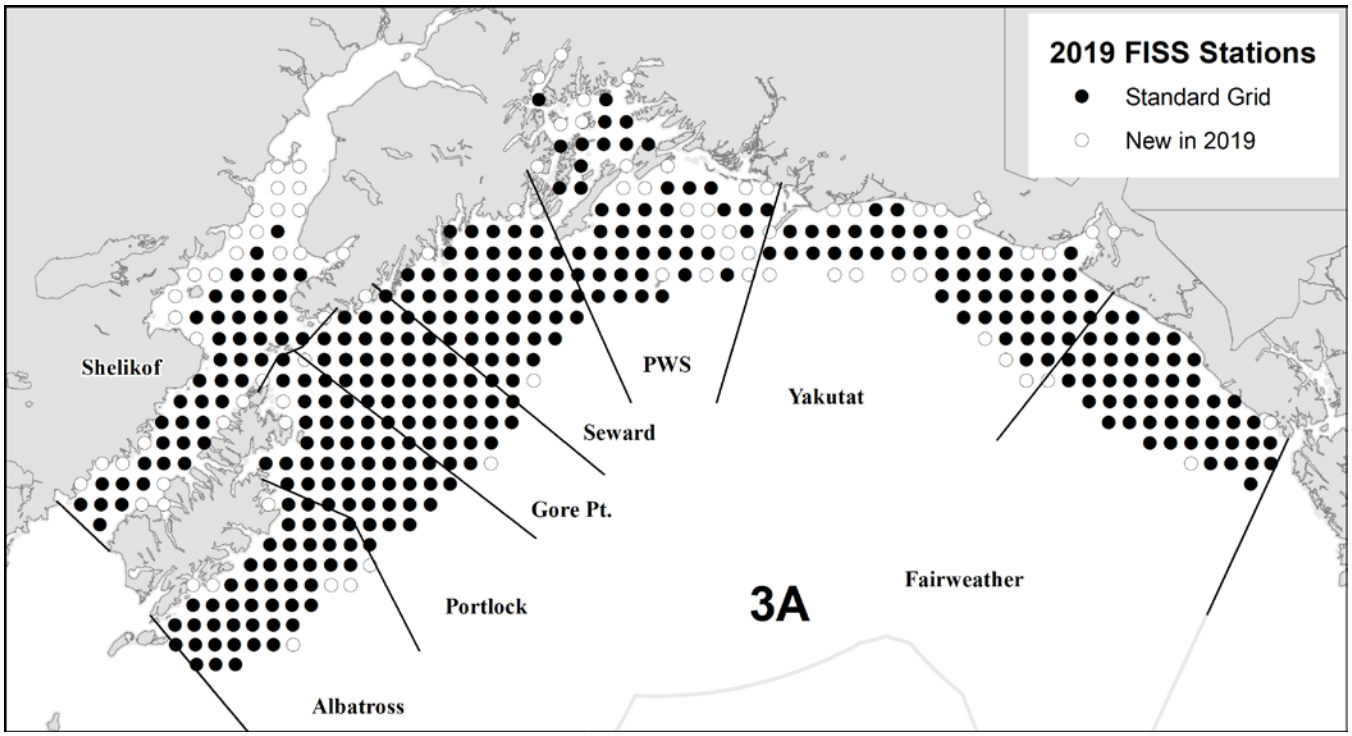

Figure 4. 2019 IPHC FISS stations in IPHC Regulatory Area 3A by charter region.

2019 Expansion in IPHC Regulatory Area 3B (USA)

The FISS expansion in IPHC Regulatory Area 3B included 231 of the existing FISS stations (standard) with an additional 66 stations, including stations as shallow as 9 fathoms (17 m) and as deep as 399 fathoms (732 m) (Figure 5).

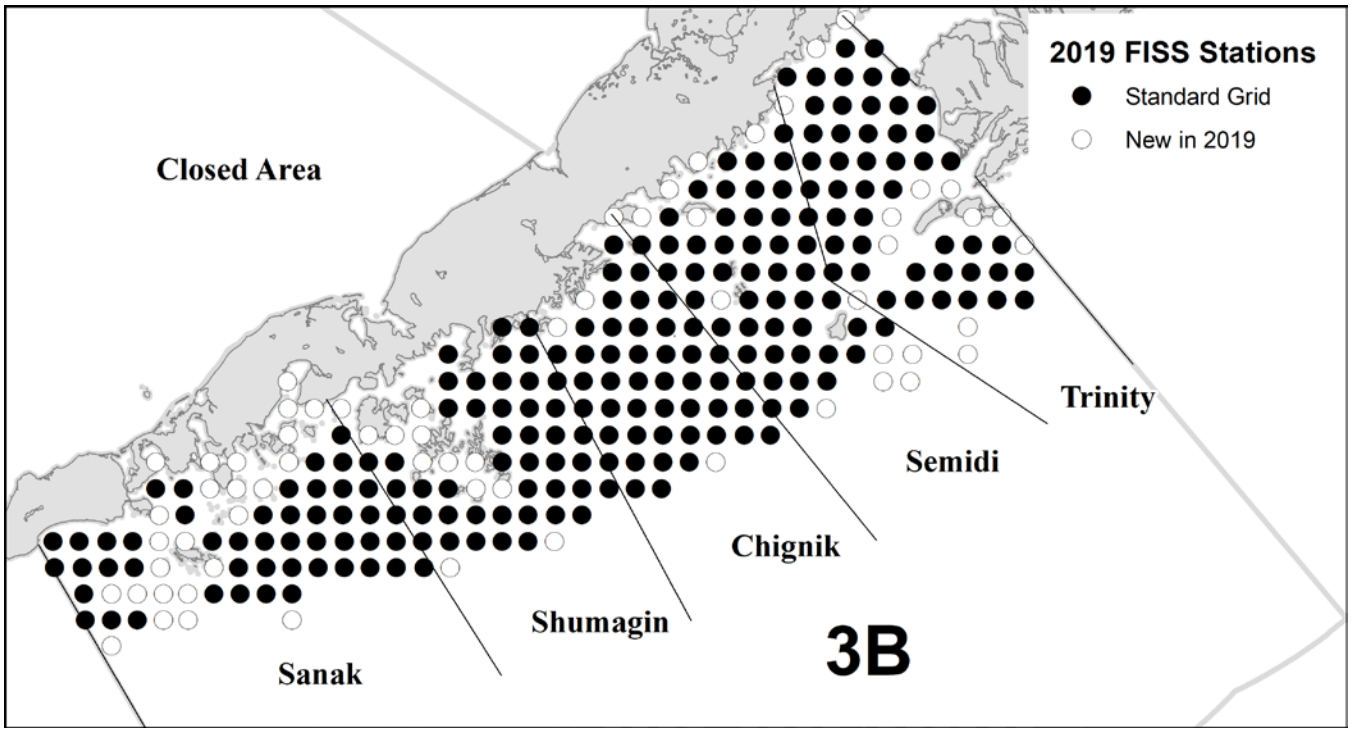

Figure 5. 2019 FISS stations in IPHC Regulatory Area 3B by charter region.

Sampling protocols

Setline Survey Specialists collected data according to protocols established in the 2019 FISS Manual.

Bait purchase

The minimum quality requirement for FISS bait is No. 2 semi-bright (Alaska Seafood Marketing Institute grades A through E), headed and gutted, and individually quick-frozen chum salmon. The IPHC secures most of the bait needed to supply FISS operations at the end of the previous salmon season. In August 2018, staff began arranging bait purchases for the 2019 FISS. Approximately 185 tonnes of chum salmon were utilized from three suppliers in the United States of America. Bait usage is based on 0.17 kilograms per hook resulting in approximately 117 kilograms per 7 skate station. Bait quality was monitored and documented throughout the season and found to meet the standard as described above.

RESULTS AND REVENUE

Beginning in 2017, interactive views of some of the FISS results were provided via the IPHC website and can be found here: https://www.iphc.int/data/setline-survey-catch-per-unit-effort.

As in previous years, legal-sized Pacific halibut that were caught on FISS stations and sacrificed in order to obtain biological data were retained and sold. This helps to offset costs of the FISS program. FISS vessels also retained for sale incidentally captured rockfish (*Sebastes spp*.) and Pacific cod (*Gadus macrocephalus*). These species were retained because they rarely survive the barotrauma resulting from capture. Most vessel contracts provided the vessel a lump sum payment, along with a 10% share of the Pacific halibut proceeds and a 50% share of the incidental catch proceeds. The *R/V Pacific Surveyor* received no share of Pacific halibut or bycatch proceeds. The IPHC does not retain proceeds from the sale of incidentally captured rockfish and Pacific cod. Instead, for retained bycatch captured in USA waters, proceeds are divided equally between the vessel (for handling expenses) and the state management agency. In Canada, Fisheries and Oceans Canada (DFO) receives all proceeds from sales of retained bycatch captured in Canadian waters, subsequent to abovementioned deduction of the predetermined vessel bycatch processing fees.

Vessels chartered by the IPHC delivered fish to 23 different ports (Table 1). Fish sales were awarded based on the objectives of obtaining a fair market price and distributing sales among buyers and ports. When awarding sales, the Commission considered the price offered, the number of years that a buyer had been buying and marketing Pacific halibut, how fish were graded at the dock (including the determination of No. 2 and chalky Pacific halibut), and the promptness of settlements following deliveries. Obtaining fair market value was the main consideration in awarding fish sales. However, sales were sometimes awarded to buyers not offering the highest prices, thereby meeting the goal of distributing sales among qualified buyers. Individual sales were evaluated after each event to ensure that the buyer was meeting IPHC standards. Average prices decreased from $12.65/kg in 2018 to $12.31/kg in 2019.

Table 1. FISS Pacific halibut landings by port, 2019[1,2].

Offload Port	Trips	Tonnes	Pounds	Total USD	Average Price (USD/kg)	Average Price (USD/lb)
Adak	5	13	28,345	$126,197	$9.82	$4.45
Astoria	1	1	1,801	$13,984	$17.12	$7.76
Charleston	1	1	2,362	$18,318	$17.10	$7.76
Cordova	1	6	12,173	$73,655	$13.34	$6.05
Dutch / Unalaska	7	17	38,232	$168,012	$9.69	$4.39
Homer	5	22	48,007	$299,517	$13.75	$6.24
Juneau/Auke Bay	2	9	19,092	$115,496	$13.34	$6.05
Ketchikan	3	15	33,464	$185,351	$12.21	$5.54
Kodiak	13	51	113,278	$608,893	$11.85	$5.38
Neah Bay	1	2	4,619	$24,566	$11.73	$5.32
Newport	3	3	5,639	$43,701	$17.09	$7.75
Petersburg	1	8	18,468	$104,657	$12.49	$5.67
PHardy/Beaver C/Coal	3	13	29,390	$244,968	$13.92	$6.31
Prince Rupert	12	67	148,448	$1,215,468	$13.68	$6.20
Sand Point	8	26	56,388	$243,258	$9.51	$4.31
Seward	8	44	97,571	$587,082	$13.27	$6.02
Sitka	8	47	103,494	$557,735	$11.88	$5.39
St Paul	4	9	19,736	$75,105	$8.39	$3.81
Steveston	1	3	5,584	$54,050	$16.17	$7.33
Ucluelet/Barkley Sd	1	4	9,011	$84,158	$15.60	$7.08
Valdez	1	8	17,201	$84,191	$10.79	$4.89
Westport/Grayland	1	1	2,764	$14,607	$11.65	$5.28
Yakutat	7	21	45,672	$250,504	$12.09	$5.48
Grand Total	**97**	**390**	**860,739**	**$ 4,805,923**	**$12.31**	**$5.58**

[1] Net weight (head-off, dressed, washed).
[2] Prices based on net weight.

FISS timing

Each year, the months of June, July, and August are targeted for FISS fishing. On a coastwide basis, FISS vessel activity was highest in intensity at the beginning of the FISS season and declined early in August as boats finished their charter regions (Figure 6). All FISS activity was completed by late-September.

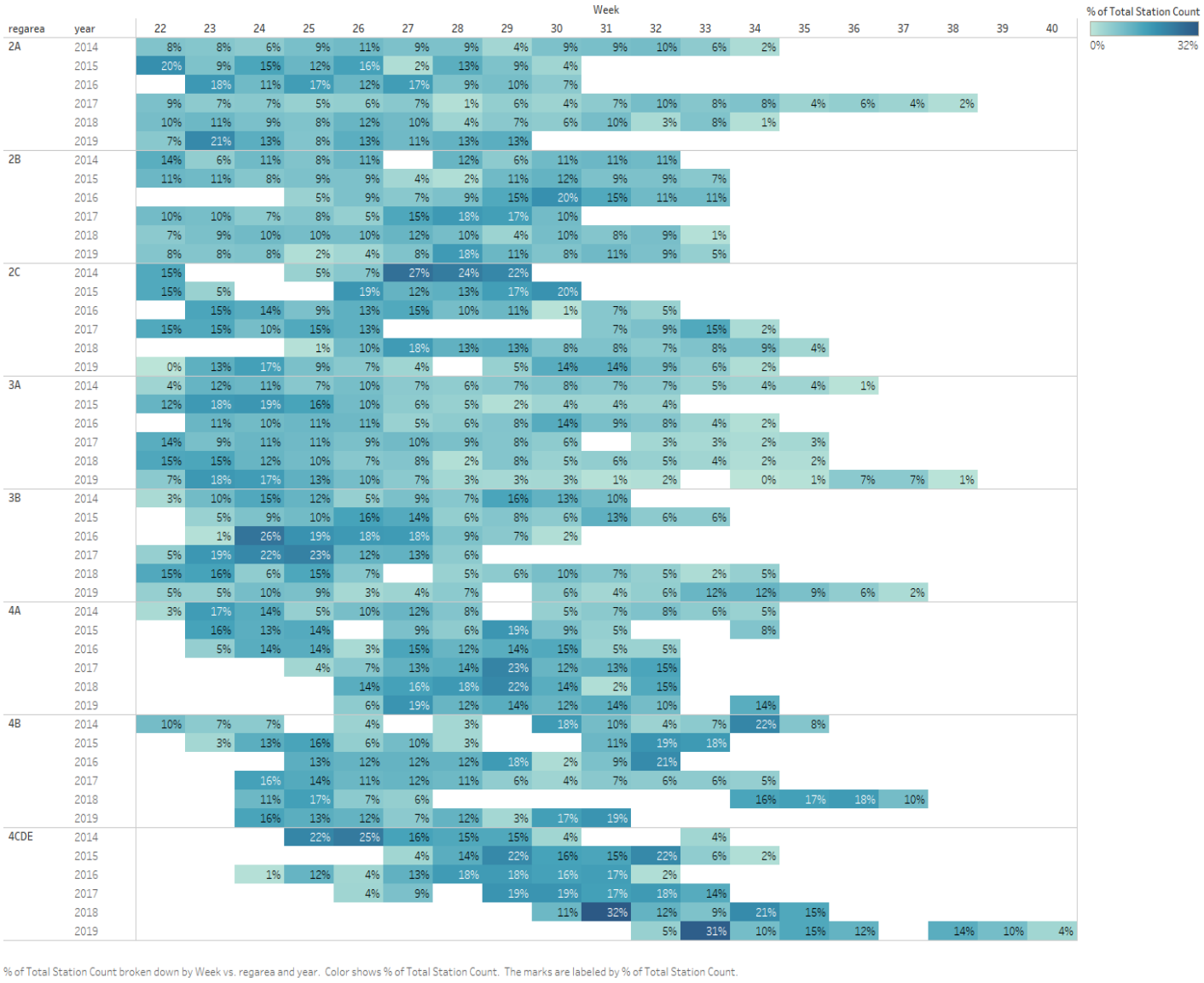

Figure 6. Percent of the total FISS stations completed by IPHC Regulatory Area during each week of the year. Week 22 begins in late May or early June depending on the year.

RECOMMENDATION/S

That the Commission **NOTE** paper IPHC-2019-IM095-06 which provided an overview of the IPHC's FISS design and implementation in 2019, including current and future expansions.

APPENDICES

Nil