International Pacific Halibut Commission

Manual for Sampling Directed Commercial Landings (2023)

DISTRIBUTION:
IPHC Secretariat

BIBLIOGRAPHIC ENTRY
IPHC 2023. IPHC manual for sampling directed commercial landings (2023) *IPHC–2023–PSM01, 35 pp.*

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TABLE OF CONTENTS

DEFINITIONS

A set of working definitions are provided in the IPHC Glossary of Terms and abbreviations: https://www.iphc.int/the-commission/glossary-of-terms-and-abbreviations

1. SAMPLING DIRECTED COMMERCIAL LANDINGS

The Port Sampling Program for collecting otoliths, tissue samples, and associated length-weight data from Pacific halibut directed commercial landings is the responsibility of IPHC Secretariat within the IPHC convention area (Figure 1.1). The samples collected are known as Market Samples.

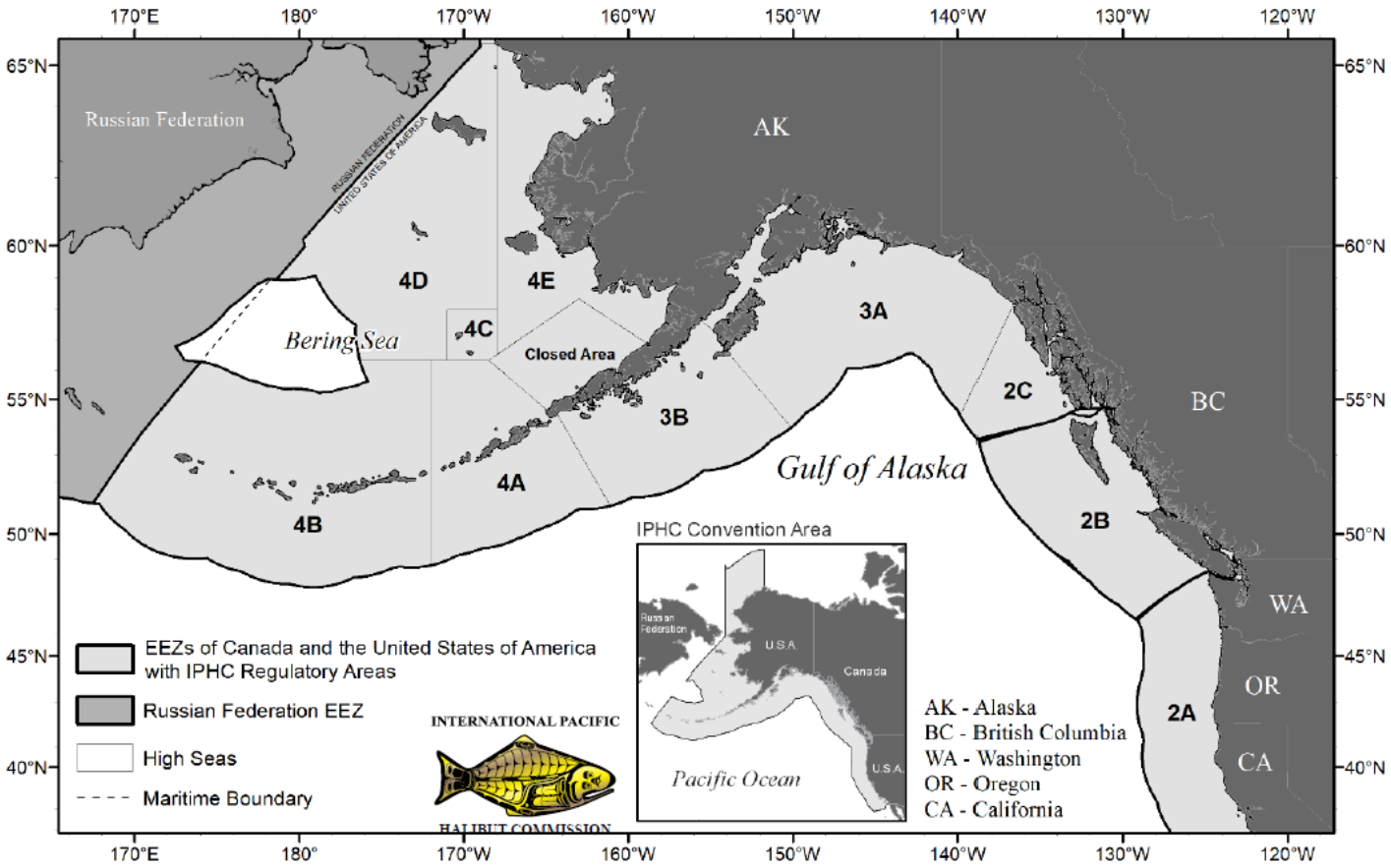


Figure 1.1. IPHC Convention Area and Regulatory Areas.

1.2 Canadian Landings

Canada's directed Pacific halibut fishery operates under an individual vessel quota (IVQ) system, where each licensed vessel is allocated a percentage of the IPHC Regulatory Area 2B fishery limit to harvest at any time over the fishing season. IVQ fish may be landed at any time however, IPHC secretariat are on call from 0600 to 1800 PST/PDT to sample Pacific halibut landings Vessels are required to hail-out before fishing and hail-in to port before landing Pacific halibut and are encouraged to hail-in 24 hours in advance of landing to ensure there is an Archipelago Marine Research (AMR) dockside observer available to validate the catch. Hailed landings are reported to the IPHC by the Canadian Department of Fisheries and Oceans (DFO) via the Fishery Operations System (FOS). IPHC Secretariat use the FOS system to track Pacific halibut landings.

IPHC FDS(F) must build a good working relationship with plant personnel and AMR supervisors and validators (dockside observers). Good relationships with plant and AMR staff ensure FDS(F) obtain timely notifications of Pacific halibut landings. IPHC FDS(F) should be at the dock for the landing and ask the captain if commercial Pacific halibut will be landed. This is especially important if you are unsure a landing contains Pacific halibut

1.3 U.S.A. Landings

1.3.1 IPHC Regulatory Area 2C, 3A, 3B, 4A, 4B and 4CDE/closed Landings

Alaskan vessels fish under an Individual Fishing Quota (IFQ) system. Vessel operators in Alaska are required to notify National Oceanic and Atmospheric Administration (NOAA) Office of Law Enforcement (OLE) three hours prior to unloading by completing a Prior Notice of Landing (PNOL). The landing must then occur within two hours of the time of landing given on the PNOL. IPHC Secretariat are notified via email and text message regarding pending landings.

The NOAA OLE may grant waivers allowing vessels to unload sooner than the required three hours. If waivers occur which prevent landings from being sampled, IPHC FDS(F) should inform the IPHC Port Operations Coordinator.

Unloading of IFQ fish in Alaska may only occur between 0600 and 1800 AKST/AKDT, under IFQ regulations. IPHC Secretariat are on call from 0600 and 1800 AKST/AKDT to sample Pacific halibut landings.

1.3.2 IPHC Regulatory Area 2A

Vessels in IPHC Regulatory Area 2A are not required to provide prior notice of when landing Pacific halibut. The IPHC Secretariat work with plant personnel, Pacific halibut buyers and vessel captains to determine when landings might occur.

1.4 Random Sampling

All sample designs must follow random sampling protocols. A random sampling procedure is one for which every unit in a sampling frame has an equal chance of appearing in the sample. Random sampling is critical because it guards against biases. Biased samples would provide a distorted understanding of the stock. There should be nothing that makes one day or landing or fish more likely to appear in the sample than any other day, landing, or fish.

The IPHC port sampling program uses random sampling to prevent biased samples. Sampling days are randomly selected to prevent biased samples due to the timing of landings. In some ports, one day per week is randomly selected to sample small landings to prevent biased samples due to landings size. Individual fish are randomly selected for sampling to prevent biased samples due to the size of an individual fish.

1.5 Sampling Objectives and Targets

IPHC FDS(F) are required to follow all sampling procedures in this manual and report their sampling procedures and any deviations from procedure to the Port Operations Coordinator (or other IPHC headquarters staff). Sampling procedures are reported on a regular basis. Any deviations from protocols in this manual should be reported to the Port Operations Coordinator as soon as possible.

1.5.1 Sampling Objectives

FDS(F) should sample:

1. as many landings as possible on designated sampling days throughout the season.
2. at the prescribed sampling rate for the Regulatory Area. This ensures an equal proportion of samples throughout the fishing season.
3. at an equal proportion from week to week; if a sample day is missed it should be made up in that same week if possible. **Any Changes to the sampling schedule must be approved by the Port Operations Coordinator.**

1.5.2 Sampling Targets

The IPHC Secretariat determines minimum sampling targets for otoliths, tissue samples and length-weighed individuals by IPHC Regulatory Area to ensure there are sufficient data for accurate stock estimation and assessment. The minimum requirements are as follows:

1. 1,500 otoliths, tissue samples and length-weighed fish from each of the IPHC Regulatory Areas 2B, 2C, 3A, 3B, 4A, 4B, and 4CDE/Closed
2. 650 otoliths, tissue samples and length-weighed fish from IPHC Regulatory Area 2A Tribal Indian Commercial landings
3. 350 otoliths, tissue samples and length-weighed fish from IPHC Regulatory Area 2A Non-tribal Directed Commercial landings
4. Extra otoliths and associated biological data may be required for the Clean Otolith Archive Collection.

1.6 Sampling Rates

Sampling rates are calculated to ensure the samples are evenly distributed over the landings from ports where sampling occurs. To reach the targeted number of otolith and tissues samples, a percentage of the total weight landed is sampled.

Table 1.1. Sampling rates displayed as percentages.

Port/Fishery	2A	2B	2C	3A	3B	4A	4B	4CD
Dutch Harbor		2	4	1.5	3	7	7.5	7.5
Homer		2	4	1.5	3	7	7.5	7.5
Kodiak		2	4	1.5	3	7	7.5	7.5
Petersburg		2	4	1.5	3	7	7.5	7.5
Port Hardy		2	4	1.5	3	7	7.5	7.5
Prince Rupert		2	4	1.5	3	7	7.5	7.5
Seward		2	4	1.5	3	7	7.5	7.5
Sitka		2	4	1.5	3	7	7.5	7.5
St. Paul		2	4	1.5	3	7	7.5	7.5
Bellingham	5	2	4	1.5	3	7	7.5	7.5
Vancouver		2	4	1.5	3	7	7.5	7.5
Directed	10							
Incidental	10							

Table 1.2. Average Pacific halibut gross weight by IPHC Regulatory Area

IPHC Regulatory Area	Average Weight (kg)	Average Weight (lb)
2A	7.6	17
2B	12.4	27
2C	14.8	33
3A	10.7	24
3B	11.2	25
4A	11.0	24
4B	10.2	22
4C	12.3	27
4D	12.6	27

Table 1.3. Average gross weight (kg) of Pacific halibut for length intervals.

Length (cm)	2A	2B	2C	3A	3B	4A	4B	4CDE
0 - 81	10	10	10	10	10	10	10	10
82 - 98	15	15	15	15	15	15	15	15
99 - 114	30	30	25	25	30	25	25	30
115 - 131	45	45	45	40	45	45	40	45
132 - 146	70	70	60	60	70	60	60	60
147 - 156	90	90	80	80	90	80	80	90
157 - 168	110	110	110	100	110	100	100	110
169 - 175	130	130	130	120	130	120	120	130
176 - 185	160	150	150	140	160	140	140	150
186 - 199	190	190	180	170	190	180	170	180
200 - 209	230	230	220	200	240	210	210	220
210 - 219	270	270	260	240	280	250	240	260

Table 1.4. Average gross weight (lb) of Pacific halibut for length intervals.

Length (cm)	2A	2B	2C	3A	3B	4A	4B	4CDE
0 - 81	22	22	22	22	22	22	10	10
82 - 98	33	33	33	33	33	33	33	33
99 - 114	66	66	55	55	66	55	55	66
115 - 131	99	99	99	88	99	99	88	99
132 - 146	154	154	132	132	154	132	132	132
147 - 156	198	198	176	176	198	176	176	198
157 - 168	243	243	243	220	243	220	220	243
169 - 175	287	287	287	265	287	265	265	287
176 - 185	353	331	331	309	353	309	309	331
186 - 199	419	419	397	375	419	397	375	397
200 - 209	507	507	485	441	529	463	463	485
210 - 219	595	595	573	529	617	551	529	573

1.7 Landings with Pacific halibut from more than one IPHC Regulatory Area

If Pacific halibut are retained from more than one IPHC Regulatory Area during a single trip, FDS(F) must sample each Regulatory Area separately at the prescribed rate (Table 1.1**)**. IPHC Fishery Regulations require Pacific halibut to be separated by IPHC Regulatory Area in the hold (either physically, by storing fish in separate pens in the hold, or by marking the fish in some way, e.g., rubber banding the tail to distinguish fish from different areas). Confirm with the captain and unloading crew how individual fish are identified by Regulatory Area, and how much of the landing is from each Regulatory Area. If fish from different Regulatory Areas are not separated, do not sample the landing. unless from IPHC Regulatory Area 4CDE. IPHC Regulatory Area 4CDE is considered one area for management purposes.

For example, a vessel lands 18.1 t (40,000 lb) of Pacific halibut from IPHC Regulatory Area 3A and 3B in Homer. After querying the captain, you determine the landing contains 11.3 t (25,000 lb) from IPHC Regulatory Area 3A and 6.8 t (15,000 lb) from IPHC Regulatory Area 3B. They have stored the fish in separated holds by IPHC Regulatory Area. You would sample this vessel as two landings.

1.8 Selection of Days When Sampling Occurs

Days (Monday – Saturday; Sundays are excluded) on which sampling occur are randomly selected so as not to bias the sampling of landings. FDS(F) are on call from 0600 to 1800 (local time) during five randomly selected days per week (excluding Sundays). **Any deviations from the predetermined port-specific calendar of randomly selected days must be approved by the Port Operations Coordinator.**

1.8.1 Selection of Days When Small Landings Are Sampled

In ports with a high frequency of small landings (Table 1.5), a single sampling day per week is randomly selected for sampling small landings. Small landings are defined to be those under 0.9 t (2,000 lb) in Bellingham, Juneau, Petersburg, Sitka and Homer, and under 454 kg (1,000 lb) in all other ports.

Ports that receive less frequent small landings will not sample small landings due to their relatively small contribution to overall catch and the difficulty of targeting such landings for sampling.

The ports that must sample small landings are: Bellingham, Juneau, Petersburg, and Sitka. Small landings are to be sampled only on designated small landing days, specified in the sampling calendars, and take priority over larger landings on these days.

Table 1.5. Proportions of small landings by port (2018-2022).

Port	IPHC Regulatory Area	2018	2019	2020	2021	2022
Port Hardy	2B	1.3	1.9	0.8	1.3	1.0
Prince Rupert	2B	0.3	0.5	0.5	0.5	0.2
Dutch Harbor	4A	1.1	0.9	1.1	0.6	1.6
Petersburg	2C	10.9	15.5	15.6	13.4	12.8
	3A	0.5	5.2	10.7	5.9	6.1
Sitka	2C	18.7	19.8	20.6	21.4	17.9
	3A	7.4	6.9	5.7	5.3	5.2
Juneau	2C	6.4	8.3	6.1	6.4	9.8
	3A	5.4	3.6	3.7	3.1	2.3
Seward	3A	1.4	1.3	2.2	2.0	1.8
Homer	3A	5.3	3.6	3.3	3.3	4.4
	3B	0.3	0.9	0.3	0.6	1.5
Kodiak	3A	4.4	4.0	2.6	3.3	2.9
	3B	0.6	0.7	0.5	0.9	0.6

1.9 Sampling Priorities When More than One Vessel is Landing

Use these sampling priorities to determine which offload(s) to sample when more than one vessel plans to land Pacific halibut at the same time.

1. Use the priority list below to determine which offload(s) are a higher priority based on IPHC Regulatory Areas.

   In Canada, the sampling priorities by IPHC Regulatory Area are:

   a. Area 4B
   b. Area 4CD
   c. Area 4A
   d. Areas 2A, 2B & 2C
   e. Areas 3A & 3B

   In U.S.A., the sampling priorities by IPHC Regulatory Area are:

   a. Area 2A
   b. Area 4B
   c. Area 4CD
   d. Area 4A
   e. Area 2C

f. Area 3B

g. Area 3A

2. After accounting for the IPHC Regulatory Area, sample the larger landing(s) except on small landing days.
3. On small landing days, after accounting for the IPHC Regulatory Area, small landings take priority. You would still sample the larger of two small landings if there were multiple small landings occurring at the same time. When there are no small landings, sample large landings.
4. Make sure to account for travel time between plants when determining which landings conflict and which landings should take priority.

Example 1: The following Pacific halibut landingsare scheduled for Sitka, Alaska on the day scheduled for sampling small landings. According to the priorities listed above, you would sample vessel 2. If you can travel to plant 1 in time (i.e., you will not miss the start of the offload) you would then travel to plant 1 to sample vessel 4. If time allows (again, you won't miss the start of offload) you travel back to plant 2 to sample vessel 5. If, on the other hand, time does **not** allow you to travel back to plant 1 to sample the entire offload of vessel 4, then remain at plant 2 and sample vessel 5 after sampling vessel 2.

1. Vessel 1 plans to offload 3,000lbs from IPHC Regulatory Area 4B at 0630 at plant 1.
2. Vessel 2 plans to offload 1,000lbs from IPHC Regulatory Area 4B at 0600 at plant 2.
3. Vessel 3 plans to offload 1,500lbs from IPHC Regulatory Area 3A at 0600 at plant 1.
4. Vessel 4 plans to offload 1,000lbs from IPHC Regulatory Area 4A at 0800 at plant 1.
5. Vessel 5 plans to offload 1,500lbs from IPHC Regulatory Area 3A at 1500 at plant 2.
6. Vessel 6 plans to offload 10,000lbs from IPHC Regulatory Area 3A at 1500 at plant 1.

Example 2: It is a regular sampling day, and the landings expected are the same as in Example 1. You would sample vessel 1 and then vessel 6.

1.10 Sampling Procedures

All sample designs must follow random sampling protocols. A random sampling procedure is one for which every fish in a sampled landing has an equal chance of appearing in the sample. There should be nothing that makes one fish more likely to appear in the sample than another fish. There should be no opportunity whatsoever for choosing fish arbitrarily.

Each year, the sampling procedures for each landing site in each port are thoroughly documented by IPHC Secretariat in the field and then reviewed, revised, and approved by IPHC HQ Secretariat.

Follow this sampling outline, and proceed to the subsections for landing site specific guidance:

1. Prior to each landing, ask the captain of the vessel for the best estimated weight (hail weight).
2. Collect a fishing log for each sampled landing.
3. Convert the hail weight from net weight to gross (head-on) weight, using the following formula:
    a. hail weight ×1.1 = gross weight of fish being landed
4. Apply the applicable sampling rate(s) to the gross weight to arrive at the weight of fish to sample, using the following formula:
    a. gross weight of fish being landed × sampling rate = target sample weight

5. Find the sampling frequency (*n*) to be used to randomly collect fish for sampling. The sampling frequency will differ depending on the sampling situation. The most common sampling situations are covered in sections 1.10.1-1.10.3
6. Collect an otolith and tissue sample and the associated weight-length data from each Pacific halibut chosen for sampling (each *n*th fish).
7. To determine when the sample is complete – i.e., the total target sample weight has been sampled– use a running total of weight of fish in your samples, read from the scale and rounded to the nearest whole pound. A good practice is to add up the fish weight in each column of four fish (corresponding to the 4 fish in the otolith box). Then sum the weights across columns as columns are filled.
    a. Stop sampling when your total weight of fish is within half the average weight of a Pacific halibut for that IPHC Regulatory Area (0) from your target sample weight. For example, if your target sample size is 205 kg (451 lbs) for a landing from IPHC Regulatory Area 3A you would stop sampling when you reach 200 kg (440 lbs) because 5 kg (11 lbs) is half of the average weight of a Pacific halibut in that IPHC Regulatory Area.
    b. If you cannot obtain a weight for any of your sampled Pacific halibut (e.g.; your scale malfunctions or a fish is too large and the plant cannot help you), use the estimated weight in Table 1.3 or Table 1.4 to keep your running total accurate and determine when you have reached the target sample weight.

1.10.1 Sampling off the Line

The preferred method for sampling individual fish is to stand near or at a point where all the fish pass by singly and can be counted in order. A conveyor belt on the way to the header is ideal, but a plant worker feeding fish to the header or to boxes or totes could also be watched to count fish as they come off the vessel.

1. Calculate your sampling frequency; every n^{th} fish that will ensure that fish are sampled throughout the entire offload from start to finish.
    a. Find a starting sample frequency (*n)* as 1/(sampling rate in Table 1.1).
        i. For a sample rate of 1%=0.01, you sample 1 in every 100 fish (n = 100 = 1÷.01).
    b. When you actively sample a fish, you will need to lower the starting frequency (*n*) to account for fish that pass by while you are actively sampling. For example, if about 10 fish go by while you are sampling at an initial sampling rate of 1%, then you would adjust your *n* from 100 to 90. The amount you adjust will depend on the speed of the offload.
    c. You should become adept at choosing an appropriate *n* such that reaching the end of the landing and obtaining the required target weight occur at the same time.
    d. In IPHC Regulatory Area 2A, you might have a partner, and in this case you will not need to adjust the *n* as they will be able to count Pacific halibut that go by and collect them as needed while you are sampling.
2. For each landing, randomly choose a starting fish from the numbers between one and *n* inclusively. For example, if your *n* is 5, choose a random starting number from one to five.
    a. For IPHC Regulatory Area 2A, the landings are small and might consist of fewer than ten fish. Therefore, choose a starting fish at the start of the season and maintain a tally of the fish from every sampled landing, sampling your *n*th fish throughout the season until you are done with sampling for the season.
3. Sample this *n*th fish by removing the otolith and obtaining a fin clip, fork length, and weight.

4. Return the sampled fish to the line.
5. Count the passing fish until you reach *n* and sample this fish. Note, that you do not count the fish passing while you are sampling your previously selected fish.
6. Repeat steps 4-5 until you have reached the end of the landing, or the target sample weight has been obtained (Step 6 in Section 1.9).

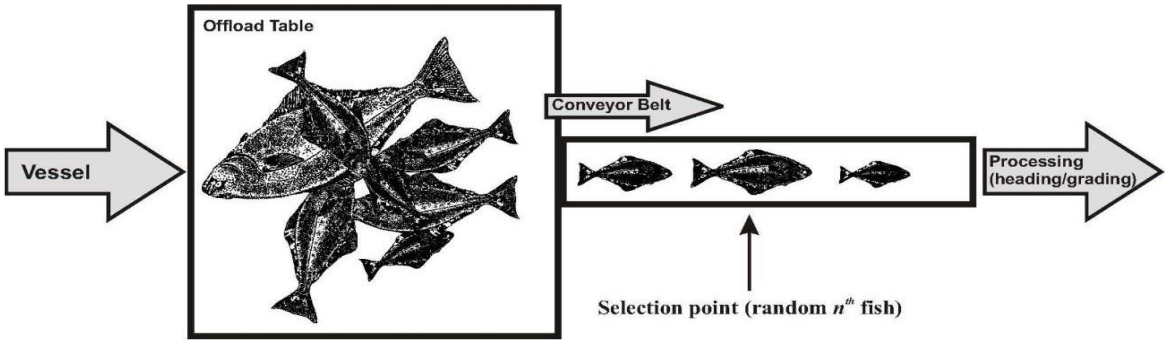


Figure 1.2. Depiction of line sampling.

1.10.2 Sampling off the table

If individual fish cannot be counted in order, then the sample must be drawn from the table when the fish are dumped. Typically, fish will be unloaded from the vessel in slings, and larger fish will be unloaded one at a time with straps. Sample fish from each sling or strap at the same rate until the required sample weight is obtained.

1.10.2.1 Sling fish

1. Determine the number of fish to be sampled from each sling using the following formulas:
   a. Weight of a sling / Average weight if a fish listed in 0 = Number of fish in a sling.
   b. Number of fish in a sling * Sampling rate = Number of fish to sample in each sling (*n*))
2. For each sling, pick a random point using a random *X* and *Y* coordinate on the table and select the *n* fish to be sampled whose noses are closest to the chosen point.

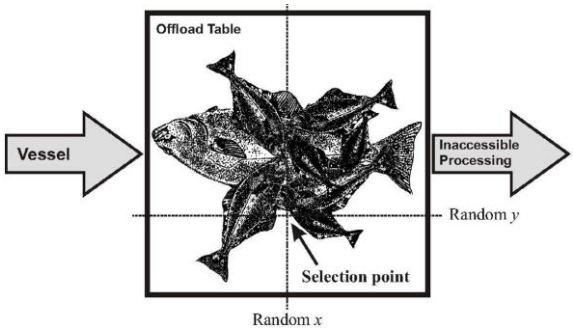


Figure 1.3. Depiction of table sampling

1.10.2.2 Strap Fish

One drawback to sampling off the table is that a variable and unpredictable proportion of large fish is unloaded with straps rather than in slings. It is very important to sample strap fish at the same rate as sling fish.

1. Estimate the numerical sampling rate, 1 in n_{strap} fish for sling fish and take a systematic sample of strap fish at the same rate.

For example, if at a particular plant a sling holds about 454 kg (1,000 lb) and you are selecting 2 fish averaging 13.6 kg (30 lb) from each sling, the numerical sampling rate for sling fish is 2 fish out of every 33 (1,000 lb ÷ 30 lb) or about 1 in 16; in this case $n_{strap} = 16$.

2. Sample strap fish at the numerical sampling rate.
    a. Keep a running tally of the number of strap fish unloaded.
    b. Pick a random number between 1 and n_{strap} (between 1 and 16 in the above example).
    c. Select the corresponding strap fish and every n_{strap}^{th} fish thereafter.
3. Continue sampling both sling and strap fish until the required sample weight has been obtained.

Figure 1.4. Strap fish

1.10.3 Sampling from Totes

At some plants, slings are emptied into single totes or an array of totes, and the totes are trucked to the processing line. In these cases, either slings or totes could serve as the sampling unit. If sampling totes, FDS(F) staff must work closely with the plant manager and forklift driver to obtain the randomly selected tote. Only sample the totes that you randomly selected; totes haphazardly selected by the forklift driver should not be included in your sample.

1. Obtain the average weight of a tote. This can be obtained by asking the plant manager or other plant personnel to get a good first estimate of the weight of a tote. Some adjustment of this initial weight of a tote might be necessary. If plant staff give you a range of weights, use the smaller end of the range for your calculations to ensure you don't overestimate the number of totes in the offload and miss a sample. As you gain experience, adjust your estimates of average tote weight to ensure you are sampling totes from the start to the finish of the offload.
2. Determine the number of totes in the landing using the following method:
    a. Gross weight of landing = net hail weight × 1.1
    b. Gross weight of landing / Weight of an average tote = Number of totes in the landing.
3. Determine the number of totes to sample.

a. Number of totes in the landing * sampling rate = Number of totes to sample.

4. Determine the sampling frequency (*n*)

   a. Number of totes in the landing / Number of totes to sample rounded to the nearest whole number = sampling frequency (*n*).

5. Randomly choose a starting tote from the numbers between one and *n* inclusively.

For example, the landing is ~10 totes, and you need to sample 1.9 totes, choose a random number between one and five inclusively, because the sampling frequency (*n*) = 1.9/10 ~ 2/10 = 1/5.

6. Obtain and sample every n^{th} tote until you have sampled the entire landing, or the total target weight has been sampled.

1.10.3.1 Sampling Less than a Full Tote or Sling

Ideally, all fish in a selected sling or tote will be sampled. However, where less than a full sling or tote is needed to get the desired poundage or number of fish for the sample, a method for selecting sampled fish is needed.

1. Estimate the gross weight of Pacific halibut, in the randomly selected tote.
2. Determine the proportion of fish in the tote or sling needed for the sample. For example, if a tote holds 454 kg (1,000 lb) but only 136 kg (300 lb) are needed for the sample, you will need to sample 1 in every 3 fish (300/1000 = 3/10 ~ 1/3).
3. Use the Watch Method to select fish.

   a. Divide the seconds on a watch into the proportion of fish needed for the sample.

   b. Line up that number of fish and number each fish.

   c. Look at the watch and select the fish that corresponds to the section where the seconds hand falls.

   For example, if 1/3 of a tote is needed, count three fish from the top of the tote. Then look at the watch, if the seconds hand falls between 1-20 seconds, select that fish to sample. The remaining two fish are not sampled.

4. Continue using the Watch Method to select fish throughout the entire tote to ensure all fish have an equal chance of being included in the sample.

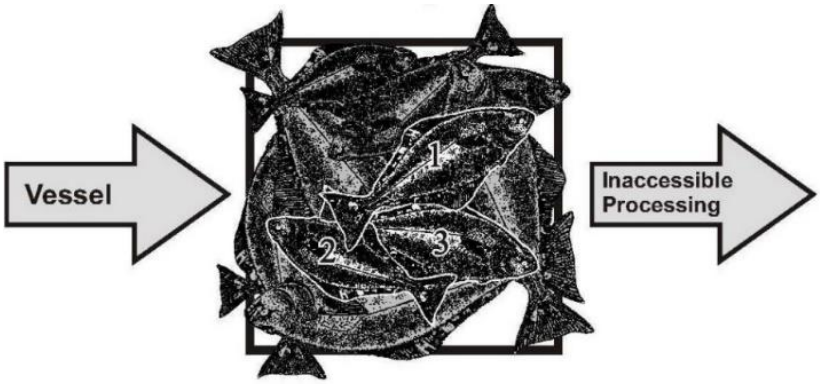


Figure 1.5. Depiction of tote sampling.

1.11 Pooling Offloads for Sampling

To create a more practical sampling schedule, the requirement of sampling as many individual landings as possible **might** be modified using pooling. When pooling, you will maintain a running total weight of the landings based on the weight parameters listed in Table 1.6. You will then sample the vessel whose landing weight brings the sum of the weight of the pooled vessels over the threshold.

Table 1.6. Weights included and excluded from pool by location.

Ports	Exclude from Pool
Port Hardy	<0.5 t and ≥ 6.8 t (<1000 lb and ≥ 15000 lb)
Prince Rupert	<0.5 t and ≥ 6.8 t (<1000 lb and ≥ 15000 lb)
Dutch Harbor	<0.5 t and ≥ 6.8 t (<1000 lb and ≥ 15000 lb)
Homer	<0.9 t and ≥ 6.8 t (<2000 lb and ≥ 15000 lb)
Juneau	<0.9 t and ≥ 6.8 t (<2000 lb and ≥ 15000 lb)
Kodiak	<0.5 t and ≥ 6.8 t (<1000 lb and ≥ 15000 lb)
Petersburg	<0.9 t and ≥ 6.8 t (<2000 lb and ≥ 15000 lb)
Sitka	<0.9 t and ≥ 6.8 t (<2000 lb and ≥ 15000 lb)
St. Paul	<0.5 t and ≥ 6.8 t (<1000 lb and ≥ 15000 lb)

***IPHC Regulatory Area 2A, 4A, 4B and 4CDE landings cannot be pooled.**

***All other areas can be pooled to a 6.8t (15000 lb) threshold.**

1.11.1 Pooling Procedures

1. Pooling must be done throughout the year, or not at all as all landings must have an equal opportunity of being sampled.
2. Keep running tally (pool) of vessels that fit the port's specific pooling weight range (Table 1.6)
    a. Only include vessels that could have been sampled in your pooling scheme.
    b. **DO NOT** include vessels that:
        i. unloaded at a facility where sampling is physically impossible.
        ii. you would not be able to sample due to a scheduling conflict
        iii. unloaded on days that you did not work.
3. Keep a separate running tally (pool) for each IPHC Regulatory Area.
4. Sample the vessel that brings the total weight of landings from the pooled vessels over that port's prescribed threshold for pooling (Table 1.6).

Example of pooled vessels for IPHC Regulatory Area 3A in Sitka, Alaska

Date/Time	Vessel Name	Hail
11 Apr / 0600	Misty Sea	2.3 t (3,000 lb)
11 Apr / 1400	Stormy	4.5 t (10,000 lb)
13 Apr / 0800	Lucky	3.6 t (8,000 lb)

Above example: Gross pooled hail: total hail weight for all vessels in pool multiple by the conversion factor. Above example: 9.5 t (21,000 lb) × 1.1 = 10.5 t (23,100 lb)

Sample weight: apply sample rate for the IPHC Regulatory Area to the gross pooled hail.

Above example: 10.5 t × 0.01 = 0.1 t = 105 kg (23,100 lb × 0.01 = 231 lb)

In this example, sample 105 kg (231 lb) from the fish landed by FV Lucky on 13 Apr following the approved sampling methods for that plant/landing facility.

1.12 Sampling Small Landings

Small landings should be sampled in the same way as large landings, except when the target sample weight for the landing is less than the average weight for one fish from that IPHC Regulatory Area (0).

1. If the target weight is >50% of the average weight of a fish, randomly sample one fish from the landings.
2. If the target weight is <50% of the average weight of a fish, determine your ***probability of sampling one fish from the landing*** using the following formula:
    a. Probability of sampling one (1) fish = target weight /average weight of a fish for that IPHC Regulatory Area.

For example, you have landing of 30 lb from 2C. The sampling rate is 10% (Table 1.1), so you need 3 lb (30*0.10 = 3). The average weight of a fish for 2C is 26 lb (0). To determine the probability of sampling one fish from this landing, divide the target weight (3 lb) by the average weight of a fish (26 lb), so 3/26 = 0.2. Therefore, your probability of sampling a single fish is 0.2 or, a 2 in 10 chance of sampling one fish.

In this example, you should use the random number table to choose a number 0-9. If the number is either 1 or 2, sample a fish; if it is greater than 2, or is zero, do not sample.

1.12.1 Sampling Small Landings from Totes

Sampling one or two fish from a full tote can be challenging. To do this, use line sampling methods and count individual fish in order as they come out of the tote or go into the tote. This can either be done as the fish are loaded into the brailer, on the vessel, or as the fish are taken out of the tote to be funneled down the processing line.

1.13 Sample Collection and Preparation

For each randomly selected Pacific halibut, collect:

a) an otolith

b) a fin clip

c) a fork length

d) a weight

Before randomly selecting your fish, prepare your workstation. Set up your sampling table and scale, knife, forceps, fin clippers, chromatography paper, plastic slate, and pillboxes.

Pillboxes are used to store the otolith samples. The box consists of an outer housing with removable, sliding cell covers, a colored plastic tray, an inner 28 cell tray (which may be painted black), and a grid card (which is provided with your sampling gear). The inner trays have numbers embossed into the bottom of each cell; (1 – 4 from top to bottom for each of the seven "days" or columns). Check to make sure the embossed

number 1s on the inner tray are at the top when inserted into the outer plastic tray. It is not necessary to disassemble the box when taking your sample. Simply pull the clear plastic cover for the row you are working on and place the otolith in the appropriate cell. Notice that some pillboxes will not allow the clear plastic cover to open unless the colored button on the upper right side (near SAT 7AM-9AM) is pressed simultaneously.

Figure 1.6. Otolith sampling "pill box".

1.14 Otolith Cutting Procedure

1. Only take the blind side otolith
2. Cut the top off the auditory capsule with a knife, being careful not to cut so deeply that the otolith is broken or knocked out of reach.
3. Use forceps to remove the otolith and insert it in the appropriate box cell.

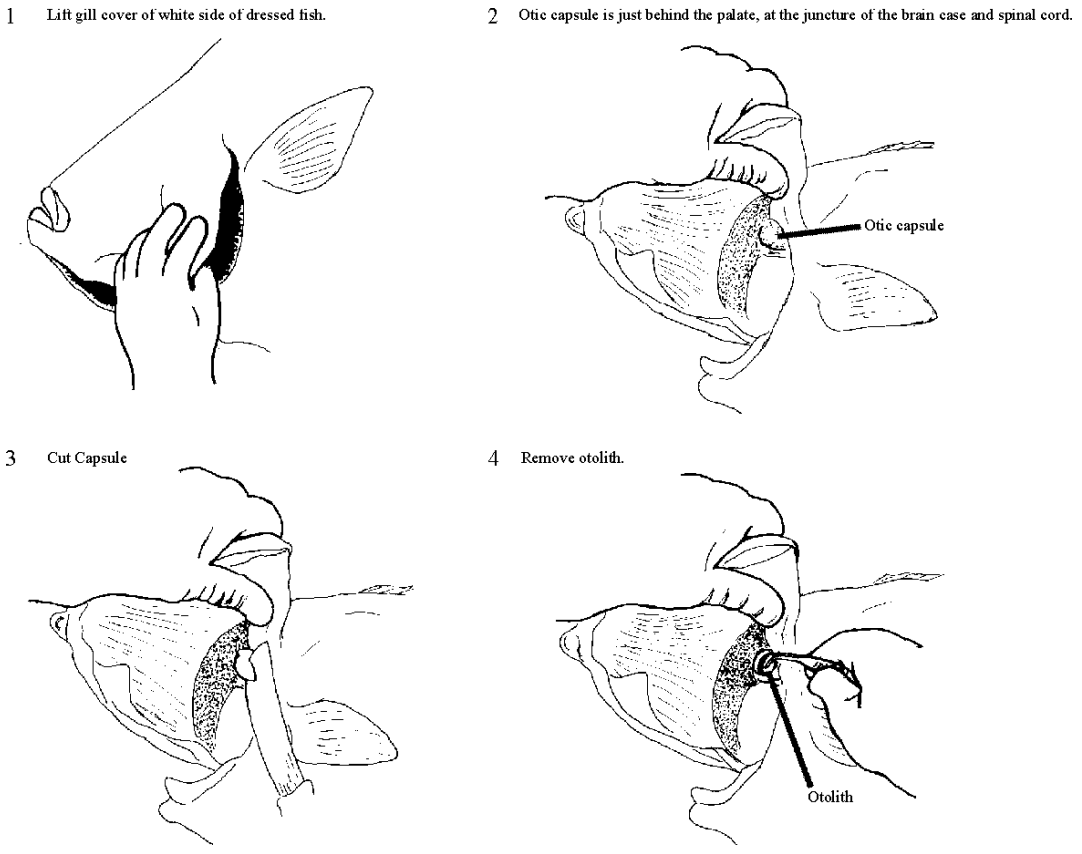


Figure 1.7. Removing a Pacific halibut otolith.

1.15 Otolith Issues

Depending on your sampling procedure, you may have to "make up" poundage for "lost" otoliths.

1. If **line-sampling** and a fish you selected had a crystallized otolith, an external tag, the otolith was shattered, the fish was sinistral, or you were unable to find the otolith, you would not include that fish's weight (and corresponding length) in your cumulative sample weight. You would sample the next fish in line then continue selecting every *n*th fish until you have reached your target sample weight.

Note: if your selected fish had a crystallized otolith; keep the otolith, fin tissue and length-weight data. Select 'Crystalized' for Oto Status in the PowerApp. When completing the market sample report, enter the box and cell number(s) and "Crystallized" in the comment section.

2. If **sling or tote sampling**, **DO NOT** replace a fish that had a damaged or unobtainable otolith. However, use your own judgment in this matter. If an unusually large number of fish in a sling or tote had crystallized otoliths or if you lost many otoliths, you would start over with a new sling or tote (discarding any otoliths you had collected from the unusual sling/tote). High rates of otolith loss can occur if the fish were heavily infested or eaten by sand-fleas (the membrane and fluids around the otoliths are consumed by the fleas and the otoliths disappear inside the head) or if the fluid surrounding the otolith becomes frozen, in which case the otoliths are impossible to extract or shatter when removed.

Note: occasionally the structures separating the right and left otolith cavities are destroyed by sand flea predation or heavy stunning and a right-side otolith may be collected by accident; right otoliths should not become part of the sample. Refer to Appendix I in this handbook for images to help you identify crystallized or right-side otoliths.

1.16 Filling Sample Otolith Boxes

1. After the otolith is extracted, remove any attached membrane from the otolith by wiping it on the back of your gloved hand or rinsing in a cup of clean water.
2. Place the otolith in the appropriate cell in the box. Boxes are filled top to bottom, left to right, starting at the top left (Sunday morning). Do not leave empty cells between samples.
3. When the row of cells is filled, cover the cells with the clear plastic strip. It is important to cover the cells before opening the next row in case the box tips or is knocked and the otoliths are either lost or dislodged.
4. Fill all 28 cells and if you run out of room for the sample, continue the sample in a new otolith box. Keep samples in consecutive order. Do not jump from box to box and back again.
5. As soon as possible, put a few drops of 50% glycerin-water solution on each otolith, just enough to cover the otolith completely.
6. Clean the outside of the boxes if they have slime on them. Slimy boxes can become moldy by the time they reach the IPHC headquarters in Seattle. If you wash the outside of the boxes, make sure they dry and are stored somewhere dry prior to shipping. Mold can grow on moist boxes that are sealed in bags or stacked in a box for several weeks.
7. Prior to shipping to the IPHC Headquarters office
    a. Cover the otoliths with just enough cotton to soak up the excess glycerin and keep the otoliths from rattling around in the cells. DO NOT over-stuff with cotton. This makes it difficult to remove the lid without the otoliths flying out, as the cotton expands.

b. Place the Length/Weight data form (Figure 1.13) on top of the corresponding box and secure with rubber bands.

c. Place the boxes into ziplock bags.

8. In the unfortunate event that a full pillbox spills and the contents are mixed, we can still use the ages independently from the lengths and weights. Just note which cells are mixed.

9. Ship otoliths and tissue samples to the IPHC headquarters in Seattle with accompanying logs to meet required deadlines. Send complete samples, even if it means sending a partially empty otolith box! Remember to submit the Market Sample and OWL reports prior to mailing the otoliths and tissue samples.

1.17 Tissue Sample (fin clips)

A tissue sample must be obtained from each randomly sampled fish. Tissue samples are placed on chromatography paper forms and dried.

1. Enter your Staff ID code in the header section as you prepare to use each sheet, along with the box #, port code, and year.

2. Tissue samples must be taken from a fin; preferably the tip of the pectoral fin (see Figure 1.8). Try to take clips that are about 1 x 1 cm to 1 x 1.5 cm (½" x ½" to ½" x ⅔") in size (see Figure 1.11). This size ensures that clips fit inside the printed cells of the tissue sample form and provides enough tissue for multiple genetic tests from each clip.

3. Wipe the clippers off between fish to avoid cross contamination; a quick wipe of your clippers and forceps between fish, on a paper towel or something similar.

Many FDS(F) staff find that it is more efficient to temporarily place the tissue samples in the pill box in the same cell as the corresponding otolith. Once the sample is complete for the vessel, the tissue samples can be transferred to the chromatography paper.

Be careful not to allow the tissue samples to dry out or the tissue sample will not stick to the paper. When transferring to the chromatography paper, place the tissue samples in the same order as the otoliths (match). Make sure the tissue samples are laid flat on the paper. This maximizes adherence to the paper and speeds drying. Use forceps to spread the tissue sample as it is being transferred.

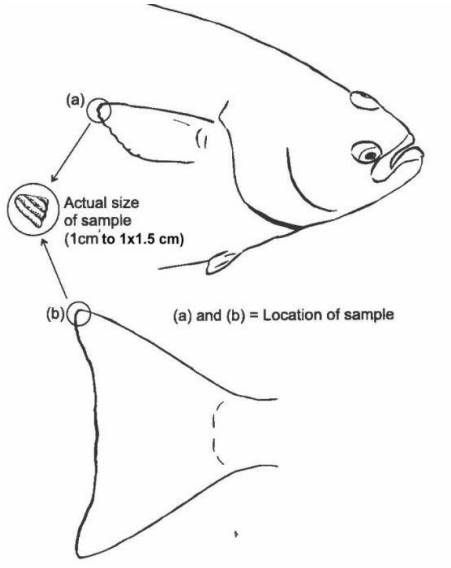


Figure 1.8. Convenient tissue collection location. Location A is preferred.

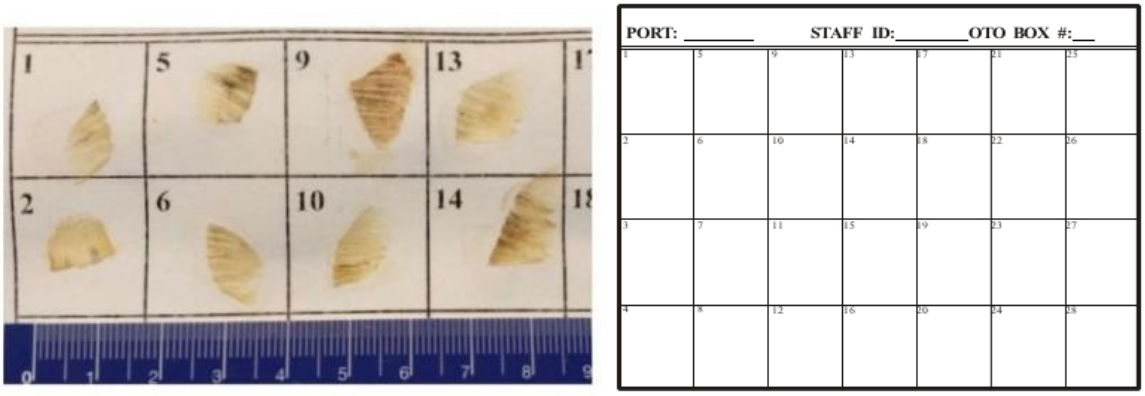


Figure 1.9. Tissue sample (Left) Chromatography paper (Right)

1.18 Preserving and Shipping Tissue Samples

Upon completion of a day's sampling, allow each sheet of chromatography paper that contains a tissue sample to dry completely. Allow sheets to dry out after additional tissue samples are added. If not all the cells on a sheet have been used for tissue samples, take a pencil and write an "X" in each of the empty cells prior to shipping. This allows IPHC staff to quickly identify unused cells and distinguishes unused cells from cells where the tissue sample fell off the paper or otherwise lost. Once the sheet is ready to mail, and completely dry, place the sheet in a recloseable plastic bag, with one each of the colour-indicating and non-colour-indicating silica gel packets. Place silica packets on the back side of the sheet, not the side with the tissue samples, then zip the bag tightly closed. Extra heavy recloseable bags for storing fin clip forms are provided in two sizes: 8" x 10" and 5" x 8". Forms with four grids will fit in the larger bags and the smaller bags can be used with single-grid forms. Please do not use the heavy plastic recloseable bags for pill boxes—you will be provided with lighter-weight Ziploc storage bags for pill boxes.

NOTE: If the tissue samples do dry out before transferring to paper, they can be stuck with small strips of scotch tape to the appropriate cells on the paper. Similarly, if you notice a sample coming loose or one that falls off after the sheet is dry, reattach them with tape (in the case of multiple samples falling off a sheet, only re-attach if you can be sure from which cell the tissue came).

1.19 Pacific Halibut Lengths

The fork length of Pacific halibut is to be measured to the nearest centimetre, from the snout to the fork of the tail. In most cases, measurements are taken on the IPHC sampling cradle, but in some cases (such as a fish too large to move to the sampling cradle) a tape measure and bookends are used.

1.19.1 *Length Measurement with the IPHC Sampling Cradle*

Measure the Pacific halibut to the full cm mark that appears first to the right of the tail. For example, for a fish measuring 122 cm, the reading would be taken between 121 and 122 cm as it appears on the IPHC sampling cradle.

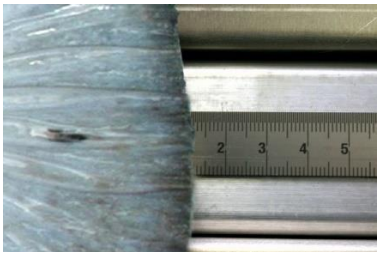


Figure 1.10. Fish measuring 122 cm.

1.19.2 Length Measurement with the Bookend

Make sure the fish is on a flat, level surface and that the fish is positioned in a straight line. Ensure that the bookends are not bent and are perpendicular to the surface and that the measuring tape is in a straight line.

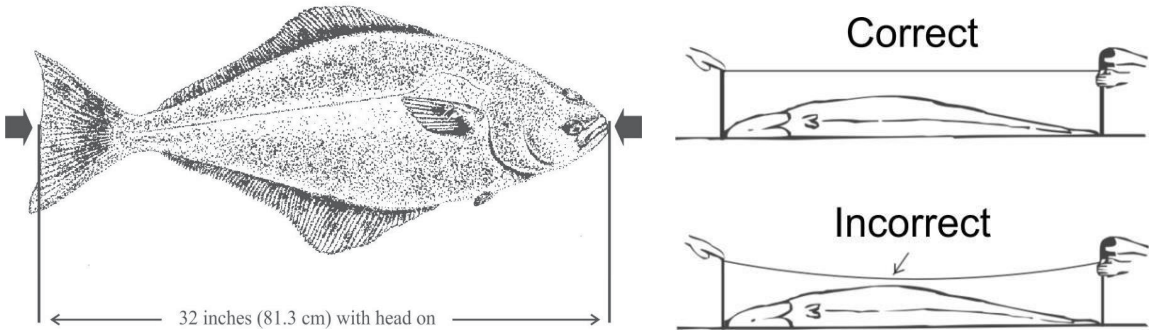


Figure 1.11. Sample Fork Length -- Total length between black arrows.

Measure the Pacific halibut to the ½ cm mark and round to the nearest whole number. For example, for a fish measuring 88 cm, the reading would be taken between 87.5cm and 88.5 cm.

Figure 1.12. Fish measuring 88 cm.

REMEMBER it is very important to match the Pacific halibut length, weight(s), and tissue sample with the corresponding otolith.

Record lengths in the field directly onto the Length-Weight Data Form, which is printed on waperproof, erasable Duracopy paper. This way HQ staff can more easily resolve potential transcription errors in the length/weight data entered by FDS(F) into the Power app. In past years, data was recorded on a plastic slate which was photographed after data was entered and prior to being erased. The Length/Weight data form is sent to HQ along with the pill boxes and eliminates the need for FDS(F) to keep photographs of the slate data.

1.20 Pacific Halibut Weights

Each sampled fish will have its weight (head-on) recorded, as well as other condition (unwashed and washed) weights when possible. The nature of the processing operation in each plant will determine whether a fish is weighed washed or unwashed.

1. Weights must be taken to the nearest one tenth of a pound. When weighing the larger fish (i.e., >120 cm), weights to the whole pound are acceptable when using a plant's scale that does not have precision to one tenth of a pound. If weights are taken with a scale other than the IPHC provided scale, record the make and model of the scale used for each weight.

2. When more than one condition weight can be obtained for a single fish (i.e., unwashed and washed), the fish selected for measurement can be tagged around the tail using the provided coloured Tyvek tags and rubber bands. You must record a unique number on each tag to track your selected fish and obtain the other condition weight. It is imperative to match each initial length-weight to any subsequent weight for a given fish. To ensure this, the same numbers must never be used at the same time during the offload. Tags should be reused in subsequent samples. The weight data must be recorded alongside the fork length data for later data entry.

If you are having difficulties, obtaining weights for any large fish, contact the Port Services Coordinator or the IPHC headquarters immediately to discuss options.

1.21 Recording Length/Weight Data

Record all length-weight data on the length-weight data form (Figure 1.13). Fill out all the fields as shown in the example and defined below.

1. Staff: Initial – ID
2. Port: Port name – Port code
3. Box #
4. S#: Fill out the last three digits of the sample number when you begin a new box or a new sample.
5. L: Fork Length
6. W: Gross Weight
7. The back side of the data form can be used for any notes related to the market sample(s) on the form. This form will be rubber-banded to the top of the pill box

Staff: BN		Port: Seward - 516			Box #: 1	
1 001 L 82 W 21.4	5 L 151 W 81.7	9 L W	13 L W	17 L W	21 L W	25 L W
2 L 126 W 53.7	6 002 L 120 W 35.7	10 L W	14 L W	18 L W	22 L W	26 L W
3 L 95 W 18.1	7 L W	11 L W	15 L W	19 L W	23 L W	27 L W
4 L 143 W 70.7	8 L W	12 L W	16 L W	20 L W	24 L W	28 L W

Figure 1.13. Length/Weight Data Form

1.22 Sinistral Pacific Halibut (Left-eyed)

If you come across (or are presented with) a sinistral Pacific halibut, collect both otoliths and all associated information. Place the otoliths inside a tag recovery envelope (NOT in an otolith box) and record as much information as possible on the tag envelope (see Tag Recovery). Send the sealed and completed envelope to IPHC headquarters with your package.

1.23 Clean Otolith Archive

1.23.1 Background

The IPHC otolith collection consists primarily of structures collected and used for age determination for the stock assessment. After being aged, otoliths collected by the IPHC are stored in a glycerin/thymol solution (to maintain readability) and archived. The glycerin solution renders otoliths unusable for research involving isotopic and elemental analyses. Therefore, the IPHC maintains a separate Clean Otolith Archive Collection (COAC) which contains a set of otoliths that are not used for age determination, and are cleaned, dried, and stored whole in climate-controlled conditions for future analysis. COAC samples are collected from commercial landings only for Regulatory Areas 4B and 4CD. COAC samples for other Regulatory Areas are collected during the IPHC fishery-independent setline survey (FISS).

1.23.2 COAC Sampling

Use the standard pillbox to collect COAC samples. However, identify this pillbox (**Clean Otolith Archive: No Oto Juice**) to ensure that market sample otoliths are not confused with COAC otoliths. Different pillboxes are provided to be used for shipping the COAC samples. They consist of an outer case which holds seven removable inner trays of four cells, with individual snap top lids for each cell. The individual lids prevent otoliths from moving between cells, which can happen with small, dry otoliths in the regular pillboxes, even with cotton. The lids of the inner trays are numbered in the office to prevent mixing of otoliths if more than one inner tray is removed at a time. An example of a COAC "shipping" box in Figure 1.16

Figure 1.14. Example of a COAC "shipping" box.

1. Collect both -eyed and blind side otoliths
2. Minimize the time the otoliths are in contact with metal. Some contact is unavoidable, because knives and forceps are metal. Try not to scratch surface of COAC otoliths with the knife and do not leave COAC otoliths sitting on metal surfaces.
3. Both otoliths of the pair must be "normal" – neither otolith can be crystalized or broken.
4. Clean all membranes and moisture thoroughly from otoliths using paper towels or a clean dry cloth.
5. Do not use any fluids, including water, to clean otoliths and do not expose to glycerin solution.

6. Place otolith pairs in the same cell of the COAC pill box.
7. Allow COAC otoliths to completely dry before adding cotton and closing the box.
8. Store the COAC otolith boxes in a stable environment until shipping (i.e., indoors at room temperature; no extreme temperature or humidity fluctuations)
9. Place COAC boxes in two ziploc bags (double-bag for extra protection) just prior to shipping; DO NOT put COAC and regular market sample boxes in the same ziploc.
10. Ship COAC otoliths with the other sampling data on the same shipping schedule.

A Market Sample and OWL report must be completed for each COAC sample. COAC samples are designated by clicking the 'Archival' box on the market sample report and a box number in the 500 series on the OWL report. Collect all standard data (length, weight, otoliths and tissue sample) as identified in this handbook (**Reminder: both otoliths must be collected**).

1.23.3 COAC Sample and Box Numbering

The COAC target sample is 100 otoliths for IPHC Regulatory Areas 4B and for Areas 4CD combined.

1. The COAC sample number series will begin with XXX501 (XXX = three-digit port code) and the regular market sample number series will begin with XXX001.
2. The COAC box number series will begin with 501 and the regular market sample box number series will begin with 001. **It is important that COAC otoliths are kept in separate box(es) from regular Market Sample otoliths**.

1.23.4 COAC Sampling in IPHC Regulatory Area 4BCD

COAC otolith collections from Regulatory Area 4BCD occur in conjunction with sampling of the commercial landings only in Dutch Harbor and St. Paul (if St. Paul buys Pacific halibut in 2023); the sampling rate has been increased to accommodate a target of 100 otolith pairs for the COAC. Collect both otoliths from every 10th fish identified for sampling. The otolith pair from each 10th fish should be prepared for the COAC as described above. Regular market samples and COAC samples will be collected from the same delivery in most cases. Be sure to keep market samples and COAC samples in separate boxes.

The COAC sample and regular market sample will each have a separate market sample report submitted, a separate sample number, and be in separate boxes. **Both sample numbers must be recorded on the log**.

2. TAG RECOVERY

Recovery of tagged Pacific halibut provides information on seasonal migration, rates of growth, and estimates of fishing and natural mortality rates. Asking whether any tagged Pacific halibut were caught is often an easy way to begin an interview with a captain. All IPHC external tags are clearly marked with the letters 'IPHC'.

Make sure you get a mailing address for the person who found the tag. IPHC will send a letter with release information and tag reward (if not redeemed in the field) to the recipient as a gesture of appreciation for returning the tag. The reward for all tag types is $10 or a hat. You will be issued both baseball style or knit caps embroidered with the IPHC logo and "Tag Reward". If the finder requests a hat as reward, please try to issue it at the time you receive the tag. The $10 rewards will be issued by check from Seattle HQ. Most IPHC tags are plastic-coated wire tags that are located on the dark side operculum (Figure 2.1, Table 2.1). Occasionally, tags from other individuals or groups who have tagged Pacific halibut without permission from the IPHC will be found and returned to FDS(F). Collect the associated data and tag from these non-IPHC tags, indicating the tag is a non-IPHC tag. The IPHC does not give rewards for non-IPHC tags released without IPHC permission.

IPHC regulations allow ANY vessel at ANY time to retain IPHC-tagged Pacific halibut. Therefore, people in other fisheries, such as recreational, subsistence or non-directed commercial in other fisheries (e.g., trawl) are to be encouraged to retain tagged Pacific halibut.

2.1 Tag Types

2.1.1 Plastic-coated Wire Tags

Plastic-coated wire tags have been used alone (wire-only) or along with other external and internal tag types (double-tag experiments). Figure 2.1provides examples of the wire tag types.

Figure 2.1. Wire tag types

2.1.2 Satellite Tags

The IPHC has released several hundred pop-up satellite transmitting archival tags (PAT tags). The tag body is released from the leader at a pre-programmed date, but the leader remains attached by dart to the dorsal region of the fish. The tag bodies may also be found washed ashore—PAT tag bodies from earlier experiments may be printed with text offering a $500 reward for their return, but the current reward amount is either $10 or a hat.

Figure 2.2. Pop-up satellite transmitting archival (PAT) tag

2.2 Removal from the fish

Wire spaghetti tags are twisted into the operculum cover of the cheek on the dark side and can be untwisted or cut out of the cheek of the Pacific halibut. Stainless steel and plastic tipped dart tags must be cut out of the fish.

Figure 2.3. Pacific halibut with wire spaghetti tag.

2.3 Data Collection from Tagged Fish

The numbered items, in this section, refer to items on the tag redemption envelope (see Figure 2.4). The envelopes are to be filled out and must be legible.

INTERNATIONAL PACIFIC HALIBUT COMMISSION TAG RECOVERY

Tag Number	Type	Recovery Date (capture date) Day Month Year
Latitude / Longitude (preferred) or Recovery Location		Statistical Area
Gear Type: Longline / Troll / Trawl / Pot / Handline / Unknown		Depth (fathoms)	Re-released Y / N
Fork length cm	Weight (circle units) kg lb	Sex M F	Landing Port	Port Code
Data collected by: (circle one) IPHC / Observer / Enforcement / Other / Fishing crew / Plant worker	Tissue Y / N	Tail Photo Y / N	Otolith (both preferred) Right / Left / Both
Na	St 1	Vessel Number	Vessel Name
Name, Street Address			
City, State/Province, Zipcode/Postal Code			Hat issued Y / N

Rev. 03/2020 IPHC Form-Tag Recovery

Figure 2.4. Tag redemption envelope

1. **TAG NUMBER**: Number on the tag. If the Pacific halibut is from a double-tagging PIT experiment, record the wire tag number and note whether or not the PIT tag was recovered.
2. **TAG TYPE:** Single digit or one letter code (capitalized). See Table 2.1.

Table 2.1. Tag types.

Color	Type	Year Used
Pink wire	C	1984-1994 grid/directed research 2017 setline survey and NOAA trawl survey U32 tagging
Two-tone orange wire	D	1995 trawl bycatch and survival 2003 double tagging in BC (PIT tag in head) 2017 NOAA trawl survey U32 tagging 2018-present FISS U32 tagging 2021 recreational discard mortality
Homer Derby orange wire	E	Homer Derby tag releases (odd years)
Coffman Cove Derby orange wire	E	Coffman Cove Derby (2013 -2014)
Homer Derby yellow wire	G	Homer Derby tag releases (even years)
Hot pink wire	H	2009-2013 (wire only and double tag projects) 2016 Seward recreational Pacific halibut Tournament
Fluorescent orange wire	J	2018-present (tail pattern recognition project)
Neon green wire	N	2001 double tagging experiment with PIT tags
Seward Tournament blue wire	T	2012 Seward Pacific halibut Tournament
Homer Derby purple wire	U	2012 Homer Derby tag releases
Green wire tag	V	2017 Homer Derby and Seward Tournament releases
Seward Tournament white wire	W	2013 Seward Pacific halibut Tournament releases
Neon yellow wire	Y	NOAA trawl tagging (2015-2019) FISS U32 tagging (2016-present) 2016 Seward Tournament releases
Thin neon yellow wire	Z	2016 NOAA trawl tagging (fish<30 cm)

3. **RECOVERY DATE:** Date the fish was **caught** (day/month/year) not the day the vessel delivered. If no date is specified, use mid-date of the fishing trip.
4. **LATITUDE/LONGITUDE or RECOVERY LOCATION:** Lat/lon where fish was caught as degrees, decimal minutes.

If told the tagged fish was caught somewhere in a series of sets or when a range of locations are given, assign the tag recovery to the string where the most fish was caught (assumption is the tagged fish had the greatest probability of being caught in the set with the most fish).

If unsure on how to convert the location correctly to a latitude - longitude, leave it blank and it will be converted at the IPHC HQ. Write on the envelope what the problem was in determining the latitude - longitude. **Please ask IPHC HQ staff before submitting incomplete data.**

5. **STATISTICAL AREA:** IPHC statistical area where fish was caught (from nautical charts or plasticized charts). ***Stat Area is one of the fields often left blank. Must complete if you have a recovery location!***
6. **GEAR TYPE:** Most vessels recovering Pacific halibut tags will have longline gear. Some tags will be from other types of fisheries. Check the appropriate box. If you know specifically what longline gear was used, write the appropriate gear code in the box (e.g., FH, SS, SN). If not, write UL = unspecified longline. If the tag recovery came from a trawl gear fishery, try and find out what type and write that beside the gear type (i.e., Bottom Trawl=BT, Shrimp Trawl= ST, Mid-water Trawl=MT).
7. **DEPTH:** Depth the fish was caught in fathoms.
8. **RE-RELEASED:** Circle "Y" for yes, "N" for no. Used to indicate whether fish was re-released with or without the tag. (NOTE: if finder has re-released fish, please remind them that IPHC-tagged Pacific halibut of any size and from any fishery or time of year may be retained and the information they provide is very valuable.)
9. **FORK LENGTH:** Length from snout to fork of tail (see section 1.19)
10. **WEIGHT:** Weight of the fish. Circle units of weight.
11. **SEX:** Circle "M" for male, "F" for female, if known.
12. **LANDING PORT:** Port where the tagged fish was landed by the ve ssel (may be different than the port where tag is redeemed).
13. **PORT CODE**: The 3-digit port code for the port where the tagged fish was landed.
14. **DATA COLLECTED BY:** If tagged fish was collected by Secretariat, circle "IPHC" and note initials in or next to the box. If the tagged fish was collected by someone from another agency (i.e., NOAA Enforcement, ADF&G, WDFW, ODFW, CDFW, or DFO, etc) or by fishing crew or plant worker, circle the appropriate category. If the person who collected the data falls outside of these categories, circle "other" and describe on the back of the envelope.
15. **TISSUE:** Circle "Y" for yes, "N" for no to indicate whether a tissue sample (fin clip) was collected.

    A tissue sample should be collected and dried on chromatography paper. Blank strips of chromatography paper are provided and can be cut into smaller pieces for this purpose. Record the tag number and type on the paper beside the fin clip. As soon as possible allow the envelope and chromatography paper with the fin clip to completely dry out. Place the clip on the paper in the envelope when dry.
16. **TAIL PHOTO:** Circle "Y" for yes, "N" for no to indicate whether a tail photo was taken.

    A photo of the **white side** of the tail must be taken for recovered fish bearing Type J wire tags imprinted with the text "Please Photograph Tail" (see Tail Photograph for Recovered Type J Tags).
17. **OTOLITH:** Circle RIGHT, LEFT, or BOTH where two, one or no otolith(s) were collected.
18. **NATION:** Nation where the vessel is licensed (1=U.S.A., 2=Canada).
19. **STATE:** State where the vessel is licensed (AK=1, BC=2, WA=3, OR=4, CA=5).
20. **VESSEL NUMBER:** The VRN for Canadian vessels or the state number for U.S.A. vessels.
21. **VESSEL NAME:** The full name of the vessel from which the tagged fish came (capitalized).
22. **NAME, STREET ADDRESS:** Name of person to receive release data and their street address.

23. **CITY, STATE/PROVINCE, AND ZIP/POSTAL CODE:** Mailing address of person to receive reward and release data. Use the finder's mailing address**. NOTE: addresses need postal or zip codes.**

24. **HAT ISSUED:** Hat rewards should be issued in the field when the tag is collected. Note whether a reward hat was issued by circling 'Y' for yes and 'N' for no.

2.4 Tail Photograph for Recovered Type J Tags

Since 2018, a subset of U32 Pacific halibut were tagged with bright orange wire tags ("J" tags) with the text "PLEASE PHOTOGRAPH TAIL" (see Figure 2.5) as part of a study investigating whether pigmentation patterns on the white side of the tail persist through life and can therefore be used as a natural tag. The IPHC would like captains recovering J-tagged fish to provide the whole fish with tag still attached to the Secretariat.

Upon receiving a whole animal with a tag requesting a picture of the tail:

1. Use the blue craft mat provided as a backdrop for photographing the white side of the tail. When the tail photos are analyzed, the blue background enhances the ability of the pattern recognition software to segment the image into 'tail' and 'non-tail' components. Using the lined side of the mat will help, as we can use it for scaling.
2. Spread the tail fin rays wide.
3. Wipe any excess ice/slime/blood off the tail.
4. Include the tag number (written on a slip of paper) in the image.

See the example of a tail photo in Figure 2.6. Generally, an image that fills most of the view and is taken directly over the tail is best. To achieve an image that fills the field of view, the distance between the camera and the tail is usually around 30cm, but most important is that you focus the camera (e.g., if using a cell phone camera, tap the image before taking the photo). Images from cell phones or most standard digital cameras will suffice, just be sure when emailing or texting the messages to the office, that you send the highest quality version you have (some email and texting programs lower the quality of the image to save on data transmission time and rates).

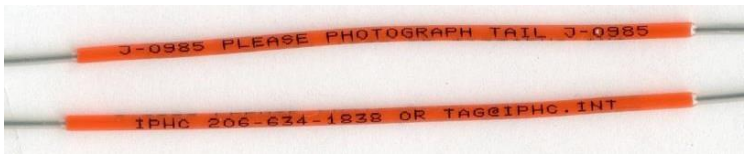
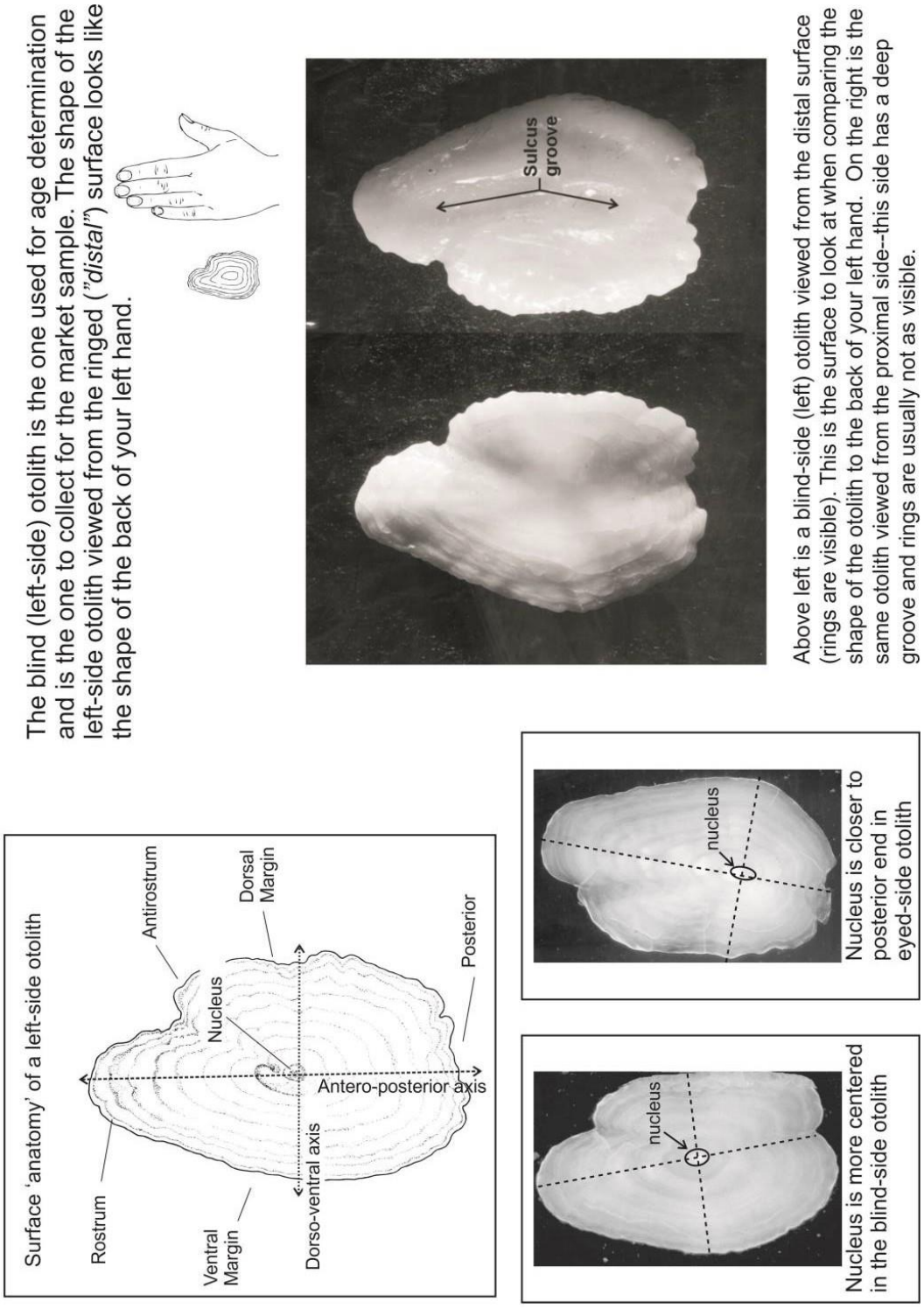


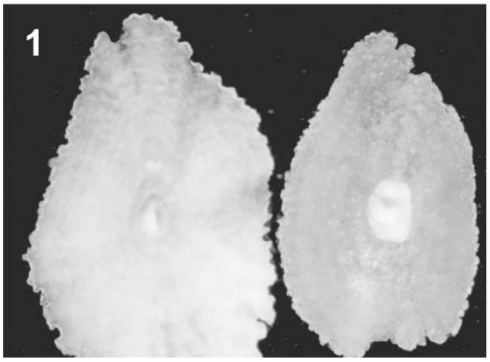
Figure 2.5. "J" type tags used for tail pattern project

Figure 2.6. Example of image of white side Pacific halibut tail

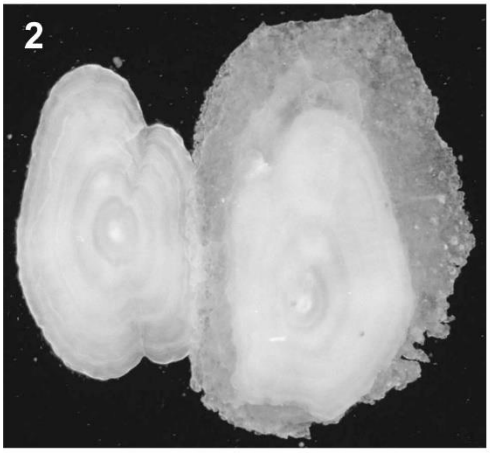
APPENDIX I: OTOLITH GUIDES



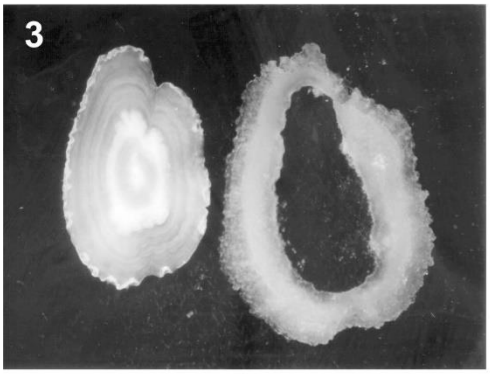
Recognizing Crystallized Otoliths: Otoliths are composed of calcium carbonate that can take one of two different crystalline forms. The form found in 'normal' otoliths is *aragonite* while in crystallized otoliths, the form is *vaterite*.



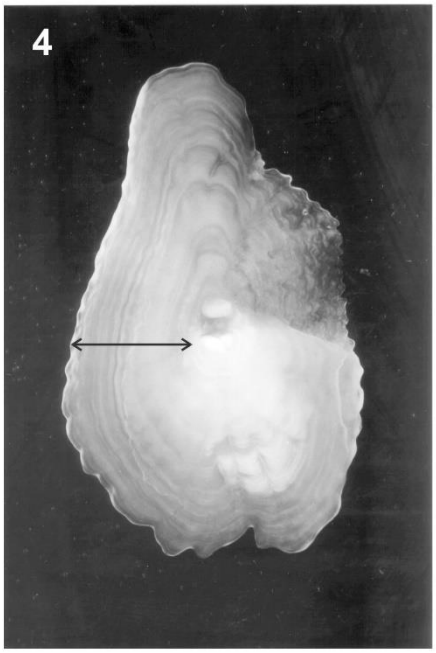
1. Fully crystallized: opaque form (left) and translucent form (right). These otoliths cannot be aged.



2. Pair of otoliths that began depositing vaterite after 6th year. Crystallized ring has broken off the left-side otolith. The left otolith was probably unusually small for the size of the fish. This otolith would not be aged.



3. Left-side otolitih with crystallized ring that broke off. This otolith cannot be aged.



4. Partially crystallized: this otolith could be aged because there is 'normal' growth from the nucleus to one edge (see arrow).

5. Partially crystallized. This otolith cannot be aged.

APPENDIX II: RANDOM NUMBER TABLE

9	2	3	3	0	3	3	9	7	3	4	5	4	2	5
2	5	5	3	1	6	1	0	5	9	9	2	4	2	2
0	7	9	7	2	7	7	3	3	0	9	1	5	7	5
5	3	6	1	0	5	7	5	7	3	4	8	1	5	1
6	9	4	0	6	9	3	5	3	2	7	6	3	0	7
0	0	2	0	5	0	4	9	5	8	2	9	9	8	5
0	1	1	7	2	7	1	4	4	6	0	5	4	6	7
0	3	9	7	9	6	1	8	9	0	5	8	7	2	9
5	2	4	3	1	2	8	3	3	3	2	3	8	0	0
6	0	8	2	3	2	4	4	5	8	4	8	2	0	4
1	1	5	8	4	4	1	3	0	9	5	9	0	8	9
9	6	4	9	6	0	2	9	7	9	7	4	3	0	5
7	4	6	4	6	8	3	9	1	3	9	7	0	8	6
6	4	0	8	1	8	5	0	8	5	1	8	5	0	7
9	5	4	7	6	4	1	1	7	5	2	5	8	9	6
6	6	3	9	6	9	8	8	4	1	9	4	0	6	4
3	3	0	5	8	5	1	6	6	4	7	9	6	0	5
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6	6	9	1	4	9	0	9	2	1	1	4	0	6	3
9	3	2	3	2	1	4	0	6	9	4	8	5	6	0
9	4	0	6	3	0	4	9	2	4	5	7	0	9	6
9	2	7	1	8	8	5	4	3	7	5	4	2	4	5
9	4	1	2	1	2	3	1	4	8	3	0	2	1	0
7	7	4	0	1	8	9	8	3	7	5	7	8	6	0
7	7	8	9	9	4	1	8	6	1	9	5	6	2	8
0	7	7	7	4	2	2	3	0	0	6	4	4	7	1
9	8	5	1	7	9	4	8	3	6	9	9	7	8	4
2	9	9	8	4	0	6	0	3	7	3	0	1	5	5
7	1	1	6	4	7	3	6	3	8	5	4	5	3	8
7	4	0	4	5	8	0	8	4	5	6	5	1	9	2
2	3	3	8	7	0	0	0	2	3	1	6	1	0	9
7	3	0	4	1	7	5	3	2	5	9	0	1	7	5
6	2	4	6	5	1	4	4	7	1	9	7	3	0	9
5	9	0	4	1	2	0	4	3	6	4	3	9	7	2
5	0	3	5	4	8	5	1	3	9	6	2	1	1	5
1	7	0	2	4	5	5	8	9	4	3	9	3	9	5
9	0	5	0	5	0	3	4	1	3	5	8	4	2	2
5	2	3	2	2	6	5	2	3	2	9	4	7	2	4
0	4	2	1	5	1	5	8	9	6	5	3	8	8	1