International Pacific Halibut Commission

Manual for Sampling Directed Commercial Landings (2021)

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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 sampling procedure for collecting otoliths, tissue samples, and associated length-weight data from directed commercial landings (also called Market Sample) is the responsibility of IPHC Secretariat. A sampling rate is determined for each port by IPHC Regulatory Area. The applicable rate is calculated from the current year's fishery limits and estimated percentages of pounds landed and estimated percentages of pounds sampled in that port to allow for collection of the target number of otoliths/tissues and associated length-weight by IPHC Regulatory Area. The sampling rates are used to obtain representative and proportional samples to hailed weights.

Cooperate with plant personnel and impress upon them that actual sampling will be of a short duration and should not interfere with their operations. Establishing several sampling sites will minimize inconvenience to plant operations.

1.1 Canadian Landings

Canadian vessels fish under an Individual Quota (IQ) system. The captain is required to hail in to a port 24 hours before unloading Pacific halibut. Note that landings that were not listed 24 hours ahead of time might still occur. It is important to establish a good rapport with the Archipelago Marine Research (AMR) port supervisor or validator(s) in applicable ports as they may notify you of landings not previously listed in Fishery Operations System (FOS). Finally, unloading of IQ fish in Canada may occur as early as 5:45 am and as late as 9:30 pm. However, the majority (80%) of the offloads occur between 7:45 am and 2:30 pm.

Work closely with AMR validators to be notified anytime a landing is comprised of Pacific halibut. If unsure, the Secretariat must be at the dock for the offload and ask the captain if any commercial Pacific halibut will be offloaded. An AMR validator has to validate the weight of the catch, as the Pacific halibut are unloaded. It is crucial that the IPHC Secretariat works closely with AMR and the processing plant to successfully obtain a representative sample of the landed catch. If there are problems with lack of landing notifications or sampling logistics, contact your supervisor at the IPHC Headquarters' (HQ) office.

1.2 U.S.A. Landings

Alaskan vessels fish under an Individual Quota (IQ) 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 offload must then occur within two hours of the time of offload given on the PNOL. The IPHC Secretariat is notified via email and text message regarding pending landings. The NOAA OLE may grant waivers allowing vessels to unload without waiting the required three hours. The IPHC Secretariat should work closely with NOAA OLE concerning notification when these waivers are given. If waivers occur frequently, inform your supervisor. Unloading of IQ fish in Alaska may only occur between 6 am and 6 pm, under IFQ regulations.

1.2.1 *IPHC Regulatory Area 2A Landings*

Vessels in this IPHC Regulatory Area are not required to provide prior notice of a landing. However, the fisheries are often of shorter duration with multiple landings occurring in close proximity to each other. The Secretariat must work with plant personnel to know when landings are expected to occur.

1.3 Sampling Objectives

It is very important that samples be representative of total directed commercial Pacific halibut landed removals and random sampling techniques are followed. The Secretariat must adhere to the objectives listed:

1. Take samples from as many landings as possible on designated sampling days throughout the season.
2. Sample at an equal proportion, throughout the season, by using sampling rates.

3. Sample at an equal proportion from week to week such that, if a sample day is switched with a log collection day or missed in a given week, it must be made up in that same week.
4. Sampling throughout the offload is most representative. If necessary, develop a system to take otoliths, tissue, and length-weight data from the first third, the middle third, and the last third of landings proportionally, if applicable to your sampling situation. This applies to large offloads and when it is difficult to spread your sample throughout the offload. An alternative to this is choosing a sampling frequency when tote sampling (sampling every n^{th} tote) similar to the procedure for choosing a sampling frequency when line sampling.
5. By following the sampling procedures in this chapter, work towards achieving each port's share of the target otoliths-tissues and length-weight measurements by IPHC Regulatory Area.

1.4 Sampling Rates by IPHC Regulatory Area

Prior to sampling an offload, be sure to check with the captain regarding which IPHC Regulatory Area(s) were fished and the accompanying hail by IPHC Regulatory Area. Once you have determined the IPHC Regulatory Area the fish are from, apply the applicable sampling rate(s) to the hail weight given by the captain to arrive at the weight of fish to sample by IPHC Regulatory Area.

Note that Pacific halibut retained from multiple IPHC Regulatory Areas during a single trip must be identified as such and sampled separately (Sampling Landings with Pacific halibut from more than one IPHC Regulatory Area)

From IPHC Regulatory Area 4CD, Pacific halibut must also be separated in the hold, under IPHC regulation. It is preferable that the fish from these areas be sampled separately. However, it is acceptable, for these areas only, to sample the landings if the fish are mixed since they are managed as one area.

Table 1.1. Sampling rates by port and IPHC Regulatory Area, displayed as percentages.

Port	2B	2C	3A	3B	4A	4B	4CD
Dutch Harbor	3	6	1	2.5	6	15	15
Homer	3	6	1	2.5	9	15	15
Kodiak	3	6	1	2.5	6	15	15
Petersburg	3	6	1	2.5	6	15	15
Port Hardy	2	6	1	2.5	6	15	15
Prince Rupert	5	6	1	2.5	6	15	15
Seward	3	6	1	2.5	6	15	15
Sitka	3	6	1.5	2.5	6	15	15
St. Paul	3	6	1	2.5	6	15	15
Bellingham	3	6	1	2.5	6	15	15
Vancouver	10	6	1	2.5	6	15	15

Table 1.2. IPHC Regulatory Area 2A sampling rates by fishery.

Fishery	Sampling Rate (%)	Sampling Rate (Ratio)
directed commercial	10	1 in 10
incidental to longline sablefish fishery	10	1 in 10

Table 1.3. IPHC Regulatory Area 2A Tribal Indian commercial sampling rates by percentage and ratio.

Tribe	Sampling Rate (%)	Sampling Rate (Ratio)
Hoh	10	1 in 10
Jamestown S'Klallam	5	1 in 20
Lower Elwha Klallam	5	1 in 20
Lummi	15	1 in 7
Makah	11	1 in 9
Nooksack	10	1 in 10
Port Gamble S'Klallam	5	1 in 20
Quileute	5	1 in 20
Quinault	7	1 in 14
Skokomish	10	1 in 10
Suquamish	10	1 in 10
Swinomish	5	1 in 20
Tulalip	10	1 in 10

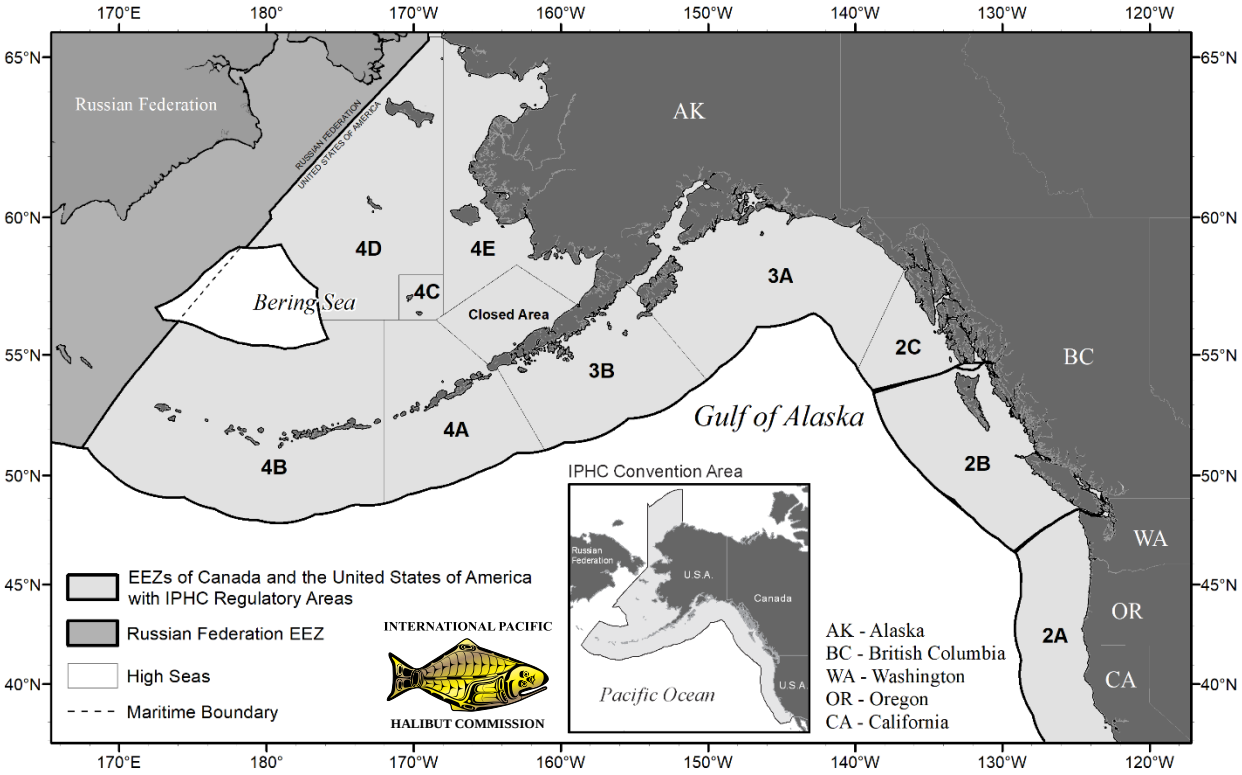


Figure 1.1. IPHC Convention Area and Regulatory Areas.

1.5 Sampling Landings with Pacific halibut from more than one IPHC Regulatory Area

Pacific halibut retained from more than one IPHC Regulatory Area during a single trip must be identified as such and sampled separately. When a vessel lands catch from more than one IPHC Regulatory Area, it is important to query the captain as to how much of the landing is from each IPHC Regulatory Area and how the catch is separated. For example, a vessel landing 18.1 t (40,000 lb) of Pacific halibut from IPHC Regulatory Area 3A and 3B into Homer, has 11.3 t (25,000 lb) of Pacific halibut from IPHC Regulatory Area 3A and 6.8 t (15,000 lb) from IPHC Regulatory Area 3B. This is determined after querying the captain. Therefore, the IPHC Regulatory Area 3B poundage would be added to the existing IPHC Regulatory Area 3B pool (and possibly sampled) and the IPHC Regulatory Area 3A landed catch would be sampled on its own (depending on the pooling threshold).

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). The IPHC Secretariat must clearly identify the area of catch as the Pacific halibut are offloaded. Confirm with the captain and unloading crew whether the fish really are separated by IPHC Regulatory Area. If the Pacific halibut are not separated, do not sample the landing, unless from IPHC Regulatory Area 4CD. IPHC Regulatory Area 4CDE/Closed is one management area.

1.6 Selection of Sample Days

It is important that as many landings as possible have a probability of being sampled in order for the sampled Pacific halibut to be a representative portion from the population of retained Pacific halibut. To help ensure this, the weekly sampling schedule is randomized so that landings on any day have an equal chance of being selected for sampling.

1.7 Sampling Priorities

Use judgment when you have conflicts with more than one vessel landing at a specific time. For example, if two IPHC Regulatory Area 3A vessels are unloading at the same time, sample the one with the greatest poundage. Alternatively, if you have several vessels at different plants, but the plant where you are working has a constant unloading schedule, you should stay at that plant and sample rather than dash around. Below are the priorities by IPHC Regulatory Area for Canada and U.S.A.

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

1. Area 4B
2. Area 4CD
3. Area 4A
4. Areas 2A, 2B & 2C
5. Areas 3A & 3B

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

1. Area 2A
2. Area 4B
3. Area 4CD
4. Area 4A
5. Area 2C
6. Area 3B

7. Area 3A

On small landing days, small landings take priority. When there are no small landings, sample large landings.

1.8 Sampling Procedures

Otoliths are collected to provide age information for the directed commercial landings. All otoliths collected will be used to determine the age composition. The age of the fish is determined by counting the number of annual rings.

Each Pacific halibut has two easily-visible otoliths, but only the one from the blind side is collected. See Appendix I in this handbook for details on how to recognize blind and eyed side otoliths.

1. Take the fork length, and weight(s) of the Pacific halibut for every otolith and tissue sample.
2. Divide the mean weight of the Pacific halibut being offloaded into the hail weight to provide an estimated number of fish.
3. Sample throughout the entire offload as this allows for the most representative sample (preferred).

   For offloads over 4.5 t (10,000 lb), you may designate your scheduled sampling vessel to be either a first third, second third, or last third sample. This must be done randomly through the use of a random number table. If the designated portion of the landing has already been unloaded, DO NOT sample the landing.

   When tote sampling, choose a sampling frequency, i.e., every n^{th} sling or tote, which will ensure the sample is spread throughout the offload. Assess how many pounds each tote holds and how many totes are likely to be filled for a given offload.

   a. Randomly choose a starting sling or tote from the numbers between one and *n* inclusively.
   b. Sample this tote.
   c. Sample the next n^{th} sling or tote until you reach the end of the offload or the required sample weight has been obtained.

   A fishing log must be copied/collected for each sample taken.

The aim of the following section is to explain what qualifies as a good sampling strategy so that when faced with various and changing conditions, you can devise procedures appropriate to each unloading site.

The target is to collect 1,500 biological structures (otolith and tissue samples) and associated length-weight measurements from each of the IPHC Regulatory Areas 2B, 2C, 3A, 3B, 4A and 4CD. For IPHC Regulatory Area 2A, the target is 650 otoliths from Tribal Indian Commercial landings and 350 otoliths from Non-tribal Directed Commercial landings. These targets are achieved by taking samples from a fixed percentage of the weight of each Pacific halibut landing sampled. The sampling percentages are calculated for each IPHC Regulatory Area by port to ensure the samples are evenly distributed over the landings from all ports where sampling occurs.

Note that there is no mention here of the number of fish to be selected from a landing. The aim is to draw a certain percentage of the weight landed for the sample. The number of fish in the sample will depend on the average size of fish in the landing. For equal landing weights, a landing of large fish will be represented by a few otoliths and a landing of small fish will be represented by many otoliths, consistent with the relative numerical abundance of those sizes in the combined landings.

In order to achieve the prescribed sample weight, the Secretariat must obtain (from the captain or the PNOL/FOS hails) an estimate of the total landing weight by IPHC Regulatory Area. This will be an

estimate, such that the realized sampling rate for individual trips may vary from landing to landing. This is acceptable as long as the deviations from the target rate are unrelated to the size composition of the landings.

In IPHC Regulatory Area 2A, landings are generally smaller and the captain may not have an accurate estimate of the total weight. Therefore, obtain a sample from these landings by using a ratio rather than a percentage.

The basic sampling challenge is how to draw a "representative" sample of a certain size (i.e. weight) from a landing. The guiding principle in designing a sampling procedure is that every fish in a sampled landing has an equal chance of appearing in the sample. Stated another way, there should be nothing that makes one fish more likely to appear in the sample than another fish.

Achieving this objective in practice requires a procedure that can be performed mechanically, with no opportunity whatsoever for choosing fish arbitrarily. A more casual approach to selecting the sample will often result in a bias by providing opportunities to exercise some degree of choice in which fish to sample.

Each sampling procedure detailed below provides a "mechanical" sampling method to ensure that a random sample is taken. However, offloading procedures may vary at the various ports and plants from year to year. To comply with one of the approved sampling methods, at the beginning of the season, the IPHC Secretariat visits each port to assist with establishing and refining sampling procedures. The approved procedures by port are documented within the first month following an internal review and approval process. Sampling methods and procedures are discussed below and listed in order of preferred method.

1.8.1 *Sampling off the Line*

The best approach is to sample at a point where all the fish pass by singly and may be sequenced. 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 may also be viewed as a sequencer.

1. Pick a sampling frequency, i.e. every n^{th} fish (e.g. every fifth fish, or every tenth fish) that will ensure the sample is spread throughout the offload.

   As an example, for a small delivery 4.5 t (10,000 lb), n could be chosen between one (i.e. every fish) and five (i.e. every fifth fish), while with a large delivery (e.g. 13.6 t; 30,000 lb), the number could be between ten and fifteen.

2. Randomly choose a starting fish from the numbers between one and n inclusively (from one to five for a small delivery and one to fifteen for a large delivery, in our example).
3. Sample this fish (remove the otolith and obtain a tissue sample, length, and weight measurement).
4. Return the sampled fish to the line.
5. Count the passing fish until you reach the chosen number, *n*, and sample this fish.
6. Repeat steps 3-5 until you have reach the end of the offload or the prescribed sample weight has been obtained.

In IPHC Regulatory Area 2A, use the applicable sampling ratio listed in Table 1.2 or Table 1.3. This assumes the presence of a sampling partner to count passing Pacific halibut while a fish is being processed. If sampling alone, select a lower *n* that will ensure enough fish are sampled throughout the offload to reach your prescribed sampling weight.

Many IPHC Regulatory Area 2A landings are small and may consist of less than 10 fish. Therefore, follow these steps:

a) Randomly pick the first sample fish using the procedure previously outlined.

b) Maintain a tally of the fish from every offload, sampling your n^{th} fish throughout the season

until you are done with sampling for the season.

This requires you to keep tally throughout the season. Only include trips where you would be available to sample.

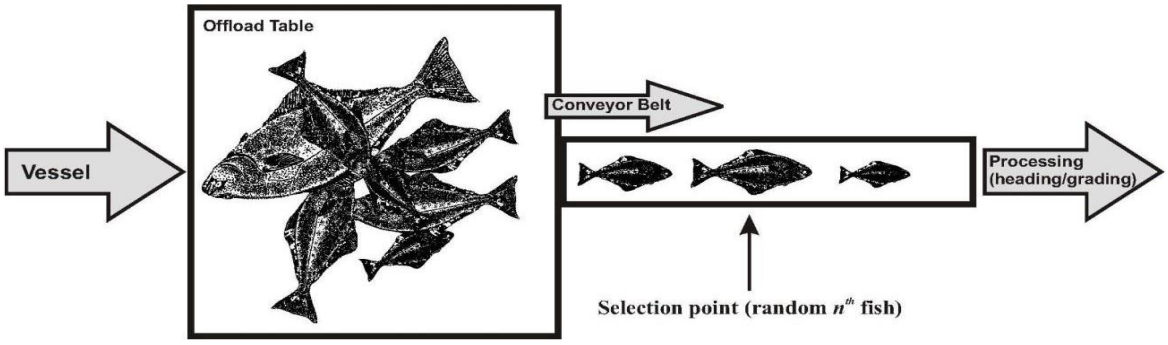


Figure 1.2. Depiction of line sampling.

Stop sampling when the prescribed sample target weight is obtained or when you are within half the average weight of a Pacific halibut from that IPHC Regulatory Area.

Become adept at choosing an appropriate number such that reaching the end of the offload and obtaining the required target weight occur in close temporal proximity to each other. This helps to ensure that the samples are spread evenly throughout the offload and is representative of the entire landing. The weight for each sampled fish is determined through use of the chart of length intervals (in cm) and corresponding average net weights (in kg and lb) which will provide acceptable estimates of the weight of fish in a sample. Use Table 1.4 to determine when to stop sampling rather than the actual weight measurements.

Table 1.4. Average net weight of Pacific halibut for length intervals.

Length (cm)	Weight (kg)	Weight (lb)	Length (cm)	Weight (kg)	Weight (lb)	Length (cm)	Weight (kg)	Weight (lb)
70 – 81	4.5	10	132 – 146	27.2	60	176 – 185	63.5	140
82 – 98	6.8	15	147 – 156	36.3	80	186 – 199	77.1	170
99 – 114	11.3	25	157 – 168	45.4	100	200 – 209	95.3	210
115 – 131	18.1	40	169 – 175	54.4	120	210 – 219	131.5	290

1.8.2 *Sampling off the table*

If the fish cannot be sequenced, the sample must be drawn from the table when the fish are dumped. The method is to take two or three fish from each sling until the required sample weight is obtained.

1. Determine the number of fish to be sampled from each sling.

   Consider the average size of the fish as well as the hail weight for the sample. These are taken into account to ensure the target sample weight is reached while also spreading the sample throughout the offload, thereby making it representative of the entire landing. If the target or the last part of the offload is consistently not being reached, the judgment that is being used to arrive at the number of fish that is removed from each sling should be reviewed.

2. Pick a point on the table and select the two (or three, or *n*) fish to be sampled whose noses are closest to the chosen point.

   Do not choose a point that is close to the edge of the table as the large fish tend to spread/extend out to the edge of the table and choosing a spot here would favour the larger fish.

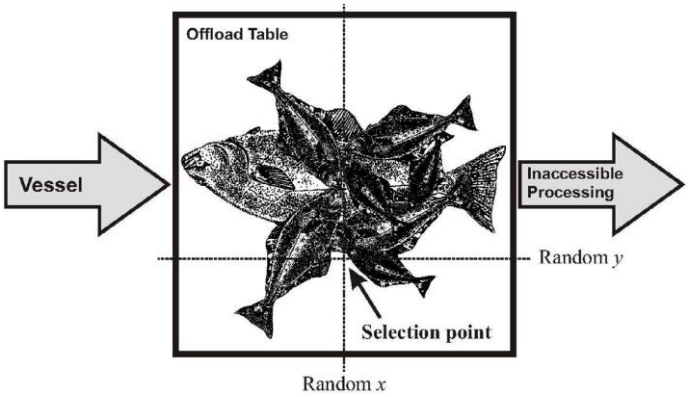


Figure 1.3. Depiction of table sampling

1.8.3 *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.

1. Estimate the numerical sampling rate 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.

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* (between 1 and 16 in the above example).

   c. Select the corresponding strap fish and every n^{th} strap fish thereafter.

Continue sampling both sling and strap fish until the required sample weight has been obtained. To determine the number of fish in a sling, use the average weight listed in Table 1.5 for the appropriate IPHC Regulatory Area. Table 1.5 must be used when an average weight by IPHC Regulatory Area is needed. These weights are based on the commercial fork length measurements obtained in the previous season.

Figure 1.4. Strap fish

Table 1.5. Average Pacific halibut weight by IPHC Regulatory Area.

IPHC Regulatory Area	Average Weight (kg)	Average Weight (lb)
2A	7.4	16
2B	11.0	24
2C	14.3	32
3A	9.1	20
3B	8.9	20
4A	9.0	20
4B	9.0	20
4C	9.9	22
4D	10.5	23

1.8.4 *Sampling from Totes*

Some landings are unloaded sling by sling, so a landing may be regarded as a sequence of slings from which one or more could be selected according to a rule that gives every sling the same chance of being chosen. The probability that a particular fish will be chosen is then just the probability that its sling will be chosen, and therefore, equal for all fish. At most 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. Also, keep in mind that a critical step in all sampling, whether sling, tote or individual fish, is to ensure you get the unit that is selected. Failure to secure a selected sample is a serious matter. It has the same effect as choosing the sample arbitrarily.

For example, should the random number table return the number 5.

a. Ask the forklift driver to bring you the fifth tote or sling from the offload.

b. You will also need an empty tote for transferring your "used" fish.

Unacceptable ways of choosing your tote would include: having a forklift driver simply drop off whichever tote he decides to drop off; arbitrarily pointing at one tote and having the forklift driver drop it off.

Ideally, all fish in a selected sling or tote will be sampled. However, where a full sling or tote is not needed to get the desired poundage or number of fish for the sample, a method for selecting a quarter, third, half and so on, is needed.

1. Estimate the weight, if applicable, in the tote (or sling). Keep in mind the weight of the fish in the tote will vary with the amount of ice in the tote.
2. Use the "watch method" to select fish.
    a. Determine the proportion of fish in the tote needed for the sample.
    b. Divide the seconds on a watch into this same proportion.
    c. Count the inverse number of fish.

        For example, if one third of a tote is needed for the sample, count three fish from the top of the tote.

    d. Look at the watch and select the corresponding fish to be sampled. The remaining fish are not sampled.
3. 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.

For example, if a tote holds 454 kg (1,000 lb) but only 136 kg (300 lb) are needed for the sample:

a. Count three Pacific halibut from the top of the tote and select a Pacific halibut from these three identified fish by dividing the second hand on the watch into 20 second segments and sampling the fish that corresponds to the first, second, or third segment of the watch.

b. Move the other two fish to the tote used for fish we are "finished with" as far as sampling.

c. Repeat this process throughout the entire tote to ensure all fish have an equal chance of being included in the sample.

With practice, weight estimates for totes will become quite accurate. The weight of the final sample may not be precise every time, but on average, it should come close with some actual weights being over and some under.

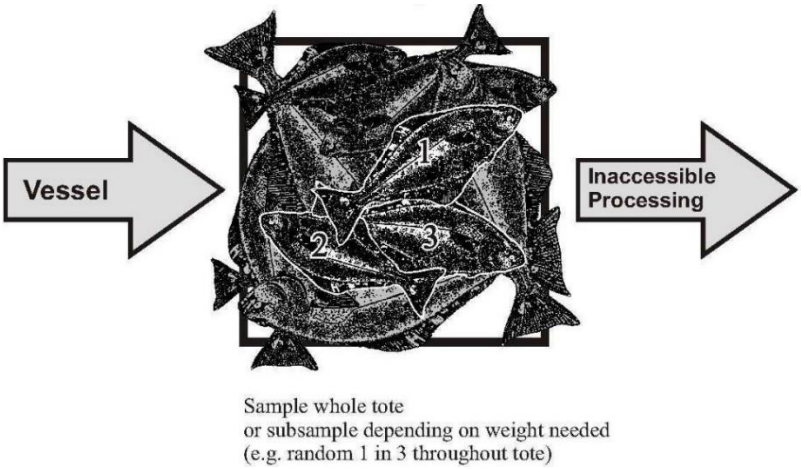


Figure 1.5. Depiction of tote sampling.

1.9 Pooling Offloads for Sampling

It is important to sample all landings at the same rate. To decrease the number of possible conflicts (two or more landings occurring at the same time) and to create a more practical sampling schedule, the requirement of sampling as many individual landings as possible may be relaxed by a system called pooling. Pooling requires the Secretariat to sum the hail weights of specific landings, based on the weight parameters listed in Table 1.6, and sample the vessel that brings the weight over that port's prescribed threshold for pooling.

For example, in Sitka the Secretariat will obtain one sample from each landing increment of 2.7 t (6,000 lb) from vessels with hail weights between 0.9 t (2,000 lb) and 2.7 t (6,000 lb). At a rate of 4%, the Secretariat would need to obtain a 109 kg (240 lb) sample from the vessel that pushes the pool over 2.7 t (6,000 lb). To be objective about the choice of vessel to sample, the FDS(F) must maintain a running total of the pooled landings by vessels available for sampling.

*Landings are not pooled in IPHC Regulatory Area 2A.

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

Ports	Exclude from Pool	Include in Pool
Port Hardy	<0.5 t and ≥2.3 t (<1000 lb and ≥5000 lb)	≥0.5 t and <2.3 t (≥1000 lb and <5000 lb)
Prince Rupert	<0.5 t and ≥2.3 t (<1000 lb and ≥5000 lb)	≥0.5 t and <2.3 t (≥1000 lb and <5000 lb)
Dutch Harbor	<0.5 t and ≥2.3 t (<1000 lb and ≥5000 lb)	≥0.5 t and <2.3 t (≥1000 lb and <5000 lb)
Homer	<0.9 t and ≥9.1 t (<2000 lb and ≥20000 lb)	≥0.9 t and <9.1 t (≥2000 lb and <20000 lb)
Juneau	<0.9 t and ≥2.7 t (<2000 lb and ≥6000 lb)	≥0.9 t and <2.7 t (≥2000 lb and <6000 lb)
Kodiak*	<0.5 t and ≥11.3 t (<1000 lb and ≥25000 lb)	≥0.5 t and <11.3 t (≥1000 lb and <25000 lb)
Petersburg	<0.9 t and ≥4.5 t (<2000 lb and ≥10000 lb)	≥0.9 t and <4.5 t (≥2000 lb and <10000 lb)
Sitka	<0.9 t and ≥2.7 t (<2000 lb and ≥6000 lb)	≥0.9 t and <2.7 t (≥2000 lb and <6000 lb)
St. Paul	<0.5 t and ≥2.3 t (<1000 lb and ≥5000 lb)	≥0.5 t and <2.3 t (≥1000 lb and <5000 lb)

***Note that IPHC Regulatory Area 4 landings must be pooled to 2.3 t (5,000 lb) in all ports even in Seward and Kodiak where IPHC Regulatory Area 3A and 3B landings may be pooled to 11.3t (25,000 lb) at the most.**

When sampling from totes or slings, the pool size should be such that your sample weight corresponds to at least one-quarter of the weight that the tote or sling holds. For example, for a tote holding 454 kg (1,000 lb) of Pacific halibut (net weight) the sample weight should be at least 113 kg (250 lb). Therefore, when sampling from totes, the sample rate for the IPHC Regulatory Area you are sampling must be at least 2.5% to allow you to pool to 4.5 t (10,000 lb). Pool size may vary from port to port, depending on trip sizes, sampling rate, and prevalence of tote-sampling.

Only include vessels that could or would have been sampled in the pool.

A running tally of vessels that fit the port's specific pooling weight parameters should be maintained. Only include vessels that could have been sampled in your pooling scheme. DO NOT include vessels that unloaded at a facility where sampling is physically impossible or vessels that were missed for any reason. Similarly, do not include vessels that unloaded on days that you did not work. Once the pooling threshold for your port is reached, the last vessel in the tally should be sampled to represent the total hail weight for all of the vessels in the pool.

1. Pool vessels: chronological tally of all vessels for a given port and IPHC Regulatory Area.

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

Date	Vessel Name	Hail
11 Apr	Misty Sea	2.3 t (5,000 lb)
11 Apr	Stormy	4.5 t (10,000 lb)
13 Apr	Lucky	3.6 t (8,000 lb)
17 Apr	St. Patrick	3.2 t (7,000 lb)

2. Pooled hail: total hail weight for all vessels in a pool.

   Above example: 13.6 t (30,000 lb)

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

   Above example: 13.6 t x 0.01 = 0.1 t = 136 kg (30,000 lb x 0.01 = 300 lb)

4. Sample weight: sample weight to obtain from the last vessel (landing) in the pool.

   Above example: sample 136 kg (300 lb) from the 3.2 t (7,000 lb) landed by the St. Patrick on 17 Apr using the sampling methods approved for the plant where the vessel is landing.

   Note: A separate pool (running tally) must be kept for each IPHC Regulatory Area.

1.10 Small Landings

Small landings are those that cannot be sampled as part of a pool because the sampling rate leads to more fish than the landing has available for sampling, or because of difficulties in selecting a representative sample.

For example, Sitka has a sampling rate of 5% for IPHC Regulatory Area 2C. If a 454 kg (1,000 lb) landing increases a pool's total in Sitka to 2.9 t (6,400 lb), then we wish to sample 145 kg (5% of 2.9 t, 5% of 6400 lb is 320 lb), which is difficult to do in some random manner from such a small offload and without impeding plant operations.

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

Small landings should be sampled in the same way as large landings, including sampling to weight rather than number, except when the target sample weight for the landing is less than the average weight for one fish from that IPHC Regulatory Area.

a. If the target weight is from half a fish to one fish, aim to sample one fish from the offload.

b. If the target weight is less than the weight of half a fish, then sample one fish from the offload with probability equal to the target weight divided by the average weight of a fish for that IPHC Regulatory Area.

For example, suppose your offload is 31.8 kg (70 lb) and the sample rate is 10%, and the average fish weight is 13.6 kg (30 lb). Your target weight is 3.2 kg (7 lb), and since 31.8 kg ÷ 13.6 kg = 0.2, 3.2 kg (7 lb) ÷ 13.6 kg (30 lb) = 0.2), you sample a single fish with probability 0.2 or a 2 in 10 chance.

In this example, you should use a random number table (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.

Sampling one or two fish from a full tote can be very challenging. The simplest and easiest way to do this is to sequence the fish whether it is as they come out of the tote or go into the tote. This can either be done as the Pacific halibut 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. In either situation, line-sampling procedures should be followed. This may impact the plant's processing procedures. However, collecting samples from small landings where tote sampling is normally conducted is rare.

1.10.1 *Sampling Small Landings*

Small landings are defined to be those under 0.9 t (2,000 lb) in Bellingham, Homer, Juneau, Petersburg, and Sitka and under 454 kg (1,000 lb) in all other British Columbia and Alaska ports. Small landings contribute a significant proportion of the total landed catch. For recent years of sampling (2016-20), the following table gives the proportion of small landings. Data are only shown if there were at least ten small landings in one of the five years.

Table 1.7. Proportions of small landings by port.

Port	IPHC Regulatory Area	2016	2017	2018	2019	2020
Port Hardy	2B	1	1.1	1.3	1.9	
Prince Rupert	2B	0.6	0.5	0.3	0.5	
Dutch Harbor	4A	1	0.5	1.1	0.9	
Petersburg	2C	12.4	10.9	10.9	15.5	
	3A	0.8	0.8	0.5	5.2	
Sitka	2C	14.8	16.4	18.7	19.8	
	3A	6.3	3.4	7.4	6.9	
Juneau	2C	13.5	9.2	6.4	8.4	
	3A	4	3.3	5.4	3.5	
Seward	3A	2.6	2	1.4	1.3	
Homer	3A	5	5.9	5.3	3.6	
	3B	1.3	0.5	0.3	0.9	
Kodiak	3A	2.8	2.5	4.4	4	
	3B	0.9	0.6	0.6	0.7	
St Paul	4C	26.9	10.7	14.5	16	

Ideally, we would sample small landings in proportion to their share of commercial landings. In practice, this can be difficult to achieve because of their infrequency in many ports, or due to multiple conflicts in ports such as Sitka. Small landings in IPHC Regulatory Area 2C ports and St. Paul only are sampled at a rate of 10% on 20% of the sampling days; one small landing day is randomly selected in each five-day sampling week. In shorter sampling weeks, as in St. Paul, which has four sampling days per week, a single small landing day is selected with probability $d/5$, where d is the number of sampling days in that week. Ports that receive less frequent small landings will not sample small landings.

A sampling schedule for the entire season is prepared by the IPHC Secretariat in advance for each port. It is important to follow the calendar closely to avoid any biases. **Any changes to the sampling calendar must first be approved by the Fisheries Statistics and Services Branch Manager.**

1.11 Sample Collection and Preparation

Before collecting the sample, prepare your workstation. Set up your sampling table and scale, knife, forceps, fin clippers, chromatography paper, plastic slate, and pillboxes. We use pillboxes (medication organizers) 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 1's 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".

1.12 Otolith Cutting Procedure

1. 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.
2. Use forceps to remove the otolith and insert it in the appropriate box cell.

   REMEMBER: Take only the blind side otolith.
3. Record the fork length and weight(s) of the Pacific halibut sampled such that they correspond to the correct otolith.

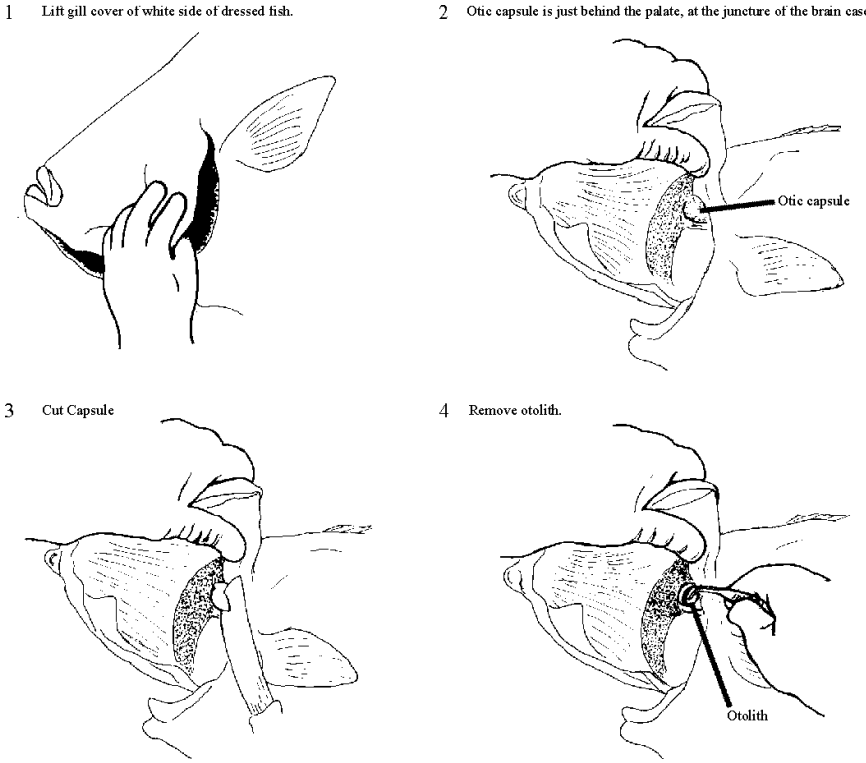


Figure 1.7. Removing a Pacific halibut otolith.

1.13 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.

   ***Note** if your selected fish had a crystallized otolith; keep both otoliths (blind and eyed), fin tissue and length-weight data. When completing the market sample report, enter the box and cell number and "Crystallized" in the comment section.

   Sample the next fish in line and then continue selecting fish until you have reached your target sample weight, if applicable.

2. If the sling or tote is your sampling unit, you would NOT replace a fish that had a damaged or unobtainable otolith by selecting an additional fish from outside the sling or tote. 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.

   Refer to Appendix I in this handbook for images to help you identify crystallized or right-side otoliths that must be removed from the sample.

1.14 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 HQ. If you wash the outside of the boxes, make sure they dry and store the boxes 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 Headquarter's office, 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.

8. Place the boxes into ziploc plastic bags.
9. Label each box with a completed pillbox label on Rite in the Rain® paper, record your initials and Staff ID,

port name, port code, and box number, as in Figure 1.8 and Figure 1.9. If using the pillbox labels, ensure that the length and weight data are recorded in the same cell as the corresponding otolith. Label the starting and ending sample for each vessel with the vessel's name. Record any lost otoliths.

10. Place the label on the top (face up) of the corresponding box of otoliths and secure with rubber bands.

Figure 1.8. Rite in the Rain® paper, record your initials and ID, port name and port code, and box number.

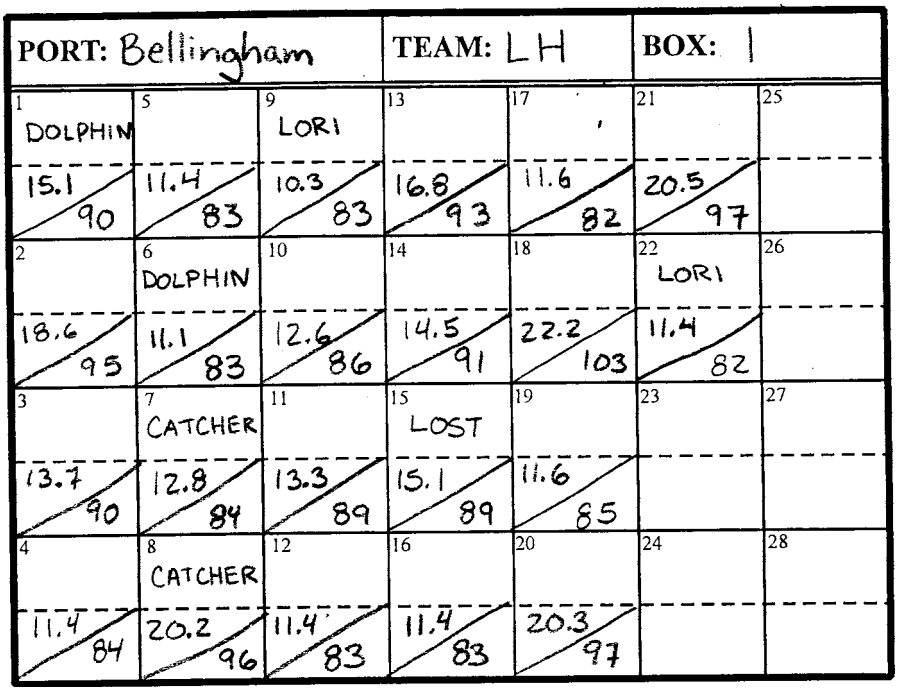


Figure 1.9. Pillbox label

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.

Ship otoliths and tissue samples to the IPHC HQ twice a month (on the 1st and 16th) with accompanying logs. 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.

1.15 Tissue Sample (fin clips)

For each sampled fish, a tissue sample must be taken. 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 1.10). 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 Secretariat 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 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 tisues 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.

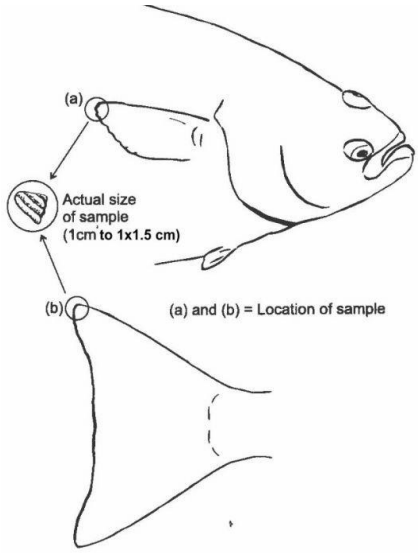


Figure 1.10. Convenient tissue collection location. Location A is preferred.

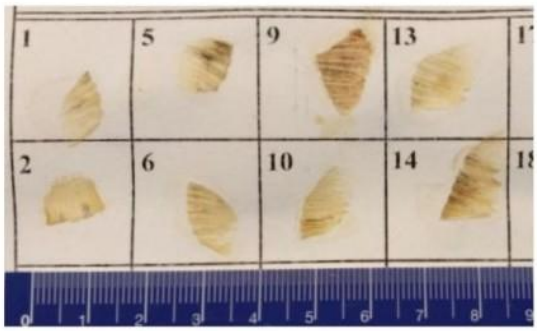


Figure 1.11. Tissue sample

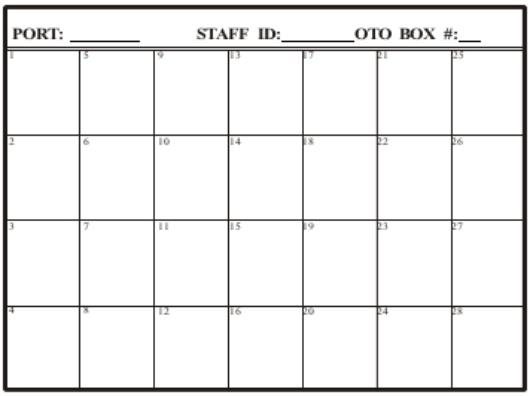


Figure 1.12. Chromatography paper.

1.16 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 of 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 way, we will be able to quickly distinguish cells that were not used from cells that might have their samples fall off in the future. Once the sheet is ready to mail, and completely dry, place the sheet in the ziploc plastic bag, with one silica gel packet inserted on the backside of the paper (not the side with the tissue samples), then seal the bag.

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).

1.17 Pacific Halibut Lengths

The fork length of Pacific halibut is to be measured in centimetres, to the nearest centimetre.

1. Placed the fish on a flat surface and ensure the mouth is closed.
2. Measure the distance from the snout to the fork of the tail.

It may take a bit of engineering to find an acceptable place to measure Pacific halibut. The bookends/measuring tapes should help to do this correctly. A common mistake is not leveling the fish or the measuring tape or laying the fish in a straight line. Check to make sure the bookends are not bent and that the measuring surface is flat, so that both the bookend and the measuring tape base are perpendicular to the surface. Measuring boards and the IPHC sampling cradles can be used to avoid this problem. **REMEMBER it is very important to match the Pacific halibut length, weight(s), and tissue sample with the corresponding otolith.**

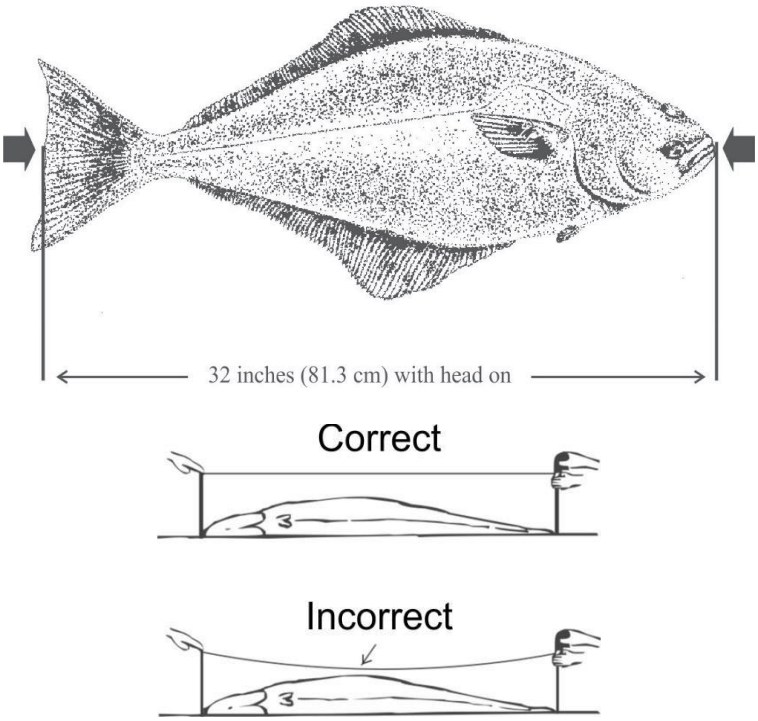


Figure 1.13. Sample Fork Length -- Total length between black arrows.

1.17.1 *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.

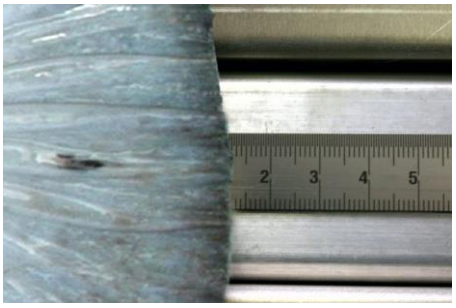


Figure 1.14. Fish measuring 122 cm.

1.17.2 *Length Measurement with the Bookend*

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 1.15. Fish measuring 88 cm.

Record lengths in the field on an erasable plastic slate, directly onto the pillbox label, or in a Rite in the Rain® booklet. A slate or Rite in the Rain® booklet is easy to use in the field since it can be handled with slimy hands. It is prudent to capture an image of the data prior to erasing, should any clarifying questions come up later.

1.18 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 your supervisor or the IPHC HQ immediately to discuss options.

1.19 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 HQ with your package.

1.20 Clean Otolith Archive

1.20.1 *Background*

The IPHC otolith collection consists primarily of structures collected and used for age determination for the stock assessment. The otoliths have been kept (archived) after being aged and are stored in a glycerin/thymol solution, which maintains readability; however, it renders these structures unusable for research involving some isotopic and all elemental analyses. For this reason, otoliths for the Clean Otolith Archive Collection (COAC) are not used for age determination, and are cleaned, dried, and stored whole in climate-controlled conditions for future analysis.

Only IPHC Secretariat is required to collect COAC samples.

1.20.2 *Instructions*

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 1.16. Example of a COAC "shipping" box.

1. Collect both otoliths (eyed and blind side)
2. Minimize metal contact (some contact is unavoidable, since knives and forceps are metal, but, for example, try not to scratch surface of otolith with the knife and do not leave otoliths sitting on metal surfaces, etc.)
3. No broken otoliths (otoliths with exposed internal microstructures are not usable)
4. No crystallized otoliths (both otoliths of the pair must be "normal")
5. Clean all membranes and moisture thoroughly from otoliths using paper towels or a clean dry cloth
6. Do not use any fluids, including water, to clean otoliths
7. Place otolith pairs in the same cell of the box identified as the COAC
8. Under NO circumstances should glycerin, or any fluid, be added to the COAC
9. Allow otoliths to completely dry before adding cotton and closing the box
10. Store in stable environment where there are no extreme temperature or humidity fluctuations until shipping (i.e., indoors at room temperature)
11. 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.
12. 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 standardized data (length, weight, otoliths and tissue sample) as identified in this handbook (**Note: both otoliths must be collected**).

1.20.3 *Pacific Halibut Selection*

Our target sample is 100 otoliths for IPHC Regulatory Areas 4B and 4CD.

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.

1.20.4 *IPHC Regulatory Area 4B*

Collections will occur in conjunction with sampling of the commercial landings; 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, with the otolith pair going into the COAC. Regular market samples and COAC samples will be collected from the same delivery in most cases.

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.

1.20.5 *IPHC Regulatory Area 4CD*

Fish from IPHC Regulatory Area 4CD are to be collected for the COAC only in St. Paul. Collections occur on non-sample days; the goal is to spread the collection over the sampling period in St. Paul. The sampling protocol has been designed so that approximately 20 otoliths per week are collected for the COAC. Attempt to collect the COAC sample on the first non-sample day of the week; that way if there are no fish available to sample on that day, the COAC sample may be collected on the second non-sample day of that week. (Note: there may be some weeks when there are no fish available on the non-sample days; this is okay, since more than 20 fish may be collected in a week, depending on fish size).

Sample selection:

1. Collect the sample from a single tote. The tote does not need to be randomly chosen; however, if there are totes of fish from multiple vessels and totes from individual vessels, choose the tote from an individual vessel.
2. Totes of fish from mixed vessels may be sampled, if the fish are all from a single IPHC Regulatory Area. Most mixed totes are from small offloads and local vessels that fish the same IPHC Statistical Area.
3. Aim to sample 20 fish for each sample. Follow random sampling techniques for tote sampling.

Sample data:

1. In St. Paul, market samples and COAC samples will NOT be taken from the same delivery.
2. If the COAC sample is taken from an individual vessel, the market sample form will be filled out in the standard way with vessel name, ADF&G number, sample number, etc.
3. Enter 'N' in the Pool field of the market sample form and click the 'Archive' box to designate the sample as part of the COAC.
4. If the COAC sample is taken from a tote of mixed vessel fish, enter the vessel name and number for the vessel with the greatest amount (pounds) of Pacific halibut in the tote and enter 'Y' in the Pool field.
5. List the names of the vessels in the mixed tote (if known) in the comments section of the market sample form.

Remember: Keep Dry – No Juice

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. Tag recovery is currently an uncommon event but can occur from all IPHC Regulatory Areas. All 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 the reward to the appropriate recipient. The tag types currently in use see Figure 2.1, as well as reward amounts see Table 2.2. We only reward individuals who return IPHC tags, see Table 2.1 from tagged Pacific halibut. There are a few other taggers, individuals who tag Pacific halibut with their own spaghetti tags, usually with their own name printed on the tag, with some offering a reward. Collect the tag and associated data, for all tags, indicating when it is a rogue tag. The IPHC does not give rewards for non-IPHC tags.

IPHC regulations allow ANY vessel at ANY time to retain 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 2.1 Figure 2.1shows examples of the wire tag types.

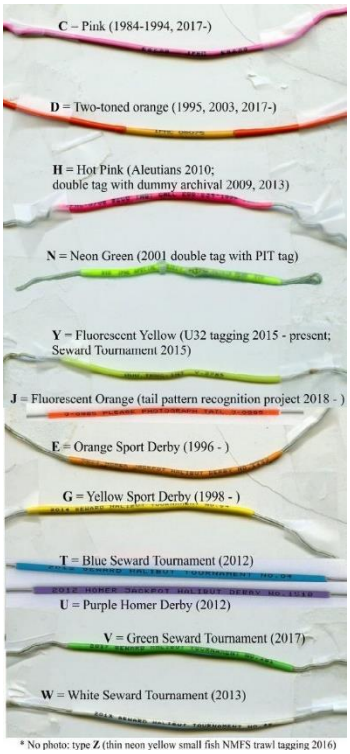


Figure 2.1. Wire tag types

2.1.2 *Wire Tag Releases*

The standard reward amount for wire-only recoveries of tagged fish is $10 or a tag reward hat. Wire tags are also used by the Homer Pacific Halibut Derby and Seward Pacific Halibut Tournament and are similarly redeemed.

2.1.3 *Spaghetti tags*

Plastic spaghetti tags were attached to either a plastic or stainless steel dart and inserted either in the back of the fish (plastic darts) or the cheek on the dark side (stainless steel dart).

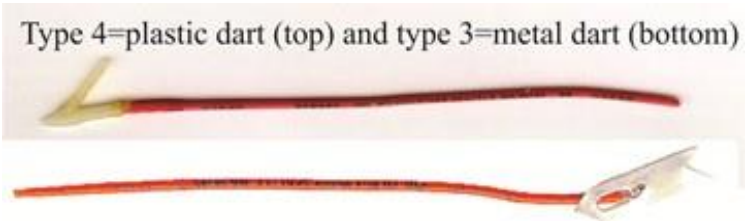


Figure 2.2. Spaghetti tags (recreational charter tagging program)

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.

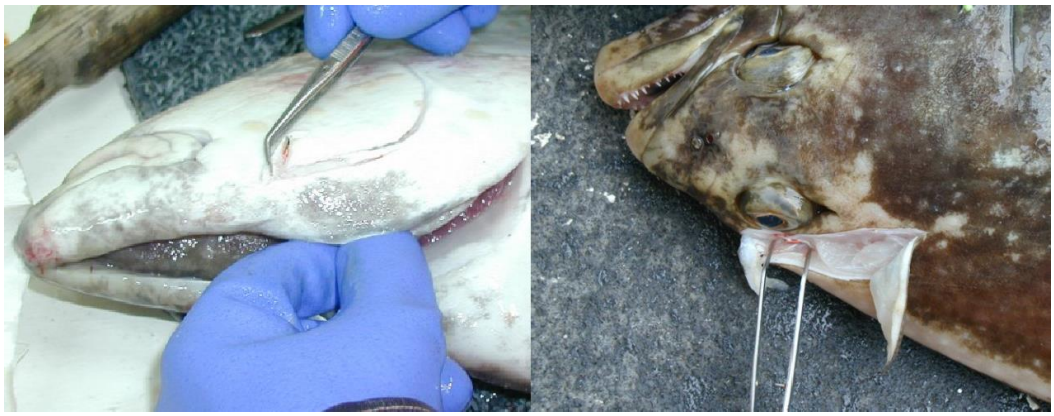


Figure 2.4. PIT tag site open to retrieve tag.

In some cases, the tag may either be discolored or have some growth of barnacle or algae attached.

NEVER discard a tag! It often looks unreadable to the naked eye but isn't under a microscope.

The otoliths and tissue samples of recovered tagged fish DO NOT become part of the market sample and should be placed in a tag envelope. The tag should be placed in a separate envelope from the otoliths and tissue sample to prevent damage.

2.3 Data to be obtained

The numbered items, in this section, refer to items on the tag redemption envelope (see Figure 2.5). 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	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 2.5. 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
Orange spaghetti tag – stainless steel dart	3	1994-1995 recreational tag releases
Pink/orange/yellow spaghetti tag – plastic dart	4	1994-2003 recreational tag releases
Dark orange wire	5	1960-1981 trawl/grid surveys
Thick yellow wire	A	1980-1984 grid surveys
Thin yellow wire	B	1980-1984 juvenile surveys
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
Homer Derby orange wire	E	Homer Derby tag releases (odd years)
Coffman Cove Derby orange wire	E	Coffman Cove Derby (2013 -2014)
1997 Homer Derby yellow wire	F	1997 Homer Derby tag releases
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-present) 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 lat/lon, leave it blank and it will be converted at

the IPHC HQ. Write on the envelope what the problem was in determining the lat/lon.

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 Figure 2.6). Place fish on cradle, blind side up, with snout against the headboard of the cradle so that the mouth is closed. Bookends may also be used. If you get a tag from a captain or other agency staff who measured the fish in inches, **convert the length to centimetres and make sure the inch measurement isn't a guess.**

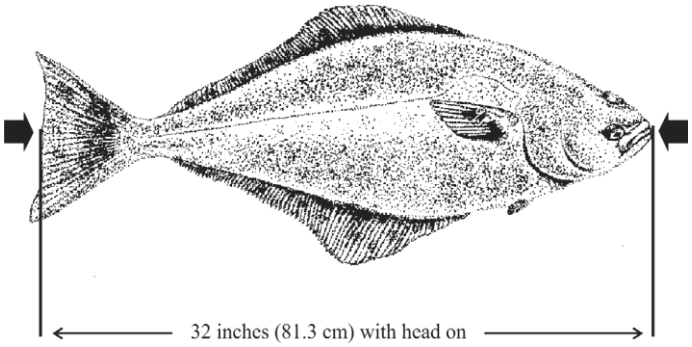


Figure 2.6. Sample Fork Length -- length between black arrows

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 vessel (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. A small piece of chromatography paper will be provided inside the tag envelope to place the fin clip on. 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. Return the clip on the paper to 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). Place the provided blue plastic sheet under the tail as a backdrop for improved image analysis.

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 and do not use c/o the plant, etc**. Remember 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.

Table 2.2. Rewards

Experiment/tag type	Reward amount	Tag form
Plastic-coated wire IPHC releases, various colours	\$10 or tag reward hat	Tag envelope
Homer Derby tags		
Seward Tournament tags		
Coffman Cove Tournament tags		
Recreational charter tags		
PAT leader without the dart		
Type J orange wire with tail photo	Double reward (\$20, two hats, or \$10+hat)	Tag envelope
Type J orange wire with no tail photo	\$10 or tag reward hat	

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 2.7) 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 2.8. 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).

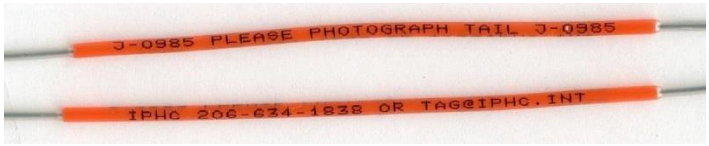
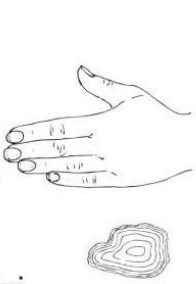


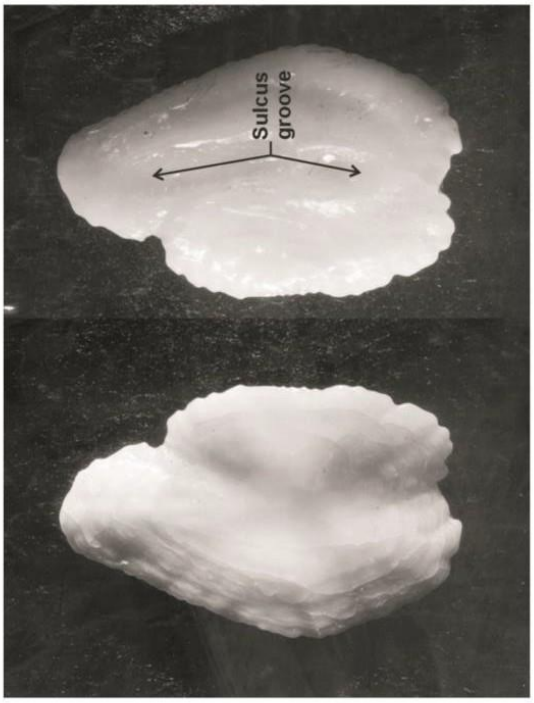
Figure 2.7. "J" type tags used for tail pattern project

Figure 2.8. Example of image of white side Pacific halibut tail

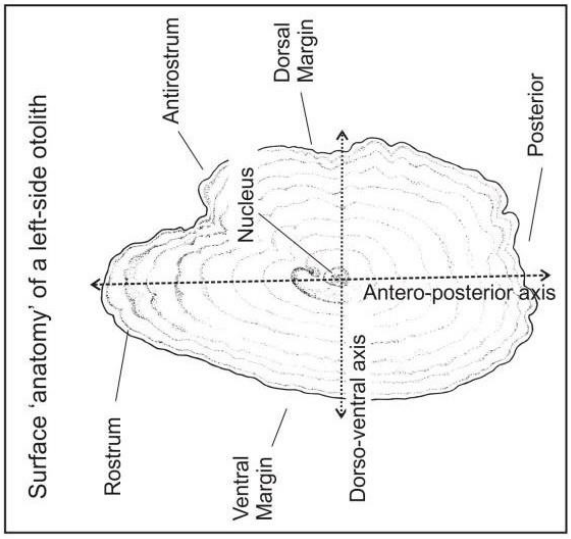
APPENDIX I: OTOLITH GUIDES

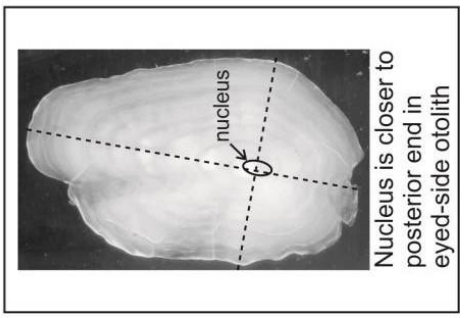
The blind (left-side) otolith is the one used for age determination and is the one to collect for the market sample. The shape of the left-side otolith viewed from the ringed ("*distal*") surface looks like the shape of the back of your left hand.



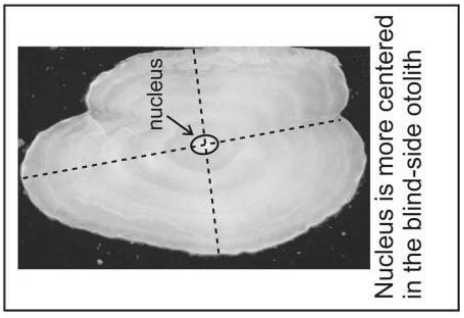


Above left is a blind-side (left) otolith viewed from the distal surface (rings are visible). This is the surface to look at when comparing the shape of the otolith to the back of your left hand. On the right is the same otolith viewed from the proximal side--this side has a deep groove and rings are usually not as visible.



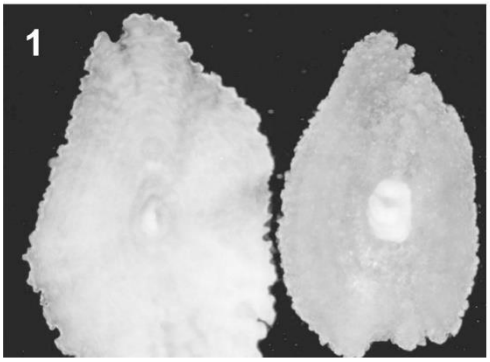


Nucleus is closer to posterior end in eyed-side otolith

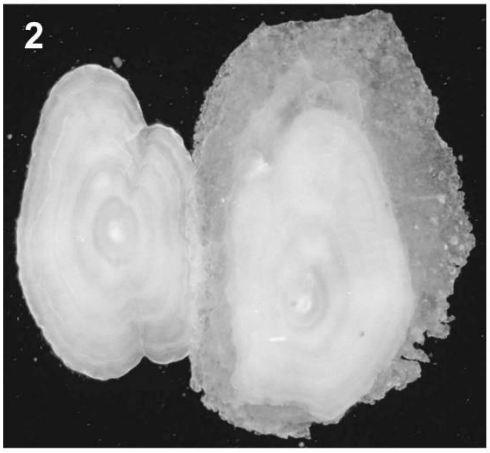


Nucleus is more centered in the blind-side otolith

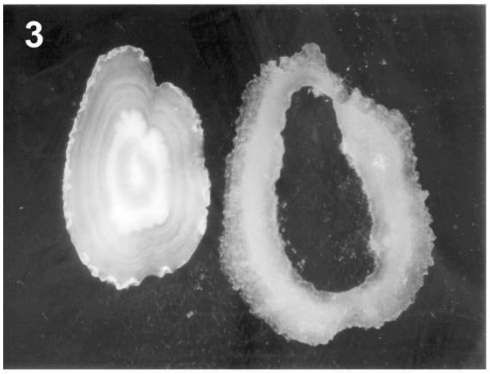
Recognizing Crystallized Otoliths: Otoliths are composed of calcium carbonate that can take one of two different crystalline forms. The form found in 'normal' otoliths is *aragonite* while in crystallized otoliths, the form is *vaterite*.



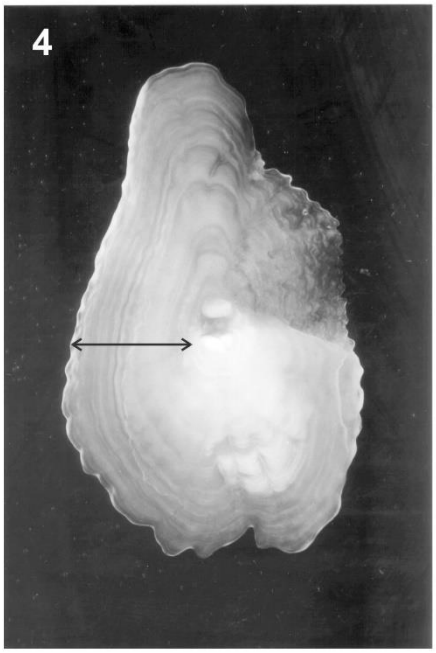
1. Fully crystallized: opaque form (left) and translucent form (right). These otoliths cannot be aged.



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
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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
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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