



Trawl Sampling

I. Introduction	4-3
II. Trawl Gear and Fishing Strategy	4-3
<i>Operations of Trawlers</i>	4-8
<i>Safety Concerns on Trawlers</i>	4-8
III. Data Collection on Trawlers	4-9
<i>Diversity of Fleet and Effects on Sampling</i>	4-9
IV. Fishing Effort Information	4-10
<i>Vessel Logbooks</i>	4-10
<i>Trip Form Instructions</i>	4-11
<i>Haul Information Instructions</i>	4-15
<i>Trip Form – Haul Locations Instructions</i>	4-16
V. Observer Total Catch Estimates (OTC)	4-18
<i>Weight Method 14 – Visual Experience</i>	4-18
<i>Weight Method 6 – Other</i>	4-18
VI. Sampling Catch	4-19
<i>Catch Categories</i>	4-19
Naming Catch Categories	4-19
Retained catch on trawlers.....	4-20
Discarded catch on trawlers.....	4-21
<i>Sampling Priority on Trawlers</i>	4-21
XIII. Weight Methods for Estimating Catch Category	
Weights.....	4-24
<i>Weight Method 1: Actual Weights</i>	4-24
<i>Weight Method 2: Bin Volume/Trawl Alley Estimate</i>	4-25

<i>Weight Method 3: Basket Weight Determinations (BWD)</i>	4-28
<i>Weight Method 5: OTC – Retained</i>	4-30
<i>Weight Method 6: Other</i>	4-31
<i>Weight Method 7: Vessel Estimates</i>	4-31
<i>Weight Method 8: Extrapolation</i>	4-31
<i>Weight Method 15: Visual Spatial</i>	4-35
<i>Trawl/Prawn Pot Catch Form Instructions</i>	4-38
<i>Weight Method 9: Pacific Halibut Length/Weight Conversion</i> 4-33	
V. Trawl/Prawn Pot Catch Form Instructions.....	4-38
VI. Collecting and Documenting Species Composition	4-42
<i>Methods for Species Composition Sampling:</i>	4-43
Sample Method 1 - Whole Haul.....	4-43
Sample Method 2 - Single Basket	4-43
Sample Method 3 - Multiple Basket	4-43
<i>Average Number Calculations</i>	4-43
<i>Species Composition Form Instructions</i>	4-44
VII. Mixed Hauls.....	4-48
VIII. Working Smarter, Not Harder.....	4-49
IX. Unsampled Hauls.....	4-51
<i>Trip Form</i>	4-51
<i>Trawl/Prawn Catch Form</i>	4-51
X. Discard That Cannot Be Attributed To A Specific Haul	4-51
<i>Trip Discard Form Instructions</i>	4-51

I. Introduction

At least 70% of all WCGOP observer days are aboard trawlers. West Coast trawlers target a variety of species, including Dover sole, sablefish, thornyheads, Petrale sole, Arrowtooth flounder, and CA halibut. Trawl catch is often very heterogeneous, containing multiple species of fish and invertebrates in each haul. A trawl trip can last from one to seven days. All West Coast trawlers deliver to shore-based processors.

II. Trawl Gear and Fishing Strategy

Most trawl vessels on the west coast are stern trawlers. They use one net that is set and retrieved off the sloping stern ramp at the back of the vessel. However, there are also side haulers. These vessels set and retrieve their nets over the side of their vessels (See Figure 4-1 and Figure 4-2).

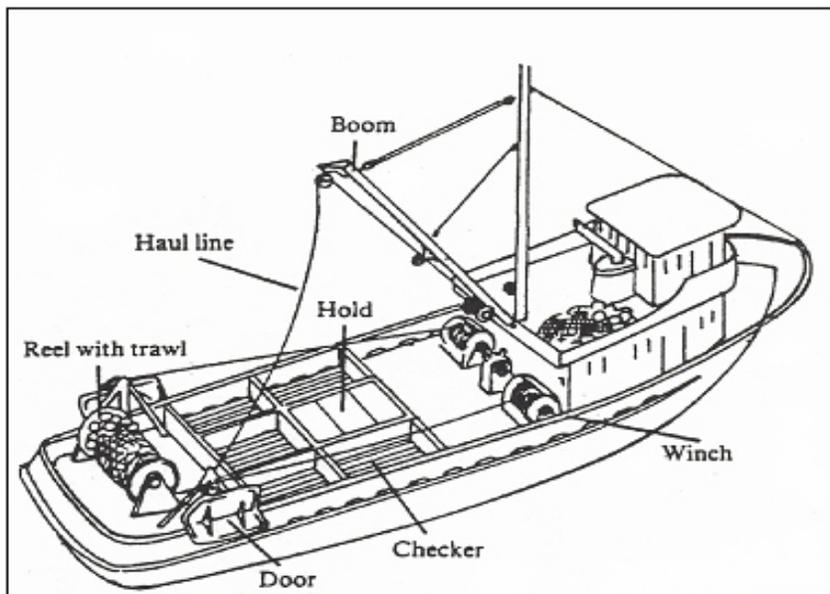


Figure 4-1: Trawl Vessel



Figure 4-2: Side hauling versus stern hauling

Trawling involves the towing of a funnel-shaped net behind the fishing vessel (See Figure 4-3). Trawl nets may be towed on or near the seafloor or in the water column. West coast trawlers use “doors” in front of and on each side of the net to spread the mouth of the net horizontally. The doors are pushed apart and down by hydrodynamic forces and by their own weight. Aluminum or plastic floats laced to the headrope on the upper lip of the net and a weighted footrope, laced to the lower lip of the net, hold the net mouth open vertically. The length of the cable (**main wire**) dragging the net behind the vessel determines the towing depth. Trawl nets can be 100’ or greater in width across the opening and over 150’ long.

Main wire:

The two large cables used to connect the trawl net to the fishing vessel while fishing.

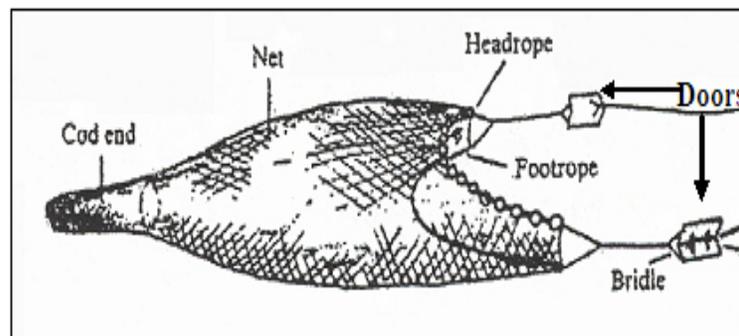


Figure 4-3: Trawl Net

The footrope or groundrope is directly attached to the bottom, leading edge of the mouth of the net. The purpose of the footrope is to separate the target species from the seabed and raise the netting far enough above the seabed to prevent damage. The footrope may be weighted with chain or may be rope-wrapped wire or cable when fishing on a soft bottom. If the net is towed over rough bottoms (as for rockfish) steel

bobbins, rubber disks or rubber rollers ('tires') are attached to the footrope. The bobbins are designed to roll and drag over the bottom (See Figure 4-4).

Regulations governing harvest levels in the groundfish trawl fleet have a footrope component. There are two "sizes" of footropes used in the groundfish trawl fleet.

Large Footrope: Any footrope that includes one or more rollers that is greater than or equal to 8 inches in diameter.

Small Footrope: Any footrope where all rollers are less than 8 inches in diameter.

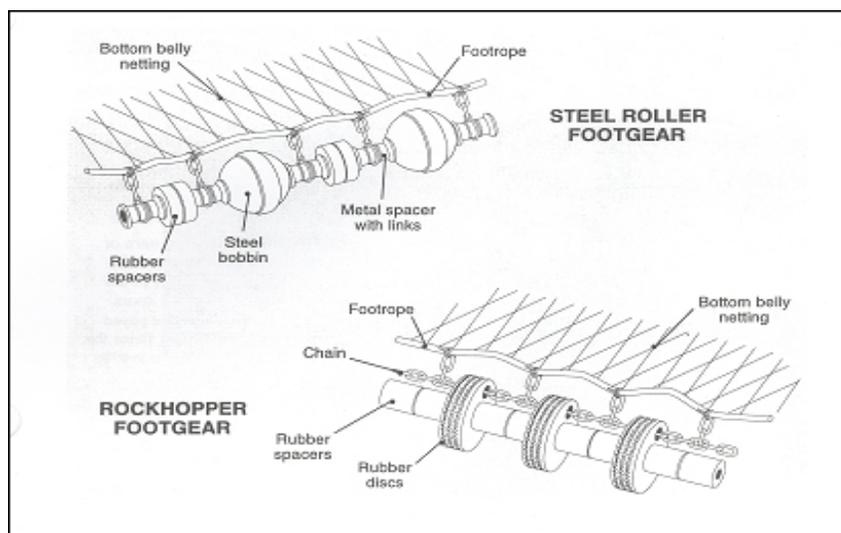


Figure 4-4: Roller Gear

There are a variety of types of trawl gear:

Bottom Trawl: One net is towed with the footrope in contact with the seabed.

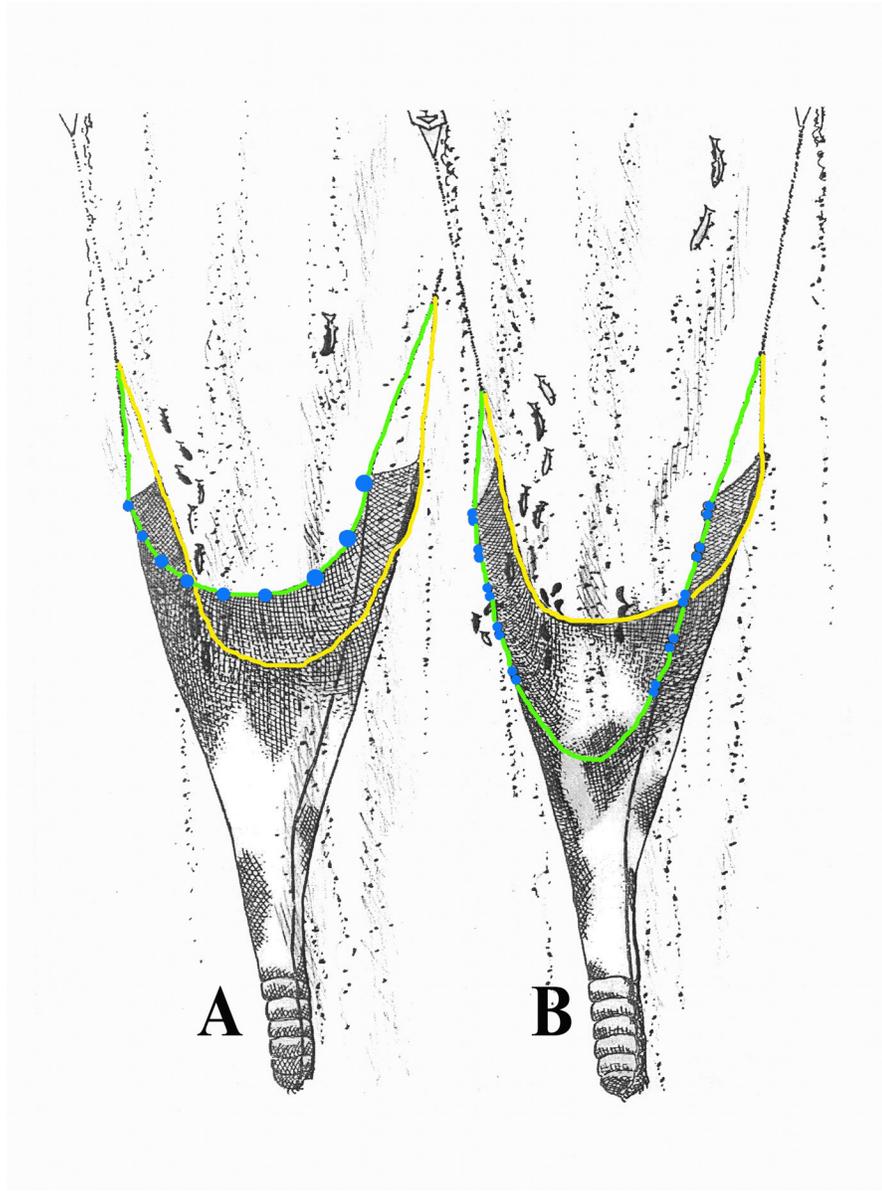
Bottom trawlers include roller (also called bobbin) trawls and Danish and Scottish seine gear. A bottom trawl is generally towed at two to four knots on or above the sea floor.

- **Selective Flatfish Trawl (Pineapple Trawl):** This net is a type of bottom trawl (See Figure 4-5). It was designed by WOC fishers to reduce the catch of rockfish and other overfished species. Fishers used the net in an experimental fishery for two years to prove the efficiency. Based upon the findings, the PFMC now mandates its use in certain areas and/or increases quotas for vessels that use the selective flatfish trawl. The characteristics of this net includes:
 - A headrope that is cut back and at least 30% longer than the footrope, which allows fish a greater area to escape.

Fishing regulations state that gear type 17 - Pineapple Trawl/ Selective flatfish net must be used when fishing shoreward of the RCA, North of 40 10'.

WOC fishers:
Washington, Oregon
and California fishers.

- The expected rise, how high the headrope is above the bottom of the net, at the center is less than or equal to five feet.
- No floats are on the center half or third of the headrope. Floats are only allowed on the wings.
- A two seam, rather than four seam, net.
- A small footrope can only be used with this net



Outrigger:
Any pole that can be lowered over the side of a boat and is used to enhance stability and aid in fishing

Figure 4-5: (A) Trawl net compared to (B) OR Set-back Flatfish net. The yellow lines show the footropes, the green lines show the headropes. The blue circles are the floats.

Paired Bottom Trawls (Double Rigged): Two nets are towed, one net off each side of the vessel from large **outriggers** lowered at 60° angles. The nets are folded on deck or

hung from booms when not fishing. They have two sets of doors, one set for each net. Paired nets are often used for CA/OR Pink Shrimp.

Midwater Trawl: Midwater trawls are generally towed above the ocean floor, although they may be used near the bottom. They are generally towed faster than bottom trawls to stay with the schooling fish they target. All midwater trawls must have a protected footrope without bobbins and rollers.

Trawl gear is used to harvest:

- Deep Water Slope Fish: Sablefish, Dover Sole, Shortspine and Longspine Thornyheads.
- Shelf and Slope Rockfish.
- Midwater Rockfish (Widow, Yellowtail, and Chilipepper).
- Shelf and Slope Flatfish.
- Pacific cod.
- Pacific hake.
- California halibut.
- Pink shrimp.

Trawl gear varies depending on the species sought and the size and horsepower of the boats used.

Operations of Trawlers

The following flow chart represents typical activity of a trawl vessel.

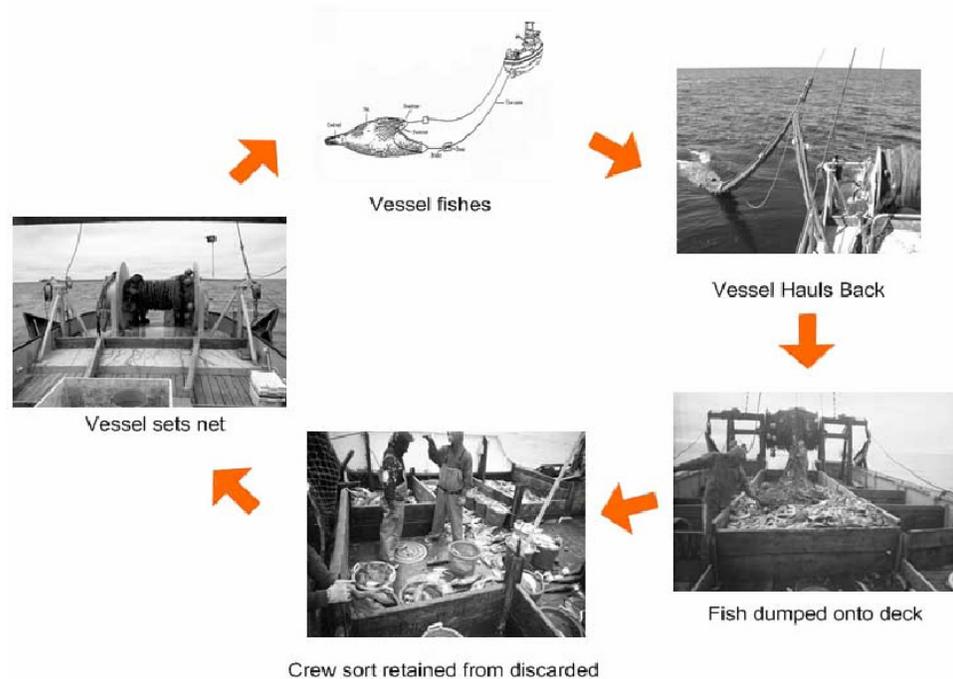


Figure 4-6: Typical activity of a trawl vessel.

Safety Concerns on Trawlers

The equipment used by trawlers can cause serious injury if you are not aware while on deck.

Trawl nets are heavy and in rough seas, tend to roll around the trawl alley or bin. Be careful to avoid putting any part of your body between the codend and the trawl alley/bin boards, as you can be crushed.

Be especially aware of the main wire and other cables being used to haul in a codend. If these snap, they fly in many directions and can cause major damage to the vessel and cause serious injury to the crew. Check for fraying on the wires during your first haul back. **Stay in the wheelhouse, with the hatch closed, while the crew is hauling in the codend.** If you are on deck during haul back, always wear your safety helmet.

Be aware that working on trawl vessels often requires a lot of lifting. Take care to use proper lifting techniques on these vessels and wear a back brace if appropriate. Filling baskets partially instead of all the way to the top is a good way to reduce the amount

of weight lifted at one time and can reduce the occurrence of back injuries. See Chapter 9, “Health and Safety”, for more information on reducing the risk of back and wrist injuries.

III. Data Collection on Trawlers

The following trawl fisheries are observed by the WCGOP Catch Shares:

Groundfish Trawl Catch Shares (limited entry)

Observers collect the following information on trawl vessels:

1. Fishing Effort
2. Total Catch
3. Catch Category Weight
4. Species Composition
5. Biological Data

This section of the manual is organized in the above order. This order is also the sequence you will normally use to collect data on trawl vessels. Biological Data collection is described in detail in See Chapter 7 “Biological Sampling” and Chapter 8 “Protected Resources” for more information.

Diversity of Fleet and Effects on Sampling

Although vessel characteristics make the fleet very diverse, sampling protocols are consistent for all net vessels. There are, however, a number of vessel characteristics that influence catch sampling. The most important characteristics that influence sampling are:

1. **Vessel size:** The size and layout of a vessel is often a limiting factor when sampling. A vessel with a small deck may not have enough deck space to hold all the discard. Therefore, the vessel may sort the discard directly out a scupper, over the side or down the stern ramp. On small vessels, observers may not have a designated sample area or a sample area with much space.
2. **Duration of tow:** Tow duration can vary greatly. If a vessel is making long tows, over 3 hours, observers will have plenty of time to sort and weigh samples. Observers on vessels that haul every hour have a limited amount of time to complete sampling duties.
3. **Size of tow:** Vessel size and size of tow are related. Problems are created when a small vessel has a large tow because there is very little room for the work up of samples. It can also create a dangerous working environment.

Size: Trawl vessels on the West Coast range from 40-80 feet.

Trawl tows range from 45 minutes to 20 hours.

Trawl tows range in size from 100lbs. to 4,000lbs.

Trawl tows can have as few as five species and as many as 45 species.

Types of crew sorting on groundfish trawl vessels:

1. Crew sorts retained into bins or baskets while leaving discard on deck.
2. Crew sorts out scupper-retained fish are taken out of the flow of fish while discards are flushed directly off the vessel.
3. Crew sorts retained into bins or baskets. Discards are tossed or scooped overboard.
4. Crew pre-sorts certain species.
5. Crew sorts from chute that discards directly overboard.

4. **Composition of tows:** Most tows encountered will have a large diversity of fish species. This is not necessarily a problem for experienced observers that are able to identify species easily. However, the species composition of the tow will affect the sample size. If the vessel has a bag full of tiny thornyheads or flatfish, it may be necessary to reduce the sample size. In the Catch Shares program, the proportion on IFQ to non-IFQ species will be an important factor in deciding how to sample.
5. **Sorting technique of crew:** Each vessel will have a unique sorting method. Discuss with the crew prior to the first haul how they sort and the best way to collect samples. Communicating with the crew that samples will be collected from **discard only** is key to fulfilling sampling requirements. In the IFQ program the crew is responsible for sorting catch into IFQ groupings.

All of the factors above are interrelated. For example, if a small vessel has short tow duration and tows are large, how the combination of these factors affect sampling options needs to be considered.

IV. Fishing Effort Information

Fishing Effort information includes where vessels fish, how long it takes fishers to catch fish, what fishers are attempting to catch, what type of gear is being used, and how much is being caught. All of this information is recorded on the Trip Form. The front side of the form includes total catch and gear performance information while the back side is the haul location information. The specifics of estimating total catch are discussed in the next section.

Vessel Logbooks

All trawl vessels are required to record fishing activities in a current logbook (See Figure 4-8). Observers copy information out of this book onto the Trip Form – Haul Locations for groundfish trawlers.

If a logbook is not available, Captains often keep a personal journal of fishing effort information that you can use with their permission. If they do not, ask them to record the information on a piece of paper. Some observers may have a handheld GPS to use for coordinates also.

Tip: It is important for observers to complete the Trip Form-Haul Locations after each haul. Some vessels may not fill in their Logbook until the steam in and/or record more or fewer hauls than actually occurred. If the Vessel

Logbook is reviewed and copied after each haul, the risk of erroneous data recording is reduced.

Trip Form Instructions

See Trip Form Figure 4-7: Trip Form (front) on page 12 and Figure 4-9: Trip Form - Haul Locations (Back) on page 16.

- **Fishery Sector:** Circle the sector the vessel participated in (**LE** = Limited Entry, **OA** = Open Access, or **EFP** = Exempted/Experimental Fishing Permit, **CS** = Catch Shares).
- **Page number:** All Trip Forms are numbered together by trip. If there are five trip forms on one trip, number them 1 – 5.
- **Trip Number:** This is an automatically generated number by the database. Complete this field once the trip has been started in the database.

Tip: Some observers find it easier to start a trip prior to leaving port. Doing this allows the observer to fill in the Trip Number while at-sea rather than when the observer returns to port.

- **USCG number:** Record the USCG vessel number. All Limited Entry groundfish trawl vessels have a six or seven digit USCG number. Request this number from the vessel skipper or a coordinator. **If the vessel does not have a USCG number, leave field blank and fill in the State Registration Number field.**
- **State registration number:** Use this field **only** if the vessel does not have a USCG number. The state registration number will begin with a **CF** in California, **OR** in Oregon, and **WN** in Washington.
- **Observer name:** Record your first and last name.
- **Year:** Fill in with appropriate year.
- **Vessel name:** Record the full name of the vessel.

EFP:

Permits that allow fishing activities that would otherwise be prohibited. The permits are usually written by the states and must pass a vote by the PFMCC.



- **Partial trips:** Check the box if the trip included more days than were observed. (Fish ticket includes unobserved catch.)

Tip: Partial trips usually occur when a vessel fishes multiple day trips in a row.

- **Total number of fishing days (known):** Document the total number of days the vessel fished before landing. This field is only completed when the trip is a partial trip.

Tip: Do not guess or make an assumption to complete this field. If you do not know how many days the trip lasted, leave column blank.

- **Fishery:** Record the name of the fishery the vessel was selected for:

Catch Shares

- **Vessel logbook name:** Record the name of the logbook the vessel is using to record fishing effort information. The following logbooks can be used:

Fishery	Vessel Logbook Name
Catch Shares	WOC Trawl Logbook

- **Permit/License number:** Document the permit/license number being used. Only one permit/license number should be used on trawl vessels. Catch Shares uses groundfish permits which start with GF and followed by 4 digits. For example: GF0432
- **Vessel logbook page number:** The Vessel Logbook number is the page number(s) where the skipper is recording the trip information. *Do not record the number of the entire Logbook!* Logbook page numbers are located:

Vessel Logbook Name	Page Number Location
WOC Groundfish Logbook	Bottom left corner (See Figure 4-8)

Q: What's a trip?

A: A trip is a fishing activity that typically results in the completion of a fish ticket (landing receipt).

For Catch Shares a trip is when the vessel leaves the dock with a catch shares observer on board. This is for tracking purposes.

Q: Why do observers record logbook page numbers?

A: The fishing locations of vessels carrying observers are compared to the fishing locations of vessels not carrying observers to ensure vessel activity has not changed with observers on board.

CHAPTER 4
Trawl Sampling

Vessel Name Example Departure: Date 7 6 96 Time 0400 Port Westport, WA
 Federal Document No. 12345 Return: Date 7 8 96 Time 0600 Port Westport, WA
 Crew Size (including Captain) 3 Buyer(s) Generic Seafoods

DATE mo/day	TIME local 24-hour clock	LATITUDE		LONGITUDE		Ave. depth of catch (fathoms)	NET TYPE	Target Strategy	Estimated pounds retained each tow - enter 4-letter code from species code list provided										
		Degrees	minutes	Degrees	minutes				SABL	DOVR	LSPN	SSPN	WOOD	YTRK					
7/6	set	1300	47	58.7	125	47.3	500	B	DTS	300	4,000	500	100						
	up	1730	48	02.6	125	46.5													
7/7	set	0800	47	20.3	125	28.3	575	B	DTS	100	5,000	800	150						
	up	1400	47	46.4	125	34.4													
7/7	set	1800	46	52.6	124	53.2	90	M	WOOD					16,000	500				
	up	2200	46	54.1	124	53.6													
	set														
	up														
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	up														
	set														
	up														

REMARKS:

Signed: John Doe

TO BE COMPLETED BY AGENCY	
VESSEL	FISH RECEIVING TICKET NO.
PORT	

39761

Figure 4-8: The "Washington-Oregon-California Groundfish Logbook."

- **Observer logbook number:** Record the number on the front page of the Observer Logbook used to document information about the trip.
- **Skipper's name:** Record the first and last name of the skipper.
- **Number of crew (including captain):** Document the number of crew, including the captain, on the vessel (not including observer).
- **Departure date/time:** Document the date and time the vessel left port.
- **Departure port:** Document the port the vessel departs from.
- **Landing date/time:** Document the date and time the vessel returns to port.
- **Landing Port:** Document the port the vessel returns to.
- **Fish tickets number(s):** Obtain the numbers of all landing receipts (fish tickets) from the vessel skipper, the port biologist, or the state liaison. **This is a required field for all fisheries and trips!**
 - CA fish tickets begin with a letter followed by six digits.
 - OR fish tickets are seven digits.
 - WA fish tickets begin with a letter followed by six digits.

Q: Why are observers required to record fish ticket numbers?

A: When observer data is analyzed, the total landed weight from the Fish Ticket is used to estimate the amount of discard by species per landed weight of target(s).

- **WOC:** The state agency code is: **C** - for California deliveries, **O** – for Oregon deliveries, or **W** – for Washington deliveries.
- **Date:** Document the date in MM/DD/YY of fish ticket issuance.

Haul Information Instructions

- **Haul/set number:** Number hauls consecutively, starting with 1 for each trip.
- **Observer Total Catch estimate (OTC):** Record the total catch estimate to two decimal places. Observer Total Catch estimate is recorded in pounds.
- **Weight method:** Enter the number that represents the weight method used to obtain the observer total catch estimate. The weight methods that may be used for Trawl OTC's are:
 - 6 – Other
 - 14 - Visual Experience

Tip: See the Appendix for a complete list of weight methods.
- **Total Hooks/Pots:** This column will be blank on all trawlers.
- **Gear Performance:** Record one of the following codes to document gear performance:
 - 1 - No problem
 - 2 - Pot was in the haul
 - 3 - Net hung up
 - 4 - Net ripped
 - 5 - Trawl net or codend lost, pot(s) lost, other gear lost
 - 7 – Other problem: Document other gear related problem in the comments section.
- **Seabird Avoidance Gear:** Leave this field blank on trawlers.
- **Avg. Soak Time:** Leave this field blank on trawlers.
- **Comments:** Document any information that is important about the haul. If the vessel documented more than one target strategy, list other strategies in this column.
- **OTC Keypunch Check:** Sum the OTC's for an entire trip and **record total weight of trip** in the OTC keypunch check box. (If more than one Trip Form is used, sum total catch estimates of ALL hauls to obtain keypunch check.).
- **Total Hooks/Pots Keypunch Check:** This field will be blank on all trawlers.

- **Haul/Set number:** Number hauls consecutively, starting with 1 for each trip that correspond to hauls on front of form.
- **Start and end date*:** Document the date the haul was set and the date the haul was retrieved as MM/DD.
- **Start and end time*:** Document the Pacific Standard Time (PST) the haul was set and retrieved in 24-hour notation (military time). A haul starts when the net has reached fishing depth and ends when the brake is released and haul back begins.
- **Start and end latitude*:** Document the latitude (in degrees, minutes, 1/100th of a minute) that the haul was set and retrieved.

Tip: When an observer boards a vessel that has a GPS, check to be sure that it is recording in degrees, minutes, 1/100th of a minute. If not, ask the captain to change the view to 1/100th of a minute instead of seconds. (See Figure 4-10)

- **Start and End Longitude*:** Document the longitude (in degrees, minutes, 1/100th of a minute) that the haul was set and retrieved.



Figure 4-10: GPS Showing Latitude and Longitude

- **Depth*:** Document the fishing depth in **fathoms**. The “Washington-Oregon-California Groundfish Logbook” only requires the vessel to document the depth at which most of the fish were caught. If only one depth is documented, use it for both depth fields.
- **Gear Type*:** Enter a code for the gear type based on the configuration of the gear, rather than how it is being fished. **Use the Trawl Net Identification Key in the Observer Logbook to determine groundfish trawl gear type.**
 - 1 - Groundfish Trawl, Footrope < 8 inches (Small footrope, Not pineapple trawl)
 - 2 - Groundfish Trawl, Footrope > 8 inches (Large footrope)
 - 3 - Midwater Trawl
 - 4 - Danish/Scottish Seine
 - 5 - Trawl Other Gear
 - 12 - Shrimp Trawl: Single Rigged (one net)

Loran:

If the vessel is using Loran C and the degrees of latitude and longitude cannot be obtained while at sea, document the Loran coordinates so that you can convert the positions to degrees after the trip. See Appendix for how to convert Loran C coordinates to latitude and longitude positions

Fathoms:

1 fathom = 6 feet

Be very careful when documenting gear type on trawlers. **Remember, regulations state that gear type 17 - Pineapple Trawl/ Selective flatfish net must be used when fishing shoreward of the RCA, North of 40 10'.**

- 13 - Shrimp Trawl: Double Rigged (two nets)
- 14 - All Net Gear, except Trawl
- 17 - Pineapple Trawl (small footrope)

***If the fishing vessel is not using one of the above gear types, this is most likely the wrong section of the manual. Please refer to Chapter 5 “Fixed Gear Sampling” and/or Chapter 6 “Fixed Gear Sampling on Small Boats”.*

Tip: Regulations require that trawlers fishing shoreward of the RCA (depth generally less than 150 fathoms) use the Pineapple Trawl (selective flatfish net).

- **Target Strategy*:** Enter the vessel’s target strategy. Refer to the Appendix for a list of target strategies. If the vessel is recording more than one target strategy on a single haul, record the strategy that has the largest representation in the catch. Document other target strategies in the haul comments field.



V. Observer Total Catch Estimates (OTC)

The total catch weight must be estimated for all hauls. There are two options for obtaining OTC on trawlers.

Weight Method 14: Visual Experience

Weight Method 6: Other

Weight Method 14 – Visual Experience

Visual estimates are the preferred option for total catch weight on trawlers. Prior to the first haul on the vessel, ask the skipper or crew how much their codend holds (by weight) and how much their trawl alley holds. Record their estimates in the Observer Logbook, Vessel Diagrams section. Use their estimate, as well as the area of the trawl alley and other resources, to visually estimate the total weight of each haul. Record the visual estimate on the back of the Catch Form.

Weight Method 6 – Other

This weight method should never be intentionally used. It creates confusion for end users and debriefers because it does not indicate how the weight was actually derived. If this method is used, document what happened in the observer logbook and on the paperwork.

VI. Sampling Catch

On Catch Share vessels, once the catch is dumped on deck, the crew will begin sorting retained individuals from discarded individuals and sorting fish into IFQ fish groupings (as stated in the regulations).

Due to the large quantity of fish, observers will usually sample, first, all retained overfish IFQ species and secondly, all discarded IFQ catch and finally the remaining NON-IFQ catch.

In the Catch Shares program, observers are responsible estimating total weight of each retained overfished IFQ species (e.g. Yelloweye, Widow, Dark-blotched, Bocaccio, Cowcod, Canary, Pacific Ocean Perch and Petrale) while the NON-IFQ retained catch total weight can be estimated using the skipper estimates (usually). Next, the catch shares observer primary responsibility is to sample the discarded Pacific Halibut and other priority IFQ species and finally the NON-IFQ discarded catch.

Catch Categories

Chapter 3 “Observer Basics” discussed catch categories briefly. This section provides a review and more specific information regarding catch categories on trawl vessels.

As a review, there are two rules that apply to catch categories:

- Retained and discarded individuals are always documented in separate catch categories.
- Individuals are grouped in the same catch category when they are sampled together. All individuals in the grouping must have the same weight method and sample method.

Naming Catch Categories

A list of catch categories and the corresponding three or four letter PacFin codes can be found in the Appendix.

When naming catch categories:

1. If the catch category is species composition sampled, the name of the catch category is irrelevant and usually named ZMIS.

The most common reason for a catch category not to be species composition sampled is when species weights are visually estimated.

2. If a catch category is not sampled for species composition, the contents must be documented using the most descriptive catch category code possible. To determine catch category code, in order of preference, use:
 - Species specific code (e.g. ARRA- Aurora rockfish)
 - Species grouping code (e.g. NSLP, North Slope Rockfish). In the Catch Shares program, unsampled species must be placed in IFQ and/or non-IFQ groupings.
 - If neither exists, use one of the following codes ONLY if no species composition sampled:
 - INVT: Invertebrate discard.
 - MBOT: Miscellaneous bottom items, including rocks, mud, logs, bones, garbage, etc.
 - ZMIS: Mixed catch which can include fish species, invertebrates, and bottom items (like rocks, logs, etc.). ZMIS should **only** be used for unsampled catch categories when a more specific name is not available.
 - NIFQ/ IFQM/ IFQRF/ IFQFF/ IFQRD: These are the acceptable catch category codes for unsampled hauls and catch categories in the Catch Shares program.

Retained catch on trawlers

In the catch shares program, observers will only sample retained catch if it is one of the eight overfish IFQ species, all other retained catch is not independently estimated for weight by the observer. Fishers are required to record the weight of retained species by catch category in a vessel logbook. Observers copy these estimates for retained catch **exactly**, unless:

- The observer is aboard a Catch Shares vessel and the vessel is retaining one or more overfished IFQ species (e.g. Yelloweye Rockfish)
- Vessel does not record catch category (often happens with species retained in small quantities).
- Vessel uses an invalid PacFin code or a code that is not the most descriptive possible. (Select most applicable name from Catch Category list, see the Appendix for a list of the Catch Categories).
- Vessel estimates of retained catch not representative of the weight and/or composition of the catch.

If a vessel is not estimating retained catch by catch category, the observer is responsible for obtaining estimates. This can be done by simply asking the skipper for an estimate or by obtaining an independent estimate using one of the weight methods discussed later in this chapter.

Discarded catch on trawlers

The amount of fish discarded on trawlers is extremely variable, from close to 0% to 100% of the total catch. Observers sort the discard into one or multiple groupings (catch categories). Usually IFQ discard and Non-IFQ discard. There are three factors that distinguish discarded catch categories from each other on trawl vessels:

Vessel/Observer sorting: If the entire discard is not weighed and the crew sorts species in different ways, then the species will fall into catch categories based on the way the crew sorted them. Observer sorting of discard may also lead to species falling into different catch categories. In the Catch Shares program, more emphasis is placed on IFQ species; therefore, species should be sorted in such a way as to allow for the most accurate sampling to be done for IFQ species.

Vessel Sort Example:
Often vessels will “presort”, or remove quickly, some of the harder species. Presorted species often fall into a separate catch category than those species not presorted

Weight method: The method used to obtain the weight estimate of the species or grouping of species can be used to determine the number of discarded catch categories. If portions of the catch have different weight methods, they must be in different catch categories.

Sample method: If species have the same weight method but are sampled for species composition differently, this also requires them to be in different catch categories.

Sampling Priority on Trawlers

The priorities for observers sampling on Catch Shares trawlers are:

1. Record incidental takes and collect appropriate biological information from protected species, including marine mammals, sea turtles, seabirds, green sturgeon, salmon, and Dungeness crab (North of Point Arena).
2. Record fishing effort information, including location, time, date, and depth for all hauls/sets.
3. Record interactions of marine mammals, sea turtles, and seabirds with fishing gear and sightings of ESA-listed species.
4. Estimate total catch weight (OTC), even for tows with 100% discard.
5. Estimate weights of IFQ species, in the following order. Mixed catch categories **must** be sampled for species composition.

- a. Estimate **retained & discarded** weight for Yelloweye and Cowcod rockfish.

§ Only actual weights allowed for 100% of catch

- b. Estimate **discarded** weight of other overfished rockfish: Darkblotched, Widow, POP, Bocaccio & Canary.

§ If catch weight is less than 1000 lbs., use Actual Weight, Bin Volume, or Basket Weight Determination.

§ If catch weight is greater than 1000lbs., the use of Visual Spatial is allowed, in addition to the above weight methods.

- c. Estimate **discarded** weight of overfished Petrale sole.

§ Use Actual weight, Bin volume, BWD, or Visual Spatial.

- d. Estimate weight of Pacific Halibut, by tallying 100% and taking actual lengths/viabilities for all or a randomly selected subsample.

- e. Estimate **discarded** weight of all other non-overfished IFQ species

- f. Estimate **retained** weight of overfished rockfish.

- g. Estimate **retained** weight of overfished Petrale sole.

6. Estimate **discarded** weight of non-IFQ species.

Priorities 1 – 6 must be completed on ALL hauls

7. Sample **discarded** non-IFQ species for species composition.

a. At a minimum, non-IFQ discard must be sampled for species composition on every third haul.

8. Document reasons for discard for each species and/or catch category.

9. Record weight, length, sex, and take necessary dissections from tagged fish.

10. Maintain observer logbook.

11. Take biological samples, including length, sex, otoliths, tissue, etc. from

discarded individuals.

12. Record sighting of marine mammals, sea turtles, and seabirds

Discarded IFQ species (non-overfished):

Arrowtooth flounder	Honeycomb rockfish	Sablefish
Aurora rockfish	Lingcod	Sand sole
Bank rockfish	Longspine Thornyhead	Sharpchin rockfish
Blackgill rockfish	Mexican rockfish	Shortraker rockfish
Bronzespotted rockfish	Pacific cod	Shortspine thornyhead
Butter sole	Pacific halibut	Silvergray rockfish
Chameleon rockfish	Pacific whiting	Speckled rockfish
Chilipepper rockfish	Pacific sanddab	Splitnose rockfish
Curlfin sole	Petrale sole	Squarespot rockfish
Dover sole	Pink rockfish	Starry flounder
English sole	Pinkrose rockfish	Starry rockfish
Flag rockfish	Pygmy rockfish	Stripetail rockfish
Flathead sole	Redbanded rockfish	Swordspine rockfish
Freckled rockfish	Redstripe rockfish	Tiger rockfish
Greenblotched rockfish	Rex sole	Vermilion rockfish
Greenspotted rockfish	Rock sole	Yellowmouth rockfish
Greenstriped rockfish	Rosethorn rockfish	Yellowtail rockfish
Halfbanded rockfish	Rosy rockfish	
Harlequin rockfish	Rougheye rockfish	

Catch shares observers effort on trawlers is focused on obtaining the most accurate estimates of IFQ retained and discarded catch AND Non-IFQ discarded catch as possible. Remember that through the use of catch categories, more precise methods of estimation can be used for those higher priority groups (prohibited species and overfished IFQ species). But, **all** discarded catch weight must be estimated using one of the weight methods explained below.

XIII. Weight Methods for Estimating Catch Category Weights

There are ten weight methods that can be used to determine catch category weights on trawlers:

- 1 Actual weight
- 2 Bin volume/Trawl alley estimate
- 3 Basket Weight Determination (BWD)
- 5 OTC - retained
- 6 Other
- 7 Vessel estimate - retained only
- 8 Extrapolation
- 9 Pacific halibut length/weight conversion
- 14 Visual experience
- 15 Visual spatial
- 19 Pacific halibut length/weight extrapolation

The weights obtained by these methods are recorded on the Trawl/Prawn Pot Catch Form.

Weight Method 1: Actual Weights

When actual weight is commonly used:

1. On Catch Shares vessels, this should **always** be used for both retained and discarded Yelloweye and Cowcod Rockfish.
2. Total discard is less than 1000 to 1500 lbs and vessel has enough deck space for all discard.
3. Priority species: Actual weight should be used for salmon species, overfished species, and all rockfish species whenever possible.

Step-by-Step Instructions

1. Place all of the individuals from the catch category in observer baskets.
2. Weigh baskets. There will be one catch category for all of the species in the baskets.

Calculation

$$\text{Catch Category Wt (lbs)} = \sum \text{Basket Weights}$$

OR

1. Sort all of the individuals in the catch category by species.
2. Weigh each species group.

Calculation

Catch Category Wt (lbs) = \sum all species groups in catch category

Weight Method 2: Bin Volume/Trawl Alley Estimate

When Bin Volume is commonly used:

1. All discard is placed in a bin or left in the trawl alley.
2. Overfished IFQ species that are sorted into checker bins to be retained.
3. Species/species grouping is initially sorted into a bin because vessel plans on retaining it. However, at end of sort, vessel decides to discard all or a portion of the species/species grouping.

Step-by-Step Instructions

1. **Determine the appropriate volume formulas for each area of the bin(s).** (see the Appendix for Weight Measures and Conversions) Most bins will be rectangular, however, some will have odd shaped areas (See Figure 4-11 and Figure 4-12).

Example: Bin is rectangular, therefore length, width, and height measurements needed.

2. **Measure the area of the bins in meters.** The area of the bin will most often be determined by measuring the length and width of the bin(s). If there are variations in the shape of the bin, multiple measurements of length and width should be made. If the catch category fills more than one bin, the total area of the bin will be:

Calculation

Total Area (m²) = S of Areas (m²) of All Bins

Example: The length of the bin = 2.43 meters and the width of the bin = 1.59 meters

3. **Measure the height of the discard in the bin in meters.** The height of the fish in the bin provides the final dimension needed to obtain the volume. Height is measured by placing a calibrated stick into the bin to measure the depth of fish at one or several points. If the height of fish varies throughout the bin, multiple height measurements should be taken. If multiple heights are measured, determine the average height:

Calculation

$$\text{Average height of fish in bin, (m)} = \frac{\text{Height A (m)} + \text{Height B (m)} + \text{Height C (m)} \dots d}{\text{number of height measurements taken}}$$

Example: Height of fish in the bin varied, therefore three height measurements taken. They were: .47 meters, .31 meters, and .25 meters. The average height = $(.47\text{m} + .31\text{m} + .25\text{m}) / 3 = 0.343333333$ meters.

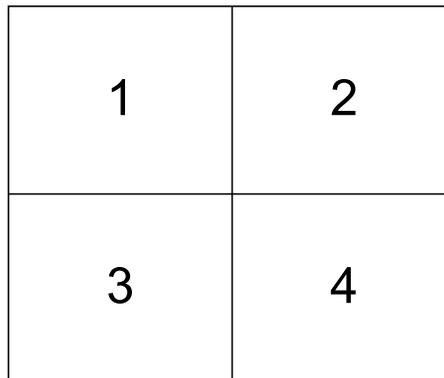
4. **Determine volume of bin(s).** Make sure that all of the measurements are as precise as possible. To obtain volume of the catch category:

Calculation

$$\text{Volume of catch category (m}^3\text{)} = \text{Total area of bin (m}^2\text{)} \times \text{Average height of fish in bin (m)}$$

Example: Volume of the bin = $2.43\text{m} \times 1.59\text{m} \times 0.343333333\text{m} = 1.326536998$ m³.

5. Once the volume of the bin(s) has been determined, randomly select area(s) to take density baskets.
- Visually divide the bin into sections of equal size.



- Use a random number table or a watch to select one or two areas from which one or more baskets will be taken.
6. Fill baskets to the top, using individuals from the selected section(s). Collect fish by moving down and out through the fish, being sure to reach the deck.
Example: 2 baskets filled to the very top.
7. Weigh baskets.
Example: Baskets weigh 71.02 lbs and 68.61 lbs.

8. Determine the average basket weight.

Calculation

Average basket weight (lbs) = $\frac{\text{Weight of Basket A (lbs)} + \text{Weight of basket B (lbs)} \dots}{\text{number of baskets weighed}}$

Example: $(71.02 \text{ lbs} + 68.61 \text{ lbs})/2 = 69.815 \text{ lbs}$.

9. Determine the density of the bin(s)

Calculation

Density (lbs/m³) = $\frac{\text{Average weight of basket (lbs)}}{\text{Volume of baskets (m}^3\text{)*}}$

**The volume of the yellow basket is a known. The volume of a basket filled to the top of the basket equals .040m³.*



Figure 4-11: WCGOP Observer Basket Volumes

Example: Density = $69.815 \text{ lbs} / .040 \text{ m}^3 = 1745.375 \text{ lbs/m}^3$

10. To determine catch category weight:

Calculation

Catch category weight (lbs) = Volume of bin (m³) x Density (lbs/m³)

Example: Catch category weight = $1.326536998 \text{ m}^3 \times 1745.375 \text{ lbs/m}^3 = 2315.3045 \text{ lbs}$



Figure 4-12: Trawl Alleys and Bins

Weight Method 3: Basket Weight Determinations (BWD)

When Basket Weight Determination is commonly used:

1. Total discard weighs less than 1500lbs.
2. A large quantity of a single species or a mix of similar species is discarded. Species this commonly applies to are Arrowtooth flounder and Spiny dogfish shark. Groupings of species this commonly applies to are flatfish species and Splitnose rockfish and Aurora rockfish.

Step-by-Step Instructions

1. Visually estimate the number of baskets it will take to hold the entire catch category.

Example: Estimate it will take 28 baskets to hold entire catch category.

2. Devise a sampling plan to randomly select baskets to use to determine average basket weight. **A minimum of four baskets must be weighed when using the BWD weight method.** Use a spatial, systematic, or temporal frame. See “*Method to Randomly Select Baskets for Weights*” on page 30.

Example: Decide to use 7 basket to determine average basket weight. Using a systematic random sampling frame, divide 28 (estimated number of baskets) by 7 = 4 (n). Randomly select a number between 1 and 4, 1 selected. Save the 1st, 5th (1 + 4(n) = 5), 9th (5 + 4 (n) = 9), 13th, 17th, 21st, and 25th baskets of discard collected.

3. Place **all** species/items from catch category into baskets to obtain the total basket count. Each basket should be filled to the **same level** and contain a random sample of catch category composition.

Example: Filled 27 baskets of discard. One partial basket also collected.

Tip: In most cases when BWD is used, the last basket will be less full than all other baskets. Be sure to weigh this basket and add it's weight into the final calculation. See step 6 below.

4. Weigh each randomly selected basket. **A minimum of four baskets must be weighed when using the BWD weight method** but observers are encouraged to weigh at least 6 – 10 baskets.

Example: 7 baskets of discard weighed 551.23 lbs.

5. Calculate average basket weight by summing all the basket weights and dividing by the number of baskets sampled

Calculation

$$\text{Average basket weight (lbs)} = \frac{\sum \text{Basket weights}}{\text{number of baskets sampled}}$$

Example: 551.23 lbs/ 7 baskets = 78.74714285 lbs.

6. If a partial basket remains, record the weight and add it to the calculated BWD estimate.

Example: Weight of partial basket = 35.87 lbs.

7. To determine catch category weight

Calculation

Catch category weight = (number of full baskets x Average basket weight) + Weight of partial basket:

Example: (78.74714285 lbs X 27 baskets) + 35.87 lbs = 2162.04 lbs.

Method to Randomly Select Baskets for Weights

Systematic (preferred)

Other methods for selecting baskets are possible, but this is the preferred method.

- a. Define population: **All baskets of fish in the catch category.**
- b. Define sample frame: **Spatial systematic, based on baskets of fish.**
- c. Define sample units: **Single baskets of fish.**
- d. Number all sample units; this may require estimating how many baskets the catch category will fill; for example, estimate that catch category will fill 15 baskets - **Number baskets 1 – 15.**
- e. Decide how many of the sample units you will weigh: **Decide to weigh 5 baskets.**
- f. Divide the total number of sample units by the number of units you want to weigh. This gives you your value for “n”. $n = 15/5 = 3$.
- g. Randomly select a number between 1 and n. This will be the first sample unit in your sample. Use random number table to select a number between 1 and 3. – **Randomly select 1.**
- h. Weigh the selected basket and then every n^{th} basket after that - **Weigh baskets 1, 4(1+3), 7(4+3), 10(7+3), and 13(10+3).**

Weight Method 5: OTC – Retained

When OTC - Retained is commonly used:

1. Observer is sick or injured and unable to sample. This is the least preferred method for estimating discard. When unable to sample, always attempt to take visual estimates of discard. In the Catch Shares program, the observer should visually estimate the amounts of IFQ and non-IFQ species in unsampled hauls.

Step-by-Step Instructions

1. Visually estimate total catch weight (OTC).
2. Estimate weight of retained fish using one or more of the weight methods. Vessel estimates are the most commonly used weight method for retained catch.
3. To determine total discard weight:

Calculation

Catch category Weight (lbs) = OTC - Retained species weights (lbs)

Tip: Be sure to document in the observer logbook why the haul or catch category was not sampled

Weight Method 6: Other

This weight method should never be intentionally used. It creates confusion for end users and debriefers because it does not indicate how the weight was actually derived. If this method is used, document what happened in the Observer Logbook and on the deck sheets.

Weight Method 7: Vessel Estimates

When Vessel Estimate is commonly used:

1. All estimates of retained catch categories on trawlers, that are NOT one of the 8 overfished IFQ species.

Step-by-Step Instructions

1. Copy retained catch category estimates from the vessel's logbook.

OR

1. Ask skipper for retained catch category estimate.

Weight Method 8: Extrapolation

When Extrapolation is commonly used:

1. Species that are presorted, such as Dungeness crab, lingcod, and sablefish.

Tip: Pacific halibut are also presorted but do not use extrapolation in this case. See weight method 19 or WM 9 for sampling of Pacific halibut.

Step-by-Step Instructions

Tip: When weight method 8 is used, **an actual count of individuals is REQUIRED!!** The actual count must be recorded on the Catch Form in the Fish # column.

1. Devise a sampling plan to randomly select individuals from the presorted fish for average weights. Use a systematic, spatial, or temporal frame. **Specifics on implementing each type of sampling frame are described below.**

Example: Sablefish are being presorted on deck by 3 crew members. The observer determines they could count ALL the sablefish being thrown over by all the crew. The observer determines that they could get a weight from all the sablefish thrown over by just ONE crew member. Number the deckhands 1 - 3 and randomly select one of the numbers. In this example, all the sablefish from deckhand 3 will be collected and ALL the presorted sablefish will be tally counted.

Presort

Vessels will attempt to get hardier, live fish back into the water quickly. After a codend has been dumped, the crew will sort through the catch, pulling out individuals of these species and toss them over. This usually happens prior to any other sorting of catch.

2. Count the number of individuals, by species.

Example: 56 Sablefish presorted by all three crew members.

3. Determine the average weight of species

Calculation

Average weight = $\frac{\sum \text{Individuals weight (lbs)}}{\text{number of individuals weighed}}$.

Example: Collected 21 Sablefish from just one deckhand (#3) which weighed 65.77 lbs. Average weight = 65.77 lbs/ 21 fish = 3.131904761 lbs/fish.

4. To determine catch category weight, apply the average weight to the total number of individuals of that species to obtain the catch category weight.

Calculation

Catch category weight = Average weight x Total number of Individuals caught

Example: Catch category weight = 3.131904761 lbs/fish X 56 total fish = 175.39 lbs.

Tip: If extrapolation is used for more than one species, place each species in it's own catch category

Methods for Randomly Selecting Individuals

- Systematic Random Selection.
- Spatial Random Selection.
- Temporal Random Selection.

Systematic Selection (preferred method)

Select individuals based on when they leave deck.

1. Estimate number of fish of particular species caught.
2. Break the number of fish into sampling units (n) by dividing the number of fish needed for average weights by the number of fish likely to be on deck.
3. Choose which fish to take first by selecting a random number that is between 1 and the sample unit (n).
4. Then collect every nth individual after that.
5. Weigh all selected individuals and divide by the number of individuals weighed to determine average weight

Systematic Random Sampling Frame

Example:

The observer estimates that 60 Sablefish are usually presorted. In order to get 15 individuals, he divides 60/15 = 4. That means that one of every four fish should be taken for average weights. Using the random number table, a number between 1 and 4 is randomly selected. A 3 is selected. The observer collects the 3rd, the 7th (3+4), the 11th(7+4), etc. individuals for average weights.

Spatial Selection

Select all individuals from a designated area on the deck.

1. Visually divide the deck into equal units.
2. Randomly select a unit to take individuals from.
3. Take all individuals in that unit.
4. Weigh all selected individuals and divide by the number of individuals weighed to determine average weight..

Temporal Selection

1. Select all individuals sorted or on deck during a unit of time. Estimate the time it will take to sort out species.
2. Randomly select a designated time during sort to take individuals or randomly select a time to begin taking individuals.
3. Take all individuals during randomly selected interval or take individuals until enough have been collected.
4. Weigh all selected individuals and divide by the number of individuals weighed to determine average weight

Weight Method 9: Pacific Halibut Length/Weight Conversion

When PHLB length/weight conversion is used:

1. Used only for Pacific Halibut (PHLB), when numbers are low enough (~10) to take actual lengths and viabilities for all individuals in the catch category.

Step-by-Step Instructions

1. Actually measure the length and assess the viability (i.e. Excellent, Poor, or Dead) of all Pacific halibut in the catch category. Record lengths to the nearest whole centimeter.

Example: 2 PHLB @ 73 cm, 1 PHLB @ 90 cm, and 1 PHLB @ 122 cm.

2. Use the Pacific Halibut length/weight conversion table to obtain a weight for each individual (see Appendix for Halibut Length/Weight table).

Example: The length/weight conversion table states that: 73 cm PHLB weigh 10.05 lbs, 90 cm PHLB weigh 19.80 lbs, and 122 cm PHLB weigh 53.07 lbs.

3. To determine catch category weight, sum the weights of all the Pacific Halibut.

Calculation

Catch Category Wt (lbs) = \sum Pacific halibut Wts from Length/Weight Conversion Table

In addition to collecting lengths, observers will be required to assess each sampled PHLB for viability, using the “Key to Injury Codes for Trawl Caught Pacific Halibut”, in the Appendix. Be sure to use the correct key, as there is a separate one for each gear type.

Example: (10.05 lbs X 2) + 19.80 lbs + 53.07 lbs = 92.97 lbs.

Tip: Retained and discarded Pacific halibut must be in separate catch categories. Typically trawlers have no retained halibut.

Recording Pacific Halibut raw data should include the following information and format on the data forms: A label which identifies the lengths as being “actual” (as opposed to visual estimates), lengths recorded in whole centimeters, viability (Excellent, Poor, or Dead), and converted weights from the P. halibut length/weight conversion table (in the appendix). See example below.

<u>PHLB-Actual Lengths</u>	
73 cm P*	10.05 lbs
90 cm E	19.80 lbs
73 cm P	10.05 lbs
122 cm D	53.07 lbs

*E=Excellent/ P=Poor/ D=Dead

Weight Method 14: Visual Experience

When Visual Experience is commonly used:

1. Species that are too large to weigh, such as marine mammals, large skates, and sharks.
2. Estimates of total discard weight when two hauls are dumped on each other (not permitted in Catch Shares program).
3. Hauls observer is unable to sample.
4. Weight of discard when all catch is dumped at-sea.
5. Weight of mixed discarded catch category species when other weight methods can not be used. Although this is the least preferred method for determining catch category weight, it may be the only estimate possible. If this method is used for a mixed grouping of discarded species, it's very important to get a species composition sample.
6. Weight of a single discarded species that has a large quantity. Commonly, the species this applies to are Arrowtooth flounder and Spiny dogfish shark.

Step-by-Step Instructions

1. Based upon previous experience, visually estimate the weight of the species or the catch category.

Tip: It may be helpful to ask the crew members for estimates of species or discard weight on new vessels or the first time a species is encountered. Do not

Visual estimates can be used for large amounts of mud, rocks, and miscellaneous junk

rely solely on their estimates but use them to help gauge the independent estimate

Weight Method 15: Visual Spatial

When Visual Spatial is commonly used:

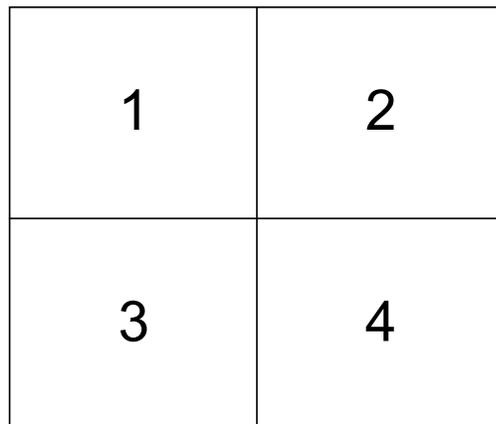
1. Mixed discarded species when a large quantity of fish are discarded.
2. Mixed discarded species on vessels with small decks, that bring up hauls back-to-back.

Step-by-Step Instructions

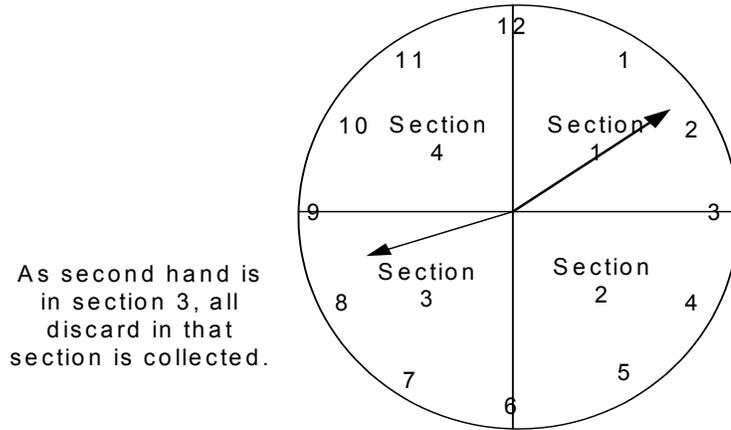
1. Visually divide the trawl alley into areas or sections of equivalent size. The visual grid can contain 2 or more sections.

Tip: If time and space on deck is restricted and the observer determines a smaller sample size is required, then increase the visual grid sections (i.e. 10 or 12 sections). If time and space on deck allows for a larger sample to be collected then use a visual grid with fewer sections (i.e. 2 or 4).

2. Number each section.



3. Randomly select one or more sections(s) from which all discard will be collected. A watch or the random number table can be used to select random numbers.



4. Collect all the discard from the selected section(s).
5. Weigh all the discard collected.

Example: The observer divided the trawl alley into a total of 4 visual sections and randomly choose to sample all the discard in ONE section. All the discard in section 3 = 564.12 lbs.

6. Determine catch category weight using the following equation:

Calculation

$$\text{Catch Category Wt} = \frac{\text{Weight of sample (lbs)}}{\text{\# of section(s) discard collected from}} \times \text{Total \# of sections}$$

Example: The total catch category weight is calculated as:

$$\frac{564.12\text{lbs}}{1 \text{ section sampled}} \times 4 \text{ total sections} = 2256.48\text{lbs}$$

Tip: When using weight method 15, ensure the calculation is documented JUST as the example above. This is the preferred format and units to used on the data forms.

- When using weight method 15, keep in mind that more than ONE section of the visual grid can be sampled. An observer may determine that 2 or 3 sections of the visual grid could be sub-sampled. For example: If the observer visually divides the discard in the trawl alley into 8 sections and the observer determines that he can weigh all of the discard in 3 (randomly chosen) sections. The total catch category weight would be calculated as:

$\frac{664.12\text{lbs}}{3 \text{ sections sampled}} \times 8 \text{ total section} = 1770.99\text{lbs}$

Weight Method 19: Pacific Halibut Length/Weight Extrapolation

When PHLB length/weight conversion is used:

1. Used only for Pacific Halibut (PHLB), when numbers are **too high** to take actual lengths and viabilities for all individuals in the catch category.

Step-by-Step Instructions

1. Obtain an actual count (tally) of all Pacific Halibut found in the haul.
2. Actually measure the length and assess the viability (Excellent, Poor, or Dead) of a minimum of 10 Pacific Halibut. Record lengths to the nearest whole centimeter. Depending on the number of PHLB present in the haul, use one of the following methods to randomly select individuals for length/assessment:
 - Devise a **random systematic sampling frame** in order to get lengths and viabilities for at least 10 individuals from throughout the haul.
 - For hauls containing **50 or more** PHLB, use a **random systematic sampling frame** to collect 1/5 of the individuals for lengths and viabilities
3. Use the Pacific Halibut length/weight conversion table to obtain a weight for each individual (see Appendix for Halibut Length/Weight Conversion Table).
4. To determine catch category weight, sum the weight of all the Pacific Halibut.

In addition to collecting lengths, observers will be required to assess each sampled PHLB for viability, using the “Key to Injury Codes for Trawl Caught Pacific Halibut”, in the Appendix. Be sure to use the correct key, as there is a separate one for each gear type.

Calculation

$$\text{Catch Category Wt} = \frac{\sum \text{PHLB Weights (from conversion table) (lbs)} \times \text{Total \# PHLB tallied}}{\text{\# of PHLB sampled (lbs)}}$$

Tip: Retained and discarded Pacific halibut must be in separate catch categories. Typically trawlers have no retained halibut.

Recording Pacific Halibut raw data should include the following information and format on the data forms: A label which identifies the lengths as being “actual” (as opposed to visually estimated), lengths recorded in whole centimeters, viability (Excellent, Poor, or Dead), weight data from the P. halibut length/weight conversion table (in the appendix), and a tally of all PHLB present in the haul.

It is important that the Total # of PHLB documented, represents the total number of PHLB in the haul. In this example, each of the PHLB that were lengthed and assessed for viability, as well as those which were not, are represented by tally marks.

Example:

<u>PHLB Tally</u>		<u>PHLB-Actual Lengths</u>	
		73 cm P*	10.05 lbs
		90 cm E	19.80 lbs
		122 cm D	53.07 lbs
		73 cm E	10.05 lbs
		85 cm P	16.45 lbs
		63 cm P	6.24 lbs
Total# = 28 PHLB		45 cm E	2.09 lbs
		110 cm D	37.94 lbs
		43 cm D	1.81 lbs
		73 cm D	10.05 lbs
		*E=Excellent/ P=Poor/ D=Dead	
Catch Category Weight = $\frac{167.55 \text{ lbs (converted)}}{10 \text{ PHLB sampled}}$ X 28 PHLB tallied			
= 469.14 lbs			

V. Trawl/Prawn Pot Catch Form Instructions

The Catch Form is the standardized form used to document Catch Categories, Catch Weight and Catch Weight methods. A Catch Form should be completed for all hauls (See Figure 4-13).

- **Haul Number:** Record the number of the haul.
- **Date:** Record the date as MM/DD/YY.
- **Trip Number:** This number is automatically generated by the database. Complete this field once the trip has been started in the database.

Tip: Some observers find it easier to start a trip prior to leaving port. Doing this allows the observer to fill in the Trip Number while at-sea rather than when the observer returns to port.

- **Page _ of _ :** Number forms sequentially with in a haul.
- **USCG number:** Record the USCG vessel number posted on the exterior of the vessel or request this six or seven digit number from the vessel skipper or a coordinator. **If the vessel does not have a USCG number, leave field blank.**

- **Catch number:** Number the catch categories consecutively, starting at 1 for each haul. The numbers on the paper Catch Form must match the numbers assigned by the database when data is entered.
- **R or D:** Record whether the catch category is from retained or discarded catch. Record **R** – Retained or **D** – Discarded.
- **Catch Category:** Record, in capital letters, the catch category sampled in the 3 or 4-letter PacFin code. For a list of PacFin catch category codes, see the Appendix for the Catch Categories and Target Strat.
- **Weight:** Record the total weight of the catch category to two decimal places. Weight unit is pounds (lbs).
- **Volume: If weight method 2 (Bin volume) was used to estimate the catch category weight, record the volume, to two decimal places, in m³.**
- **Density:** If weight method 2 (Bin volume) was used to estimate the catch category weight, record the density, to two decimal places, in lbs/m³.
- **Number of Fish:** Record the total number of fish in the catch category if weight methods 8 (Extrapolation), 9 (PHLB Length/Weight Conversion) and WM 19 were used. If weight method 14 (Visual Experience) was used for one or more individuals and you have an actual count of the number of individuals, record the number on the Catch Form. Do not record the total number of fish for weight methods other than 8, 9, and 14 and 19.
- **Weight Method:** Document the weight method used to estimate the catch category weight.

- 1 Actual Weight
- 2 Bin Volume/Trawl Alley Estimate
- 3 Basket Weight Determination (BWD)
- 5 OTC - Retained
- 6 Other
- 7 Vessel Estimate (retained only)
- 8 Extrapolation
- 9 Pacific Halibut Length/Weight Conversion
- 14 Visual Experience
- 15 Visual Spatial
- 19 PHLB Length/Weight Extrapolation

- **Catch Purity:** If catch category was *sampled* for species composition, record **M** - Mixed if more than one species was within sample. Record **P** - Pure if there was only one species in species composition sample.

Record numbers of fish for Weight Method 14 – Visual Experience only when an actual count of individuals has been obtained.

Do not record extrapolated numbers on the Catch Form for trawl trips.

If the catch category was *not sampled* for species composition, record as **P** – Pure if the catch category is composed of 95% or greater a single species or as **M** – Mixed if the catch category is composed of less than 95% a single species.

- **Discard Reason:** Record the skipper/crew's reason for discard for unsampled (no species composition sample taken) discarded catch categories only. (refer to Chapter 3 "Observer Basics" for more information on these codes)
 - 11 Incidental/Accidental
 - 12 Drop-off
 - 13 Market
 - 14 Other
 - 15 Predation
 - 16 Regulation
 - 17 Safety
 - 18 Market (docksides only)
- **Vessel Estimate:** Fill in the vessel estimate (from the Vessel Logbook) in this column **ONLY** if an independent estimate of a retained catch category weight was taken. If the weight method for the catch category is 7 (Vessel Estimate), leave this column blank and fill in the **Catch Weight column** with the vessel estimate.
- **Comments:** Document anything important about each category. Important information could include the composition of a mixed (less than 75% pure) unsampled catch category. For example, if the skipper documents a retained catch category as REX and the rex sole is mixed with sand sole, make a note of this in the comments column. **Species names should be recorded here if the catch category is not accompanied by a species composition sample and the catch category name does not indicate species** (e.g. SKAT).
- **Keypunch Checks:** This is a required field for **Catch Weight** and **Catch Numbers of Fish**. Sum up the entries in each column and place the total in the corresponding keypunch box at the bottom of the form.

VI. Collecting and Documenting Species Composition

Once the catch has been placed into catch categories, a species composition sample can be taken from all, some, or only one of the catch categories. (See Figure 4-14) Species composition samples can consist of every individual in the catch category or a subsample of the individuals in the catch category. Subsamples must be representative of the entire catch category.

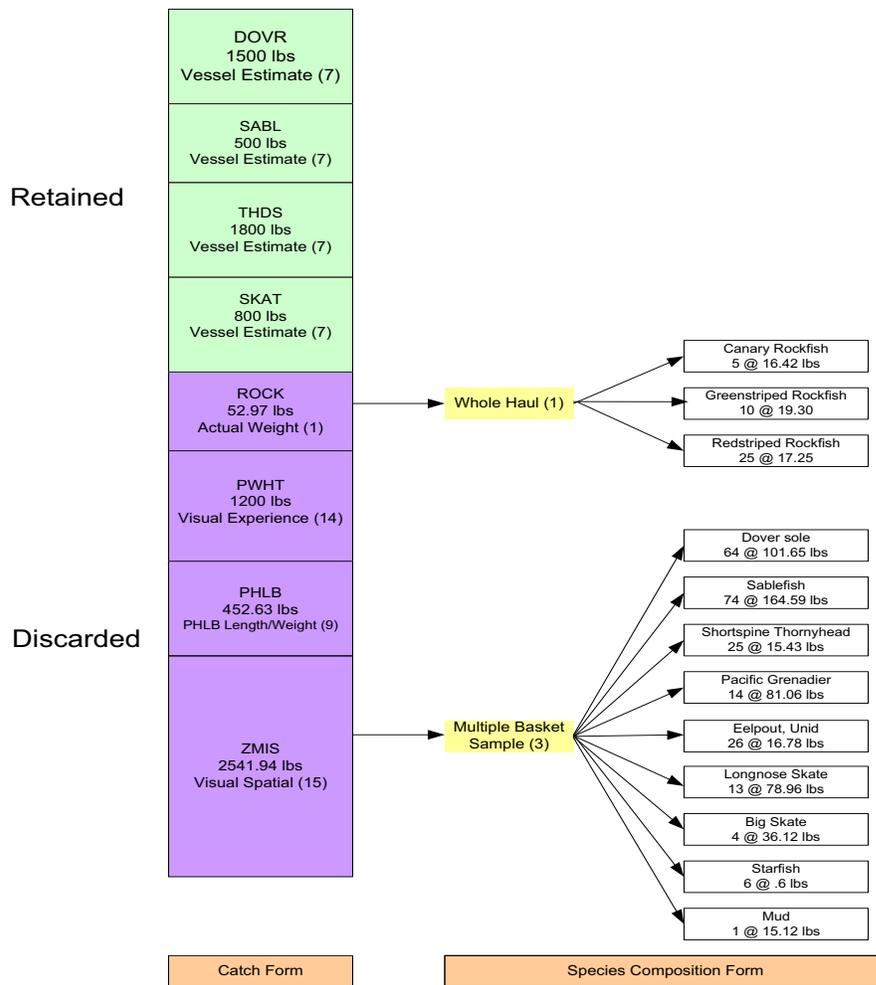


Figure 4-14: Catch to Species Composition

The most important thing to remember when species composition sampling on trawlers is that every fish/item in the sample must be weighed.

Methods for Species Composition Sampling:

Sample Method 1 - Whole Haul

1. Sort all individuals in catch category to species.
2. Weigh and count all individuals by species.

Sample Method 2 - Single Basket

1. Randomly take one representative basket from the catch category.
2. Sort individuals in basket to species.
3. Weigh and count all individuals by species.

Sample Method 3 - Multiple Basket

1. Randomly take two or more representative baskets from catch category.

Tip: Multiple basket samples should weigh, at minimum, 500lbs

2. Sort individuals in baskets to species.
3. Weigh and count individuals by species.

Average Number Calculations

On trawl vessels, all species on the Species Composition Form **must** have an actual weight. However, observers do not have to count every individual in the species composition sample. **Average number calculations are used when a species composition sample contains more than one species and all individuals can not be counted.** Consider using average number calculations to estimate the number of individuals when:

- The catch category contains many small individuals of a given species/species group, such as juvenile rockfish.
- The catch category contains many individuals of the same species and counting all of them would greatly reduce the size of the species composition sample (e.g. flatfish species).

Step-by-Step Instructions

1. Randomly select a basket (or partial basket) of the species that were collected for the species composition sample.

If Weight Method 1 – Actual Weights and Sample Method 1 – Whole Haul are used and the whole haul weight is different than actual weight, record the whole haul weight on the Catch Form.

Species
Categories:
Count only those
species that have
been actually weighed
and counted on the
Species Composition

Tip: When doing average number calculations, count and weigh as many individuals as possible. At minimum, 30 individuals should be weighed and counted for target retained species and 15 individuals should be weighed and counted for non-target retained and discarded species.

2. Weigh and count all the individuals in the basket.
3. Weigh all of the individuals of the species that appear in the species composition sample.
4. To determine the total number of individuals (“Sample Number” on the Species Composition Form):

Calculation

$$\text{Total Sample \#} = \frac{\text{\# of Individuals Actually Counted} \times \text{Total Wt of Species in sample (lbs)}}{\text{Wt of Individuals Counted(lbs)}}$$

Species Composition Form Instructions

Species composition information is recorded on the Species Composition Form (See Figure 4-15). Species composition sampling on trawlers is documented on the front of the species composition form while the back of this form is reserved for calculation documentation. This is encouraged by the program to reduce transcription errors made by the observers copying raw data from another location (i.e. back of catch form or back of the species composition form) to the front of the species composition form.

- **Haul Number:** Record the number of the haul that the sample came from.
- **Date:** Record the date as MM/DD/YY.
- **Trip Number:** This number is automatically generated by the database. Complete this field once the trip has been started in the database.

Tip: Some observers find it easier to start a trip prior to leaving port. Doing this allows the observer to fill in the Trip Number while at-sea rather than when the observer returns to port

- **USCG #:** Record the USCG vessel number posted on the exterior of the vessel or request this six or seven digit number from the vessel skipper or a coordinator. **If the vessel does not have a USCG number, leave field blank.**
- **Trawl Biosampling List:** Circle the number that corresponds to the trawl biosampling list used on the haul. (see Chapter 7 “Biological Sampling” for more information)
- **Page _ of _:** Number forms sequentially with in a haul.

- **Catch number:** Record the number that corresponds to the catch category on the Catch Form.
- **Catch category:** Record, in capital letters, the catch category sampled using the 3 or 4-Letter PacFin code. For a list of PacFin catch category codes, see Appendix for Catch Categories List.
- **Sample Method:** Record the method used to sample the catch category.
 - 1 Whole haul
 - 2 Single basket
 - 3 Multiple baskets
- **KP Weight and KP Number:** Sum the total weight of all species in the catch category sample and place the total weight in the Keypunch (KP) Weight box. Sum up the total number of all species in the catch category sample and place the total number in the Keypunch (KP) Number box.
- **Species:** Record the common name of the species in the sample. This column must be filled in with the species name. It is not acceptable to enter a species code number in this field. The common name listed on the paperwork must match the common name used in the database (see Appendix for Species Codes).

Tip: Catch category codes can be used in the common name field for those species with species specific codes.
- **Species Code:** Record the species code of the corresponding species. This field is used to ease data entry, therefore it does not necessarily need to be filled in on-deck. (see Appendix for Species Codes).
- **Sample Weight:** Record the total weight of the species in the sample. **This weight MUST be an actual weight.**
- **Fish Number:** Record the number of fish of each species in the sample. This number may be an actual count (preferred) or extrapolated.

Tip: Keep in mind, for single species catch categories, record only those actually weighed AND counted on the Species Composition Form. For mixed species catch categories, numbers of fish can be extrapolated.

- **Discard Reason:** Record the skipper/crew's reason for discard. (refer to Chapter 3 "Observer Basics" for more information on these codes)
 - 11 Incidental/Accidental
 - 12 Drop-off
 - 13 Market
 - 14 Other
 - 15 Predation
 - 16 Regulation
 - 17 Safety
 - 18 Market (docksides only)

- **Release Method:** Leave this column blank on trawlers. It is used by the Nearshore fisheries only.

- **Basket Weight and Number or Raw Data:** Use this column on deck to document numbers and weights of species. **Be sure to fill in the "Sample Weight" column with the total weight of the species in the sample and the "Fish #" column with the total number of individuals of the species in the sample.**

VII. Mixed Hauls

Mixing of Tows is **not permitted** in the Catch Shares program. The crew may not dump another tow on deck, until all catch from the previous tow has been removed from the deck or stored in a location isolated from the new haul's catch. All sampling from the first haul must be completed before the crew can begin sorting the second haul.

Occasionally, non-Catch Shares vessels will dump a haul on top of a previous haul. There are two options for documentation and sampling when this occurs.

1. If you have taken a species composition sample from the first haul prior to the second haul being dumped on top:
 - Record the two hauls as separate hauls.
 - Use a visual estimate for the OTC of the second haul.
 - Visually estimate or use other weight methods to estimate the weight of discard from first haul.
 - Record species composition from first haul.
 - If possible, visually estimate the weight of discard on second haul. If not possible, use OTC - Retained weight on Catch Form.
 - Do not take a species composition sample from second haul.
2. If you have not taken a species composition sample from the first haul prior to the dump:
 - Record the hauls as one haul, using the start time/location/etc. from the first haul and the end time/location/etc. from the second. Be sure to document in notes that they were recorded as two separate hauls in vessel logbook.
 - Sum total catch estimates of first and second haul and record as OTC. If two weight methods were used to determine total catch, document as weight Method 6 (Other) and document how weight was estimated in Haul Comments.
 - If vessel records as two separate hauls, copy retained catch categories and weights (sums of weights if same catch category) from both hauls onto one Catch Form.
 - Estimate the total weight of discard from both hauls. Record weight on Catch Form.
 - Take a random, non-biased, representative species composition sample from the combined hauls.

OR

- Record the hauls as separate hauls.
- Copy vessel's estimate of retained catch categories for each haul on separate Catch Forms.
- Visually estimate discard weight for each haul. If unable to independently estimate, use OTC - Retained for discarded catch category estimates.
- Do not take species composition samples for either haul.

VIII. Working Smarter, Not Harder

When sampling on deck, think about ways to minimize the amount of effort, especially lifting, that needs to be accomplished. Here are some things to consider:

1. **Don't weigh fish more than once.** For instance, if you are going to whole haul a catch category, do not weigh the full baskets and then sort and weigh the individual species. Instead, sort into species and weigh, then use the sum of all the weights as the catch category weight.
2. **Sample small individuals separately from larger individuals.** Small flatfish or thornyheads are hard to handle and time consuming to identify. One option for dealing with them is to split small species into their own catch category. By sampling larger specimens first, time is saved and deck space is freed up. Determine the catch category weight of the small individuals and take a one or two basket sub-sample for species composition.
 - **Thornyheads and Splitnose/Aurora-** When large quantities of thornyheads or small rockfish species are discarded or when the discarded individuals are small, it is very important to get the proportion of shortspine to longspine thornyheads or splitnose to aurora rockfish in the discard. Use one of the following methods when sampling discarded thornyheads, splitnose/aurora discard or any other discard of similar species that meet the above criteria:
 - If all discard is actually weighed and whole hauled, place thornyheads/splitnose/aurora in the ZMIS catch category with other discard. All individuals must be identified to species (e.g. do not use thornyhead, unid on Species composition form).
 - If discard is not actually weighed and whole hauled, then *either* identify all thornyheads/splitnose/aurora to species in the species composition sample or place them in their own catch category, estimate total weight of thornyhead/splitnose/aurora's in the haul, and take a single basket species composition.
 - **Thornyhead, unid should not be used on the Species composition form!**
3. **When there is a large amount of discard of a single species, estimate the weight of that species separately from other discarded species.** For instance, some hauls have a large amount of arrowtooth flounder or spiny dogfish shark discard. Observers can visually estimate (based on experience) the total weight of

these species in the haul, take a single basket species composition sample, and then use a more accurate weight method for the weight of other discarded species.

4. **Bottom line: Get creative.** Remember that there are 10 weight methods (not including OTC - Retained and Other) that can be used to determine catch category weights on trawlers. Using a combination of methods on a single haul often results in better estimates of discard and less work for you. Talk with year-round observers for ideas for specific fisheries and/or vessels.

IX. Unsampled Hauls

There may be times when a haul cannot be sampled due to illness, injury, or weather conditions. When a catch shares haul is not sampled, visual estimates of the catch is highly encouraged. If a catch shares observer is not able to sample then the vessel is required to return to port with in 36 hours.

Trip Form

- Record location, gear, and other information just like it is recorded for a sampled haul.
- **Observer Total Catch Estimate:** At minimum, make a visual estimate of the total catch weight.

Trawl/Prawn Catch Form

- Record vessel estimates of retained catch categories.
- When possible, attempt to visually estimate the amounts of IFQ and non-IFQ discard in the haul (Catch Shares program).
- For discarded catch categories, place all species in one category. Subtract the vessel estimates of retained species from the visual estimate of OTC. Use Weight Method 5 (OTC – Retained) to obtain an estimate of the discarded catch weight.
- Document the appropriate reason for discard for the catch category.

X. Discard That Cannot Be Attributed To A Specific Haul

On rare occasions, a vessel will discard fish from the hold. This happens if market conditions change during a trip or if they are catching larger fish that are worth more money. Record discard that cannot be attributed to a specific haul on the Trip Discard Form (See Figure 4-16).

The Trip Discard Form is not entered into the database system. Document the information from the Trip Discard Form in the Trip Comments on the Trip Page.

Trip Discard Form Instructions

- **Trip Number:** This number is automatically generated by the database. Complete this field once the trip has been started in the database

Tip: Some observers find it easier to start a trip prior to leaving port. Doing this allows the observer to fill in the Trip Number while at-sea rather than when the observer returns to port.

- **USCG number:** Record the USCG vessel number posted on the exterior of the vessel or request this six or seven digit number from the vessel skipper or a coordinator. **If the vessel does not have a USCG number, leave field blank and fill in the State Registration Number field.**
- **Date:** Document the month (MM) and day (DD) that the trip discard took place.
- **Time:** Document the time, in PST military time, that the trip discard took place.
- **Species:** Document the common name of the species that was discarded.
- **Weight:** Document the weight, in pounds, of species discarded.
- **Number of fish:** Document the number of fish discarded (if known).
- **Weight Method:** Document the weight method used to estimate the species weight.
 - 1 Actual Weight
 - 2 Bin/Trawl Alley Estimate
 - 3 Basket Weight Determination
 - 6 Other
 - 7 Vessel Estimate (retained only)
 - 8 Extrapolation
 - 9 PHLB L/W Conversion
 - 14 Visual Experience
 - 15 Visual Spatial
 - 19 PHLB L/W Extrapolation
- **Discard Reason:** Record the skipper/crew's reason for discard.
 - 11 Incidental/Accidental
 - 12 Drop-off
 - 13 Market
 - 14 Other
 - 15 Predation
 - 16 Regulation
 - 17 Safety
 - 18 Market (dockside only)
- **Comments:** Document any additional information that is important.

CHAPTER 4
Trawl Sampling