

WEST COAST GROUND FISH OBSERVER TRAINING MANUAL FEBRUARY 2004



West Coast Groundfish Observer Manual

February 2004

United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northwest Fisheries Science Center
Fishery Resource Analysis and Monitoring Division
West Coast Groundfish Observer Program

This document should be cited as follows:

(NWFSC) Northwest Fisheries Science Center. 2004. West Coast Groundfish Observer Manual. West Coast Groundfish Observer Program. NWFSC, 2725 Montlake Blvd. East, Seattle, Washington, 98112.

Reference in this document to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

Contact Addresses and Numbers

West Coast Groundfish Observer Program
Northwest Fisheries Science Center (NWFSC)
2725 Montlake Boulevard East
Seattle, WA 98112
nwfsc.observerprogram@noaa.gov

Washington

NWFSC
2725 Montlake Boulevard East
Seattle, WA 98112
(206) 860-3293 Office
(206) 860-6792 Fax

Oregon

Hatfield Marine Science Center
2032 SE OSU Dr.
Newport, OR 97365
(541) 867-0527 Office
(541) 867-0505 Fax

California

427 "F" St. Suite 217
Eureka, CA 95501
(707) 443-3228 Office
(707) 443-3002 Fax

To reach any of the NMFS Coordinators, call Toll-free 1-866-780-8064

Table of Contents

Chapter 1 Introduction to West Coast Fishery: Past and Present

I. Commonly Used Abbreviations.....	1-2
II. History of the U. S. Fishery.....	1-3
III. Fisheries and Observer Programs.....	1-4
Foreign Fisheries.....	1-4
Domestic Fisheries.....	1-4
IV. Washington, Oregon and California Fishery and the Advent of West Coast Groundfish Observer Program.....	1-5
V. Management Structure of Washington, Oregon and California Fishery	1-6
VI. Observer Data and Management.....	1-7

Chapter 2 West Coast Groundfish Observer Program

I. WCGOP Management Structure.....	2-2
NOAA Fisheries.....	2-2
PSMFC.....	2-2
Washington, Oregon and California.....	2-2
Alaskan Observers, Inc.....	2-2
II. Observer Qualifications.....	2-3
NOAA Fisheries Approval for Observers.....	2-3
Standards of Conduct.....	2-3
Conflict of Interest.....	2-4
Confidentiality.....	2-5
III. Observer Personal Equipment.....	2-6
Consideration for Fishing Trips.....	2-6
Observer Personal Gear.....	2-7
IV. Observer Sampling and Safety Gear.....	2-8
Scales.....	2-8
<i>How to Care for Sampling Gear</i>	2-8
V. Observer Life.....	2-10
Training.....	2-10
Vessel Deployment, Data Collection and Data Entry.....	2-11
<i>Port and Vessel Assignments</i>	2-11
<i>Contacting Vessels</i>	2-12
<i>Observer Trip Notification Phone System</i>	2-13
<i>Data Collection</i>	2-15
<i>Data Entry</i>	2-15
<i>Communication and Field Support</i>	2-15

Debriefing.....	2-16
<i>Sending Data</i>	2-17
<i>Interview</i>	2-17
<i>Data Corrections</i>	2-18
<i>Evaluation</i>	2-18
<i>Maintain WCGOP Observer Status</i>	2-20

Chapter 3 Observer Basics

I. Introduction.....	3-2
II. Duties and Priorities.....	3-2
III. Recording Data.....	3-3
Completing and Organizing Forms.....	3-3
Legibility.....	3-4
Recording Time.....	3-4
Rounding Data Rules.....	3-4
IV. Observer Logbooks.....	3-5
Observer Logbook Entries.....	3-5
The Logbook as Evidence.....	3-6
Completing the Logbook.....	3-7
<i>Title Page</i>	3-7
<i>List of Vessels</i>	3-7
<i>Calendar</i>	3-7
<i>Vessel Safety</i>	3-7
<i>Observer Safety Equipment Checklist</i>	3-8
<i>Scale Calibration Record</i>	3-8
<i>Vessel Diagrams</i>	3-9
<i>Description of Observer Total Catch Sampling</i>	3-9
<i>Description of Catch Category Sampling</i>	3-10
<i>Communication Log</i>	3-10
<i>Photo Log</i>	3-11
<i>Daily Notes Section</i>	3-11
V. Data Collected.....	3-12
VI. Catch Categories.....	3-12
VII. Data Forms.....	3-13
Page Numbering.....	3-16
VIII. Weight Methods and Sample Methods.....	3-17
Weight Methods.....	3-17
Sample Methods.....	3-20
IX. Introduction to Random Sampling Theory.....	3-21
Advantages of Random Sampling.....	3-21
Steps in Taking a Random Sample.....	3-21

Random Systematic Sampling.....	3-23
---------------------------------	------

Chapter 4 Trawl and Prawn Sampling

I. Trawl and Prawn Pot Gear Fishing Strategy Description.....	4-2
Trawlers.....	4-2
Figure 4-1: Trawl Vessel.....	4-2
Figure 4-2: Trawl Net.....	4-3
Figure 4-3: Roller Gear.....	4-4
Prawn Pot.....	4-6
Diversity of Fleet and Effects on Sampling.....	4-7
II. Collecting and Documenting Trip Information.....	4-8
Instructions for Completing the Trip on Trawl and Prawn Vessels.....	4-9
<i>Trip Form- Haul Locations</i>	4-10
Figure 4-4: Washington-Oregon-California Groundfish Logbook.....	4-11
Figure 4-5: GPS Showing Latitude and Longitude.....	4-13
Figure 4-6: Trip Form-Haul Locations.....	4-15
<i>Trip Form- Haul Instructions</i>	4-16
Figure 4-7: Trip Form-Hauls.....	4-19
Observer Total Catch Estimates (OTC).....	4-20
<i>Volumetric Estimates</i>	4-20
Trawl Alley or Checker Bin Estimates.....	4-21
Figure 4-8: Bin Volume Calculation.....	4-22
Figure 4-9: Trawl Alleys and Bins.....	4-23
Codend Estimates.....	4-24
Figure 4-10: Codends.....	4-25
<i>Measuring Large Codends</i>	4-26
Obtaining Densities for Total Catch Calculations.....	4-26
<i>Density Requirements</i>	4-26
Figure 4-11: Observer Basket Volumes.....	4-27
<i>Procedure for Calculating Density</i>	4-27
OTC Calculation.....	4-29
Review of Steps for Obtaining A Volumetric OTC.....	4-30
Figure 4-12: Schematic of Discard Sampling on a Trawl Vessel.....	4-31
Visual Estimates.....	4-32
Other Acceptable OTC Methods.....	4-32
General Rules for the Recording of OTC.....	4-33
III. Sampling Catch.....	4-34
Catch Categories.....	4-34
<i>Retained Catch</i>	4-34
<i>Discarded Catch</i>	4-35
Figure 4-13: Components of the Catch.....	4-36
Methods for Estimating Catch Category Weights.....	4-37
Weight Method Guidelines.....	4-47
Sampling Priorities.....	4-48
Catch Form.....	4-48
<i>Catch Form Instructions</i>	4-48

Figure 4-14: Trawl Prawn Catch Form.....	4-53
IV. Collecting and Documenting Species Composition.....	4-54
Average Number Calculations.....	4-55
Species Composition Form Instructions.....	4-56
Figure 4-15: Species Composition Form.....	4-59
Figure 4-16: Schematic of Discard Sampling on a Trawl Vessel.....	4-60
Unsampler Hauls.....	4-60
Discard That Cannot Be Attributed to Specific Haul.....	4-61
Trip Discard Form Instruction.....	4-61
Figure 4-17: Trip Discard Form.....	4-64
V. Examples.....	4-65

Chapter 5 Fixed Gear Sampling

I. Fixed Gear Description.....	5-2
Hook and Line.....	5-2
Longline Gear.....	5-2
Figure 5-1: Longline Gear Set-Up.....	5-3
Figure 5-2: Longline Vessel.....	5-3
Handline and Jig Gear.....	5-4
Figure 5-3: Mechanized Jig Assembly.....	5-4
Stick (Pipe) Gear.....	5-5
Figure 5-4: Stick Gear.....	5-5
Rod and Reel Gear.....	5-6
Figure 5-5: Rod and Reel Gear and Catch.....	5-6
Vertical Hook and Line.....	5-7
Figure 5-6: Vertical Hook and Line Gear Schematic.....	5-7
Troll Gear.....	5-8
Figure 5-7: Troll Gear.....	5-8
<i>Albacore Troll Fishery</i>	5-9
Figure 5-8: Albacore Troll Vessel.....	5-9
<i>Groundfish Troll Fishery</i>	5-10
Figure 5-9: Groundfish Troll Gear.....	5-11
Pots.....	5-12
Figure 5-10: Trap Vessel.....	5-12
<i>Sablefish Pots</i>	5-13
Figure 5-11: Sablefish Trap Schematic.....	5-13
<i>Other Groundfish Pots</i>	5-14
Figure 5-12: Sheepshead Trap.....	5-14
Safety Concerns on Fixed Gear Vessels.....	5-15
Diversity of Fleet and Effects on Sampling.....	5-15
II. Collecting and Documenting Trip and Total Catch Information.....	5-17
Trip Form -Instructions for Completing the Observer Haul	
Form on Fixed Gear Vessels.....	5-17
<i>Trip Form Haul Location</i>	5-18

Figure 5-13: Trip Form-Haul Locations.....	5-22
<i>Trip Form Hauls Instructions</i>	5-23
Figure 5-14: Trip Form-Hauls.....	5-25
OTC on Fixed Gear Vessels.....	5-26
Prior to Sampling.....	5-26
<i>Defining A Set</i>	5-26
<i>Determining the Amount of Gear Fished In A Set</i>	5-28
<i>Vessels Where Hook Counts Are Impossible to Obtain</i>	5-34
III. Collecting and Documenting Catch Category Weight.....	5-35
Catch Categories on Fixed Gear Vessels.....	5-36
Sampling Catch Categories.....	5-36
<i>Where to Tally Sample</i>	5-36
<i>Equipment Needed</i>	5-36
<i>Tally Random Sampling Methods</i>	5-37
Weighing Species on Fixed Gear Vessels.....	5-41
Random Sampling when Collecting Individuals for Weights.....	5-42
<i>Spatial Sampling</i>	5-42
<i>Systematic Sampling</i>	5-43
Average Weight Calculations.....	5-44
<i>Using Delivery Weights for Average Weights of Talled Individuals</i> ...	5-45
Weight Methods Applicable for Catch Categories on Fixed Gear Vessels	5-46
<i>Weight Method 13 – Tally Sample</i>	5-46
<i>Weight Method 4 – Visual Estimate</i>	5-46
<i>Weight Method 6 – Other</i>	5-46
<i>Weight Method 9 – Pacific Halibut Length/Weight</i>	5-47
Figure 5-15: Pacific Halibut.....	5-47
Figure 5-16: Visual Length Estimates of Pacific Halibut.....	5-49
Unsamped Sets.....	5-50
Fixed Gear Form Instructions.....	5-51
Figure 5-17: Fixed Gear Catch Form.....	5-55
IV. Collecting and Documenting Species Composition.....	5-56
Sample Method when Tally Sampling.....	5-56
Method for Species Composition Sampling.....	5-56
Species Composition Form Instructions.....	5-57
Figure 5-18: Species Composition Form.....	5-61
Discard That Cannot be Attributed to a Specific Haul.....	5-62
Trip Discard Form Instructions.....	5-62
Figure 5-19: Trip Discard Form.....	5-65
V. Examples.....	5-66

Chapter 6 Biological Sampling

I. Introduction.....	6-2
II. Data Collection Priorities.....	6-3
Data Collection from Tagged Fish.....	6-4
Data Collection from Salmon.....	6-4
Data Collection From High Priority Rockfish Species and Lingcod.....	6-5
Data Collection from Pacific Halibut.....	6-6
III. Biological Specimen Sampling.....	6-7
Biological Sampling Methods.....	6-7
Random Sampling.....	6-8
<i>Random Sampling Within a Species Composition Sample.....</i>	<i>6-8</i>
<i>Random Sampling Outside a Species Composition Sample.....</i>	<i>6-10</i>
<i>Non-Random Sampling.....</i>	<i>6-12</i>
IV. Data Collection Procedures.....	6-13
Lengthing Fish.....	6-13
Figure 6-1: Rockfish Length.....	6-13
<i>Data Collection Guidelines.....</i>	<i>6-13</i>
<i>Preparing to Measure Fish.....</i>	<i>6-13</i>
<i>Measuring Fish.....</i>	<i>6-13</i>
Figure 6-2: Length Measurements.....	6-14
Sexing Fish.....	6-16
Figure 6-3: Sexing Fish.....	6-16
<i>Data Collection Guidelines.....</i>	<i>6-16</i>
<i>Preparing to Sex Fish.....</i>	<i>6-16</i>
Figure 6-4: Location of Gonads.....	6-17
<i>Sexing Roundfish.....</i>	<i>6-17</i>
Figure 6-5: Sexing Roundfish.....	6-18
<i>Sexing Sablefish.....</i>	<i>6-19</i>
<i>Sexing Rockfish.....</i>	<i>6-20</i>
<i>Sexing Flatfish.....</i>	<i>6-21</i>
Figure 6-6: Sexing Flatfish.....	6-22
<i>Sexing Salmon.....</i>	<i>6-23</i>
Otoliths.....	6-23
Figure 6-7: Otoliths.....	6-23
Figure 6-8: Taking Otoliths.....	6-23
<i>Data Collection Guidelines.....</i>	<i>6-23</i>
<i>Otolith Location.....</i>	<i>6-23</i>
<i>Broken Otoliths.....</i>	<i>6-24</i>
<i>Collecting Otoliths in General.....</i>	<i>6-24</i>
Figure 6-9: Otoliths Removal.....	6-25
<i>Collecting Otolith From Sablefish.....</i>	<i>6-26</i>
Figure 6-10: Horizontal Cut Method.....	6-27
Pacific Halibut Viabilities.....	6-28
Figure 6-11: Pacific Halibut.....	6-28

<i>Data Collection Guidelines</i>	6-28
<i>Preparing to Collect Viabilities and Lengths from Pacific Halibut</i>	6-28
<i>Collecting Viabilities and Lengths from Pacific Halibut</i>	6-29
Salmon Scales.....	6-30
<i>Data Collection Guidelines</i>	6-30
<i>Collecting Salmon Scales</i>	6-31
Figure 6-12: Salmon Scale Collection.....	6-32
Tagged Fish.....	6-33
<i>Data Collection Guidelines</i>	6-33
<i>Preparing to Collect Tags</i>	6-33
Figure 6-13: Tagged Sablefish.....	6-33
<i>Collecting Tags</i>	6-34
<i>Collecting Salmon Snouts</i>	6-35
Figure 6-14: Removed Salmon Snout.....	6-35
Figure 6-15: Removing Salmon Snouts.....	6-36
Collecting Fish Specimens.....	6-37
V. Data Collection Forms.....	6-38
Length Frequency Form Instructions.....	6-39
Figure 6-16 Length Frequency Form.....	6-41
Biospecimen Form Instructions.....	6-42
Figure 6-17: Biospecimen Form.....	6-45
Tagged Fish Form Instructions.....	6-46
Figure 6-18: Tagged Fish Form.....	6-48
Specimen Collection Label Instructions.....	6-49
Figure 6-19: Specimen Collection Label.....	6-50

Chapter 7 Marine Mammal, Sea Birds and Sea Turtles

I. Marine Mammals.....	7-2
Introduction.....	7-2
Marine Mammal Protection Act.....	7-2
Marine Mammal Data Collection Priorities.....	7-4
Marine Mammal Data Collection Procedures.....	7-5
<i>Lengthing Marine Mammals</i>	7-5
Figure 7-1: Pinniped Measurements.....	7-7
<i>Sexing Marine Mammals</i>	7-7
Figure 7-2: Sexing Marine Mammals.....	7-8
<i>Collecting Canine Teeth from Pinnipeds</i>	7-9
Figure 7-3: Removing Pinniped Canine Teeth.....	7-10
<i>Collecting Tissue from Cetaceans</i>	7-10
<i>Collecting Data from Tagged, Branded or Tattooed Marine Mammals</i>	7-12
Marine Mammal Interaction and Sighting Information.....	7-13
<i>Marine Mammal Physical Characteristics</i>	7-14
<i>Marine Mammal Behaviors</i>	7-15
Marine Mammal Data Collection Forms.....	7-17
<i>Biospecimen Form Instructions</i>	7-18

Figure 7-4: Biospecimen Form.....	7-21
<i>Specimen Collection Label Instructions</i>	7-22
Figure 7-5: Specimen Collection Label.....	7-23
<i>Marine Mammal Sighting Form Instructions</i>	7-23
Figure 7-6: Marine Mammal Sighting Form-Front Page.....	7-27
Figure 7-7: Marine Mammal Sighting Form-Back Page.....	7-28
II. Seabirds.....	7-29
Introduction.....	7-29
Seabird Data Collection Priorities.....	7-30
Endangered, Threatened and Banded Seabirds.....	7-31
<i>Endangered Species</i>	7-31
<i>Threatened Species</i>	7-32
<i>Banded Birds</i>	7-32
Seabird Data Collection Procedures.....	7-32
<i>Collecting Species Composition Information</i>	7-32
<i>Collecting Seabird Interaction and Sighting Information</i>	7-34
Seabird Data Collection Forms.....	7-35
<i>Seabird Sighting Form Instructions</i>	7-36
Figure 7-8: Seabird Sighting Form.....	7-39
III. Sea Turtles.....	7-40
Introduction.....	7-40
Sea Turtle Data Collection.....	7-40
Figure 7-9: Sea Turtle ID Flow Chart.....	7-43
Sea Turtle Life History Form Instructions.....	7-44
Figure 7-10: Sea Turtle Life History Form-Front Page.....	7-48
Figure 7-10: Sea Turtle Life History Form-Back Page.....	7-49

Chapter 8 Health and Safety Information

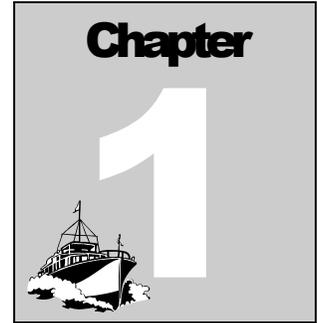
I. Introduction.....	8-2
II. Safety Regulations.....	8-2
III. Before Observers Board the Vessel.....	8-3
Vessel Safety Orientation Checklist.....	8-4
Figure 8-2: USCG Commercial Fishing Vessel Safety Examination Decal.....	8-4
Figure 8-1: Vessel Safety Orientation Checklist.....	8-7
IV. Safety While Boarding or Disembarking Vessels.....	8-8
Personal Health and Safety Aboard Vessels.....	8-8
General Safety Precautions on Board.....	8-8
Working on Decks.....	8-9
Seasickness.....	8-12
Fish and Mammal Poisoning.....	8-13
Harassment.....	8-14
<i>Identifying Harassment</i>	8-14

<i>Sexual Harassment</i>	8-15
<i>What to Do if Observers Experience Harassment</i>	8-15
<i>Illness and Accidents</i>	8-17
V. Emergencies on Board	8-17
Cold-Water Near Drowning.....	8-17
Man Overboard.....	8-17
Fire.....	8-18
Flooding.....	8-18
Sending a May Day.....	8-19
Abandon Ship.....	8-19
Donning the Immersion Suit.....	8-21
Life Rafts.....	8-22
Survival Kits.....	8-22
EPIRBS.....	8-22
The Seven Steps to Survival.....	8-23
<i>Summary</i>	8-25
VI. Federal Requirements for Commercial Fishing Industry Vessels greater than 60 ft	8-26
General Requirement.....	8-26
<i>Documentation and Official Number 46 CFR 67-69</i>	8-26
<i>Operator License 46 U.S.C. 8304</i>	8-26
Commercial Fishing Vessel.....	8-26
<i>Safety Inspection Requirements 50 CFR 679-50</i>	8-26
Navigational Requirements.....	8-27
<i>Compass 46 CFR 28.230</i>	8-27
<i>Electronic Position Fixing Devices 46 CFR 28.260</i>	8-27
Navigation and Anchor.....	8-27
<i>Lights</i>	8-27
<i>Anchor and Radar Reflectors 46 CFR 28.235</i>	8-27
<i>Radar and Depth Sounding Devices 46 CFR 28.400</i>	8-28
Communications Requirements.....	8-28
<i>Communication Equipment 46 CFR 28.245</i>	8-28
Emergency Requirements.....	8-29
<i>Personal Flotation Devices (PFD) 46 CFR 28.105</i>	8-29
<i>Ring Buoy 46 CFR 28.115 & CFR 28.135</i>	8-29
<i>Safety Protection Device (SPD)</i>	8-29
<i>Survival Craft 46 CFR Tables 28.120 (a)</i>	8-29
<i>Stowage of Survival Craft 46 CFR 28.125</i>	8-30
<i>Launching of Survival Craft 46 CFR 28.310</i>	8-30
<i>Embark Stations 46 CFR 28.395</i>	8-30
<i>Means of Escape 46 CFR 28.390</i>	8-31
<i>Visual Distress Signals 46 CFR 28.145</i>	8-31
<i>EPIRB 46 CFR 28.150 & 46 CFR 25.26</i>	8-31
<i>General Alarm 46 CFR 28.240</i>	8-31
<i>Emergency Instructions 46 CFR 28.265</i>	8-32

<i>Instruction Drills and Safety Orientation 46 CFR 28.270,</i>	
46 CFR 28.275.....	8-32
<i>High Water Alarms 46 CFR 28.250.....</i>	8-33
<i>Bilge Systems 46 CFR 28.255.....</i>	8-34
<i>Casualties and Injuries 46 CFR 28.080, 46 CFR 28.090.....</i>	8-34
<i>Injury Placard 46 CFR 28.165.....</i>	8-35
<i>First Aid Equipment and Training 46 CFR 28.210.....</i>	8-35
<i>Fire Control Requirements Fire Extinguishers 46 CFR 28.155.....</i>	8-35
<i>Fire Pumps, Fire Mains, Fire Hydrants, and Fire Hoses</i>	
46 CFR 28.316.....	8-36
<i>Fireman’s Outfits and Self-Contained Breathing Apparatus</i>	
CFR 28.205.....	8-36
Miscellaneous Requirements.....	8-37
<i>Guards for Exposed Hazards 46 CFR 28.215.....</i>	8-37
<i>Watertight and Weather tight Integrity 46 CFR 28.560.....</i>	8-37
<i>Pollution Prevention 33 CFR 151, 33 CFR 155.....</i>	8-37
<i>Sexual Abuse Act of 1986 46 CFR U.S.C. 10104.....</i>	8-37

Appendix

Appendix A: Fish Species List and Codes.....	A-1
Appendix B: Invertebrate Species List and Codes.....	A-11
Appendix C: Marine Mammal and Sea Turtle Species List and Codes.....	A-13
Appendix D: Seabirds Species List and Codes.....	A-15
Appendix E: Catch Categories and Target Strategies.....	A-17
Appendix F: Minor Rockfish Species.....	A-18
Appendix G: WCGOP Codes.....	A-20
Appendix H: Random Numbers Table.....	A-21
Appendix I: Weights, Measures and Conversions.....	A-22
Appendix J: Pacific Halibut Length/Weight Table.....	A-24
Appendix K: Injury Key for Trawl Caught Pacific Halibut.....	A-26
Appendix L: Injury Key for Pot Caught Pacific Halibut.....	A-27
Appendix M: Injury Key for Hook & Line Caught Pacific Halibut.....	A-29
Appendix N: List of Observer-Issued Equipment.....	A-31
Appendix O: 50 CFR Part 660 Observer Program Regulations.....	A-32
Appendix P: 50 CFR Part 600 Observer Health and Safety Regulations.....	A-41
Appendix Q: Vessel Selection in 2004.....	A-50
Appendix R: Radio Communications.....	A-51
Appendix S: Material Safety Data Sheet for DMSO.....	A-55
Appendix T: Chatillon Flatbed Scale Care and Maintenance.....	A-61
Appendix U: Flatfish Species Description Form.....	A-62
Appendix V: Rockfish Species Description Form.....	A-64
Appendix W: Miscellaneous Species Description Form.....	A-66
Appendix X: Contact Addresses and Numbers.....	A-68
Appendix Y: Useful Websites.....	A-69
Glossary.....	A-73



Introduction to West Coast Fishery: Past and Present

Focus Questions:

- What is the history of the U.S. fishery and why do Observer programs exist?
- Why are Observers needed in the Washington, Oregon, and California groundfish fisheries?
- How is the West Coast fishery managed?
- How does management use West Coast Groundfish Observer data?

Chapter Outline:

- I. Commonly Used Abbreviations
- II. History of the U. S. Fishery
- III. Fisheries and Observer Programs
- IV. Washington, Oregon and California Fisheries and the Advent of the West Coast Groundfish Observer Program
- V. Management Structure of Washington, Oregon and California Fisheries
- VI. Observer Data and Management

I. Commonly Used Abbreviations

ABC- Acceptable Biological Catch
BBL- The Bird Banding Laboratory of the U. S. Geological Survey
CFR- Code of Federal Regulations Oregon, California
CMA - Conservation and Management Act
CPR- Cardiopulmonary Resuscitation
CPUE- Catch Per Unit Effort
EPIRB- Emergency Position Indicating Radio Beacon
FCC- Federal Communications Commission
FMP- Fishery Management Plan
FUS- Fully Utilized Species
GPS- Global Positioning System
IPHC- International Pacific Halibut
IRCS- International Radio Call Sign
LOA - Length overall
MARPOL- Marine Pollution
M-SFCMA- Magnuson-Stevens Fishery Conservation and Management Act
MSY- Maximum Sustainable Yield
NMFS- National Marine Fisheries Service
NMML- National Marine Mammal Laboratory
OTC- Observer Total Catch
OY- Optimum Yield
PFD- Personal Floation Device
PFMC- Pacific Fisheries Management Council
PLT- Pacific Local Time
PRR- Product Recovery Rate
PSC- Prohibited Species Cap
PSMFC- Pacific States Marine Fisheries Commission
SSB- Single Side Band radio
TAC- Total Allowable Catch
USCG- United States Coast Guard WCGOP- West Coast Groundfish Observer Program
WOC – Oceans off Washington, Oregon, and California

II. History of the U. S. Fishery

Fisheries in the U.S. began in earnest in the 1950's when World War II wartime vessels were converted to fishing vessels. Like the beginning of most resource dependent industries, the U. S. government and industry personnel believed that fish were inexhaustible. As a result, a fisheries management structure was not put in place. The fisheries continued unabated through the 1960's and 1970's. By the early 1970's, large foreign factory trawlers fishing off the coast of the U. S. were out competing smaller U. S. owned vessels. Then, in 1976, the Magnuson Fishery and Conservation Act (Magnuson Act) was passed by the U.S. Congress. With this Act, the U.S. declared management authority over fish resources within 200 nautical miles from their shores, an area known as the **Exclusive Economic Zone (EEZ)**. The goals of the Magnuson Act were to Americanize the fishery and to implement fishery management plans (FMPs) to maintain **optimum yield (OY)** of the resource while rebuilding depleted stocks. Additionally, the Magnuson Act established regional councils to manage the nation's fisheries. The Pacific Fisheries Management Council (PFMC) has jurisdiction over the EEZ off the coasts of Washington, Oregon, and California. The act was re-authorized in 1996 as the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA).

Exclusive Economic Zone (EEZ) – the term used for the 200 mile jurisdiction zone, in which a nation has exclusive fishing rights.

Optimum Yield (OY) – the harvest level for a species that achieves overall benefits including economic, social, and biological considerations.

When the Magnuson Act was passed, American fishers had little knowledge of how to harvest or process many of the groundfish species. To encourage investment in this resource, the U.S. Congress passed the American Fisheries Promotion Act. It required that fish quotas be given preferentially to nations that contributed heavily to the development of the U.S. fishing industry. Joint-venture fisheries were created, with American catcher vessels delivering their catch to large foreign floating processors. This allowed foreign countries to continue receiving a quota while developing the U.S. domestic

fleet. By 1991 all foreign commercial fishing within the 200 mile EEZ off the Alaska Coast and the West Coast was terminated, leaving an entirely domestic U.S. fishery.

III. Fisheries and Observer Programs

Foreign Fisheries

The National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) began placing Observers on foreign fishing vessels operating off the northwest and Alaskan coasts of the United States in 1973. Initially, federally employed and funded Observers were placed on vessels only upon invitation of the host countries. In the early years of the program, the primary purpose of Observers was to determine incidental catch rates of Pacific Halibut in groundfish catches and to verify catch statistics in the Japanese crab fishery.

The Magnuson Act mandated that foreign vessels accept Observers, prompting an expansion of Observer coverage. The scope of the program in the North Pacific increased and in 1977-1978 Observer programs were implemented in the Northeast and Hawaii. The costs of funding these programs were recovered from the foreign nations participating in the fishery.

Most foreign vessels were phased out of fisheries within the U. S. EEZ by the late 1980's. However, limited quotas are still being taken by foreign vessels in the Northeast and 100% Observer coverage is mandatory in all of these fisheries.



Domestic Fisheries

Initial authority for NOAA Fisheries to place Observers on domestic fishing vessels came from the Marine Mammal Protection Act (MMPA), enacted in 1972. Starting in 1976, NOAA Fisheries Observers were placed on board domestic tuna purse seine vessels fishing in the Eastern Tropical Pacific

to investigate the extent of their interaction with marine mammals.

Since that time numerous domestic Observer programs have been implemented in a wide variety of fisheries. The authority to place Observers onboard domestic vessels is now provided not only by the MMPA but also by the Magnuson Act and the Endangered Species Act. In 2002, NOAA Fisheries deployed Observers in over twenty different fisheries nationwide.

Observer program activities vary widely from fishery to fishery because of differences in fishing location, types of vessels, gear types, interactions with protected or prohibited species (marine mammals, seabirds, endangered species, and species of concern), and overall program objectives. The scope and complexity of these activities often change annually, as data on other species are needed or as new regulations are introduced.



IV. Washington, Oregon and California Fisheries and the Advent of the West Coast Groundfish Observer Program

Fisheries on the West Coast followed the trend of the rest of the nation. They began in the 1950's and became foreign vessel heavy through the 1960's and 1970's. With the passage of the Magnuson Act, effort by U. S. owned vessels increased in the 1980's and West Coast groundfish landings peaked. By 1989 it became clear that harvest levels could not be maintained. A 1998 NOAA Fisheries report to the U.S. Congress on the status of fish stocks on the west coast stated that five of fifty-four rockfish species were "approaching overfished condition", four were "not approaching overfished condition", and the status of the remaining forty-five species (83%) was unknown. In 2000, Commerce Secretary Daley

declared the West Coast Groundfish fishery a failure. By 2001, the PFMC had listed seven overfished species; Lingcod, Widow rockfish, Dark-blotched rockfish, Pacific Ocean Perch, Canary rockfish, Bocaccio rockfish, and Cowcod. In 2002, Yelloweye rockfish and Pacific hake became the eighth and ninth species listed as overfished.

When the fishery was declared a failure in 2000, NOAA Fisheries director Penny Dalton said "A major underlying cause for the current situation is the lack of basic scientific data about these fish. If money is made available, we would like to work with fishermen to gather more data and improve our understanding of this valuable fishery." Fishery managers decided two courses of action were required to return the fishery to an economically and biologically sustainable level. The first occurred in 2001 when the Pacific Fisheries Management Council implemented the West Coast Groundfish Observer Program (WCGOP). The goal of the program is to gather the data needed to better manage the groundfish fishery off the coasts of Washington, Oregon and California. The second course of action was a capacity reduction in the fishing fleet. In November 2003, 92 trawl permits were bought out of the fishery by the U. S government and the remaining fishers.



V. Management Structure of Washington, Oregon and California Fishery

The Pacific Fisheries Management Council is responsible for instituting the Fisheries Management Plans (FMPs) for the federal fisheries on the West Coast of the United States. Currently there are 4 FMPs: the Pacific Coast Groundfish FMP, the Pacific Salmon FMP, the Coastal Pelagic Species FMP, and the Highly Migratory Species FMP. The council is made up of 19 members, 14 of whom are eligible to vote on

matters brought before the council. The 19 members include representatives of the industry, states (California, Oregon, Washington, and Idaho), NOAA Fisheries, tribes, the United States Coast Guard, and the U. S. Fish and Wildlife Service.

The Pacific Coast Groundfish Fishery Management Plan specifies how the Council develops recommendations for management of the groundfish fishery. In some cases, it contains specific fishery management recommendations.

Each year the PFMC designates an OY yield for all commercially valuable species or species groups. The OY is split between three sectors; the limited-entry fleet, the open access fleet, and the recreational fleet. The limited-entry fleet includes trawlers and fixed-gear vessels that carry federal fishing permits. The open-access and recreational fleets do not have federal permits and are regulated by the states.

Trip Limits – A trip limit is a specified weight of fish that can be landed during a:

- a. Two-month period
- b. Day

Groundfish trawlers are regulated mainly by two-month trip limits while limited entry fixed gear and open access vessels have daily, weekly, and monthly limits.

One of the primary goals of the Pacific Coast Groundfish FMP is to keep the fishery open throughout the year. To achieve this goal, OYs are constrained by several measures including; annual harvest guidelines, two-month cumulative **trip limits**, individual trip limits, size limits, species-to-species ratio restrictions, and other measures.

VI. Observer Data and Management

Long before the fishery was declared a failure in 2000, managers understood that there was a lack of data on a huge component of the fishery, the discards. Therefore, in the late 1990's, the Oregon Department of Fish and Wildlife sponsored a study of discard rates. This study was limited in scope (only Oregon vessels participated) and in target species (focus was on Dover sole, Sablefish-also known as Blackcod, and Thornyhead complex). However, it produced the only discard rates available for fisheries managers. After the fishery was declared a failure, a focused effort was put towards obtaining more accurate discard rates. To ensure that the

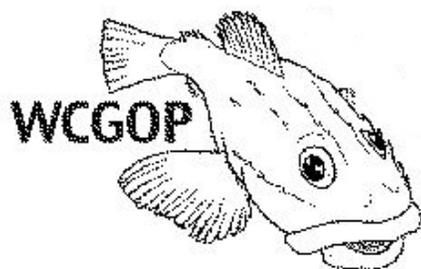
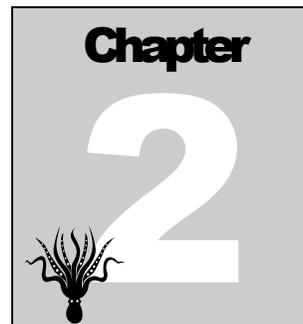
discard rates were more applicable to the wide range of West Coast fisheries, the scope needed to be broadened to include vessels in Washington, Oregon, and California and all target fisheries. As a result, the West Coast Groundfish Observer Program (WCGOP) was created. The WCGOP is responsible for providing the data required to calculate discard rates for West Coast groundfish species.



The WCGOP releases its data on an annual basis. In January 2003, the first year of Limited Entry trawl data was summarized and released. The summarized data was then used in a bycatch model to set quotas for the 2004 Limited Entry Trawl fishery. The bycatch model predicts the total amount of fish caught based on the combination of what was actually landed and discard rates.

In January 2004, the second year of Limited Entry trawl data was released along with the summary of 2001 – 2003 Limited Entry Sablefish-endorsed fishery data.

Currently WCGOP Observer data is primarily used to estimate discard rates and the marine mammal and seabird data collected by Observers is used by NOAA Fisheries scientists. Looking forward, stock assessments to be completed in 2005 are likely to include Observer data. The role of WCGOP data to promote ecosystem management has endless possibilities.



West Coast Groundfish Observer Program

Focus Questions:

- How is the WCGOP structured?
- What are the qualifications for WCGOP Observers?
- What are the duties of a WCGOP Observer?
- What type of gear does a WCGOP Observer use?
- What is the routine of WCGOP Observers?

Chapter Outline:

- I. WCGOP Management Structure
- II. Observer Qualification
- III. Observer Personal Equipment
- IV. Observer Sampling and Safety Gear
- V. Observer Life

I. WCGOP Management Structure

The West Coast Observer Program is a cooperative effort between NOAA Fisheries, Pacific States Marine Fisheries Commission (PSMFC), Washington, Oregon and California.



NOAA Fisheries

NOAA Fisheries is responsible for Observer training, debriefing, field coordination, and data analysis. NOAA Fisheries staff includes a team leader, a database manager, field coordinators, and debriefers.



PSMFC

PSMFC is responsible for selecting the Observer contractor, managing the contract, data editing, and Observer gear purchase, maintenance, and distribution. PSMFC staff includes a project manager, a half-time state coordinator in each state, and data editors.

Washington, Oregon and California

Half-time state coordinators act as liaisons between each state's fish and wildlife department and the WCGOP. They are responsible for coordinating with shore-side samplers, providing current information on vessel activities, facilitating meetings between Observers and vessel crew, and assisting NOAA Fisheries in ensuring designated vessels have obtained a United States Coast Guard (USCG) safety decal.



Alaskan Observers, Inc.

Alaskan Observers, Inc. (AOI) hires the Observers and provides them health insurance and additional insurance coverage while at-sea or working shore-side. AOI is responsible for scheduling vacation and leave without pay. They are also responsible for travel arrangements between ports.

II. Observer Qualifications

NOAA Fisheries Approval for Observers

To become a NOAA Fisheries-approved Observer for the WCGOP, three steps must be successfully completed:

1. Training.
2. Demonstration of proficiency during each trip.
3. Satisfactory performance evaluations.



Standards of Conduct

WCGOP Observers have an important image to maintain since they represent professional scientists for NOAA Fisheries, AOI and PSMFC. Observers must avoid behaving in any manner that could adversely affect the public's confidence in the integrity of the Observer Program, the data provided, or other Observers. Since Observers reside in the same small communities as their vessel crews, maintaining a business-like attitude both on and off the vessel is very important. Expected behavior includes, but is not limited to, the following:

1. Observers must maintain an unbiased and/or neutral approach to fisheries management issues while on the job and avoid declaring a pro-fishing or a pro-environmental stance.
2. Observers must diligently perform their assigned duties.
3. Observers must accurately record their sampling data, write complete reports, and report honestly any suspected violations of regulations relevant to the conservation of marine resources, or their environment.

4. Observers must not disclose collected data, observations made on board a vessel, or observations made in a processing facility to any person except the owner of the observed permit, an authorized officer, or NOAA Fisheries.
5. Observers must not engage in any illegal actions or any other activities that would reflect negatively on their image as professional scientists, on other Observers, or on the WCGOP as a whole. This includes, but is not limited to:
 - Engaging in excessive drinking of alcoholic beverages.
 - Engaging in the use or distribution of illegal drugs.
 - Becoming physically or emotionally involved with vessel personnel.

Any behavior contrary to these standards, or the intent of these standards, is grounds for disqualification. Falsification of data is grounds for immediate disqualification and may be a basis for prosecution.

Conflict of Interest



Observers are required to maintain an unbiased role by limiting their financial interest in the fishery. Observers must abide by the following conflict of interest standards:

1. Observers may not have a direct financial interest, other than the provision of Observer services, in a West Coast fishery, including, but not limited to:
 - Involvement in the catching or processing of products from the fishery either by vessels or shore-side facilities.

- Involvement in the selling of supplies or services to these vessels or shore-side facilities.
 - Involvement in the purchasing of raw or processed products from these vessels or shore-side facilities.
2. Observers may not solicit or accept, directly or indirectly, any gratuity, gift, favor, entertainment, loan, or anything of monetary value from anyone who conducts activities that are regulated by NOAA Fisheries, or who has interests that may be substantially affected by the performance or non-performance of the Observers' official duties. (Note that this standard restricts Observers from accepting home-packed fish without purchase.)
 3. Observers may not serve as an Observer on any vessel owned or operated by a person who previously employed the Observer.
 4. Observers may not solicit or accept employment as a crewmember or an employee of a vessel or shore-side processor in a West Coast Groundfish fishery while under contract with an Observer contractor.

Confidentiality

Permit owners may ask to see the paperwork collected from the vessel. Observers may share all collected data, **except the Observer Logbook**, with the **owner** of the permit. Only the permit owner, NOAA Fisheries staff, and the Observer are allowed to see the data collected. Never allow crew from one boat to see any data from another vessel and **never take data from one vessel onto another vessel.**

II. Observer Personal Equipment

A list of clothes and belongings Observers may want to bring to sea is provided below. If Observers have questions on what to bring to sea, ask for advice from the WCGOP staff or an active Observer in the program. Rather than taking a lot of clothes, focus on bringing items that can be layered. Dressing to work on the deck of a vessel off the West Coast is challenging—usually, the conditions are cold (45°F) and wet, but in the summer there are days when the outside temperature can reach the 70's. Layering will help protect Observers from the elements and will ensure that Observers don't get overheated if the weather gets warm. Synthetic or wool materials are recommended and will keep Observers warmer than cotton. Inexpensive clothes are also recommended, since the smell of fish is difficult to remove from fabric. Some Observers find appropriate, inexpensive work clothes at Army-Navy Surplus or used-clothing stores.

Considerations for Fishing Trips



- Observers will be exposed to wet conditions, even when it's not raining.
- Observers must be prepared for hot and cold temperatures and for quick weather changes.
- When working on deck Observers may be exposed to strong wind conditions.
- There will be a LIMITED amount of space aboard the vessel.
- Sea bags (small duffel bags are ideal) should be packed so that items can be easily accessed.
- Observer may or may not have a bunk.

- Vessels may not have a head (bathroom) or a shower.
- If Observers have dietary restrictions discuss them with the captain and/or the cook before departing.

Observer Personal Gear

Here are some suggestions for personnel gear needed while at-sea:

- Toiletries (towel, soap, toothbrush and tooth paste, deodorant, travel size shampoo, wet wipes)
- 2-3 pairs of socks
- Clothes that can be layered for warm weather (thermal, sweatshirt, fleece)
- Sleeping bag/blanket
- Extra contact lenses or glasses
- Personal medications
- Reading material (books, magazines), radio/walkman with headphones
- Sunglasses, sun block and chap stick
- Baseball hat, cap
- Small first-aid kit
- Small pocketknife
- Flashlight with extra batteries
- Travel pillow
- Water



IV. Observer Sampling and Safety Gear

NOAA Fisheries and PSMFC supply sampling and safety equipment. Observers should check sampling gear to see that it is in good working order when it is issued. It is the responsibility of each Observer to maintain their gear and return it in the best condition possible. Observers may be charged for misuse or neglect of sampling gear. Observers rely on their equipment to perform their duties so making gear cleaning and upkeep a daily routine is recommended.

Scales

Observers are supplied with at least two scales:

- A 6.0-pound hand-held brass scale for items up to 6.0 pounds.
- A Chatillon platform scale for items weighing more than 6.0 pounds.



The Chatillon platform scales have a gauge that can be read to a tenth of a pound. Observers are expected to take accurate weights in the field. There may be circumstances when the most accurate reading is to the nearest pound. Document those instances in the Logbook.

How to Care for Sampling Gear

1. Keep gear in a secure place aboard the vessel. Avoid leaving gear on the vessel's deck. If there is no alternative to leaving it out on deck, be sure that it is well secured.
2. Keep forms, books, pencils, pens, and unused equipment in a dry safe place, such as the forepeak, stateroom, or a secure lazarette.



3. Keep all gear as clean as possible. Use deck hoses to rinse slime, scales, and blood off the baskets, deck sheets, length boards, clipboards, scalpel, and knife after each use. Rinse gear with fresh water after each trip.
4. Keep metal parts clean and well oiled. The lubricant oil issued is food-grade and can be kept on deck.
5. Do not put scales, scalpels, knives, thumb counters, measuring tapes, or other metal objects in plastic bags or boxes when they are wet or they will rust.
6. The platform scale **MUST** be kept well oiled. Use the food grade lubricant oil on all moving parts **daily**. Use the Lanicoat spray on the underside of the scale and on the notched reading beam before and after trips (See Appendix T Chatillon Platform Scale Care and Maintenance).
7. If something does happen to the issued gear, document what happened in the Observer Logbook. Observers will not be charged for gear damage or loss due to uncontrollable, documented circumstances.
8. Keep sampling gear consolidated. This will minimize the chance of forgetting something when disembarking and will be appreciated by the vessel crew during the trip.
9. **Do not** take the laptop computer to sea and **do not** check it when traveling by air.
10. Safety equipment is provided to reduce reliance on the vessel's equipment. The immersion suit should be kept in a safe place that is dry and easily accessible. It is not a good idea to keep the suit with the crew's since it may not be easily accessible

and may be forgotten when disembarking. The immersion suit zipper must be waxed at least once a month to prevent sticking. It is important to retain original immersion suit issued at training.

The majority of sampling gear will be issued at training (See Appendix N List of Observer Issued Equipment). If replacement gear is required, contact the PSMFC or the WCGOP coordinator.

V. Observer Life

There are three phases in a West Coast Groundfish Observers life:

1. Training
2. Vessel Deployment, Data Collection, and Data Entry
3. Debriefing

Training

A two-week training course is required of all Observers new to the WCGOP. The course consists of an overview of sampling procedures, species identification, safety training, conflict resolution training, training in the use of a web-based data entry application, small boat etiquette, and general support information. Trainees must pass a series of tests and homework assignments to demonstrate their understanding of:

- Observer priorities and duties
- Methods of independent catch estimation
- Proper recording of data

- Methods of sampling and recording species composition data for both retained and discarded catch
- Fish identification and use of dichotomous keys
- Gender determination and measurement of fish
- Procedures for collection of age structures
- Ability to use the web-based data entry application
- Applications of volume, weight, density, and extrapolation calculations
- Safety and survival skills

In order to receive NOAA Fisheries-approval, trainees must attend and participate in every class, pass exams, complete all homework, and make any corrections requested. Trainees must also pass a safety test including an on-land and in-water test of survival suit and life raft use. Additionally, trainees must be able to demonstrate that they have the attitude and ability required to perform a difficult job independently and to act professionally in stressful situations.

Vessel Deployment, Data Collection, and Data Entry

Port and Vessel Assignments

AOI will make Port assignments. Observers should have written understanding of payment and reimbursement agreements prior to leaving for their assigned port, since traveling along the coast in Washington, Oregon and California can be expensive, especially in the summer.



The port in which the Observer is living and possibly the surrounding ports will be the Observer's port group. Most of the vessel assignments will occur within this port group. However, travel to other port groups is frequently required.

Contacting Vessels



Observers will be assigned a vessel by their coordinator or a lead Observer. Coordinators supply Observers with vessel names, skipper/owner names and phone numbers. Once this information is received, the Observer is responsible for completing the following tasks:

1. Contacting the vessel owner/captain.
 - When calling the vessel owner/captain, do so in a friendly but professional manner. State your name and association with the WCGOP. Make it a habit to introduce yourself to whoever answers the phone.

Hi, my name is Joe Smith. I am the West Coast Groundfish Observer in *Port Group*. Could I please speak with *Vessel Owner/Captain's Name*?

- The vessel owner/ captain will give information regarding approximate embarking date and time.

Information that should be acquired from the captain:

1. Vessel location (dock, plant, etc)
2. Departure date and time
3. Approximate length of trip
4. Vessel type/gear type (if not known)
5. If vessel has current USCG Safety Decal
6. Meeting time for vessel safety orientation

2. Completing a Vessel Safety Orientation Checklist. Document the date the USCG Vessel Safety Decal was issued, when the hydrostatic releases were checked, the last repacking of the life raft, etc. (See Observer Logbook for Vessel Safety Orientation Checklist.)
3. Mailing or faxing a copy of the Vessel Safety Orientation Checklist to the coordinator prior to departing on the first trip!
4. Arriving at the vessel at least 30 minutes prior to embarking time. Often, there will be an unforeseen delay but it's vital the Observer does not cause it!!
5. Calling the Observer Trip Notification Phone System (OTNPS) prior to embarking and upon return.

Observer Trip Notification Phone System

The WCGOP utilizes a call-in system (available twenty-four hours per day, seven days a week) for Observers to report departures and returns from vessels. Since each Observer is issued a personal Emergency Position Indicating Radio Beacon (EPIRB), it is vital that NOAA Fisheries, PSMFC, and AOI are aware of when Observers are at sea in case the EPIRB is set off.

In the event an Observer's personal EPIRB goes off, the Coast Guard will contact NOAA Fisheries, PSMFC, or AOI and inquire if there is a real emergency. The OTNPS provides a simple and quick way for any of these groups to determine if the set off EPIRB accompanied an Observer to sea or not. The OTNPS potentially reduces the time it will take the U. S. Coast Guard to respond in a real emergency.

Observers will be required to phone Answering Northwest, Inc. at 206-444-4268 immediately prior to embarking on a vessel and immediately after disembarking a vessel. Upon embarkation, Observers will leave the following five pieces of information with an operator at the answering service:

Embarking:

1. First and last name
2. Vessel name
3. Departure port
4. Estimated time of departure
5. Estimated length of trip

Note - Observers do not need to include the date and time of the call, it will be recorded automatically by Answering Northwest, Inc.

Upon disembarking a vessel, the Observer will again need to call the answering service, and leave the following three pieces of information:

Disembarking:

1. First and last name
2. Vessel name
3. Arrival port

The time and date of the call will be recorded automatically.

Remember--Observers are required to notify Answering NW, Inc. before and after every trip even if the Observer has reported the departure or arrival to the coordinator. **There will be no exceptions to this routine.**



Data Collection

Observers collect data for approximately two months and then debrief with program staff. During this two-month period, the Observer may be assigned to one or multiple vessels. Observers may also be observing multiple gear types. This means that multiple sampling methods may be employed. Observers should be familiar with the sampling protocols for the gear type before embarking on the trip. This will ensure the correct equipment and forms are brought and hopefully, ease some anxiety.

Data Entry

Observers should budget a fair amount of time for data entry. Observers use the WCGOP Database to enter:

- **Data** – All data collected on vessels, including information on Trip Forms, Catch Forms, Species Composition Forms, Length Frequency Forms, Biospecimen Forms, and Marine Mammal and Seabird Sightings forms.
- **Activity** – Observers are responsible for recording their activity in the database. **Observers should have their activity entered no later than the 3rd of each month.**
- **Communications** – Observers are required to record all communications with vessels in the database.

Communications and Field Support

The WCGOP has field stations in Seattle, Washington, Newport, Oregon, and Eureka, California that provide staff support for Observers. Observer coordinators contact new Observers after their first trip to discuss the vessel and sampling procedures.

If there are any problems, questions, or comments, call an **Observer coordinator or debriefer**. The coordinators/debriefers main purpose is to provide help and support to **Observers**. Use this resource!! A positive Observer/coordinator/debriefer relationship during deployment will provide for an easy end-of-period debriefing and a quick fix to problems encountered.

If **Observers** are ill, injured, cannot work, or are going to miss an assigned trip, contact **AOI** and an **Observer coordinator** immediately.

Debriefing

Debriefings may be extended to 4-month periods for qualified Observers.

When a two-month trip period is completed, a debriefing will be scheduled. The purpose of debriefing is to:

- Describe the methods used to collect data.
- Inform WCGOP staff of any problems encountered.
- Make corrections or changes to the data.
- Get recommendations for future cruises.
- Receive a written performance evaluation.
- Replenish gear.

Prior to debriefing, Observers should complete the following tasks:

- Double-check all data for errors.
- Run Trip Error Report.
- Send data.

Sending Data

Observers will be FEDEXing their data to a lead Observer or debriefer. Data should be sent at the end of each two-month period or when requested by WCGOP staff. Data should be organized **by trip** in the following order:

1. Trip Form(s)
2. Catch Form(s), Species Composition Form(s), Length Frequency Form(s), Biospecimen Form(s)
3. Trip Discard Form(s)
4. Marine Mammal Sighting, Tagged Fish, and/or Seabird Sighting Form(s)

Also include,

5. Logbook
6. Species Identification Forms

A debriefer will set up an interview appointment with the Observer. The meeting with the debriefer includes:

- Interview
- Data Corrections
- Evaluation

Interview

The debriefing interview is a vital part of the Observer's contract. It allows the WCGOP to get feedback from the Observer and provides an opportunity for Observers to discuss sampling methods and ask for suggestions if problems were encountered. It is also an opportunity to give personal insights to WCGOP personnel. The interview is the Observer's chance to demonstrate their understanding of the methods learned in training and their proficiency at applying them in the field.

Data Corrections

All mistakes that are found in the error check or during the interview will be corrected at the debriefing. Both the paper and electronic copies of the data will need to be corrected.

Evaluation

Observers receive evaluations for each debriefing. The debriefers are responsible for completing evaluations in a timely manner and for soliciting input from other staff members who work directly with the Observer. Observers are evaluated on 8 categories. Each category has criteria that are considered in the evaluation. The categories and criteria are:

Category 1: Sampling Procedures

Criteria A: Proper sampling procedures employed

Criteria B: Random sampling implemented and documented

Category 2: Data Forms

Criteria A: Forms are complete

Criteria B: Forms are legible

Criteria C: Forms are organized

Criteria D: Forms are relatively error free

Criteria E: Data documentation is consistent

Criteria F: Fish ticket numbers are present

Criteria G: Vessel logbook numbers are present when required

Criteria H: Data entry acceptable

Category 3: Sample Size

Criteria A: Sample size meets program requirements

Category 4: Calculations

Criteria A: Calculations are written out

Criteria B: Calculations are correct

Criteria C: Formulas are written out

Criteria D: Formulas are correct

Category 5: Species Identification

Criteria A: Species ID forms are legible and neat

Criteria B: Species ID forms are completed for all new species seen

Category 6: Observer Logbook

Criteria A: All sections are completed

Criteria B: Vessel safety checks are mailed to coordinator prior to first trip

Criteria C: Scale calibration is completed according to protocol

Criteria D: Notes and descriptions are detailed

Category 7: Attitude/Reliability/Flexibility

Criteria A: Trips are not missed

Criteria B: Observer maintains professionalism with coordinator, debriefer, lead Observer, and other Observers

Criteria C: Observer interacts well with the fleet

Criteria D: Observer readily accepts assignments and tasks

Criteria E: Observer completes shore duties in a timely manner

Category 8: Communication

Criteria A: Calls from coordinator, debriefer, lead Observer, and other Observers are made/returned promptly and professionally

Criteria B: Calls to or from vessels are made / returned promptly and professionally

Criteria C: Calls to “Observer Trip Notification Phone System” are made promptly

Criteria D: Activity is completed promptly

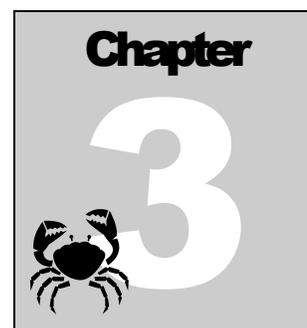
The evaluation will include paragraphs regarding the specific category and criteria that the Observer excelled in or needs improvement in. There will not be a numerical

score. Observers are required to sign off on the evaluation in the Observer database. AOI will be monitoring this and contacting Observers who have not signed off on recent evaluations. The program hopes to encourage communication between debriefers and Observers by requiring Observers to sign off on their evaluations.

Maintaining WCGOP Observer Status

Each year, Observers continuing with the program must:

- Maintain a current First Aid and CPR certification
- Pass a Fish Test
- Complete a WCGOP-approved Safety Training Course
- Participate in annual briefing and meeting



Observer Basics

Focus Questions:

- What are Observer's duties and priorities?
- How are data forms completed?
- How are Logbooks completed?
- What types of information can the WCGOP provide the fisheries managers?
- What is Random sampling?

Chapter Outline:

- I. Introduction
- II. Duties and Priorities
- III. Recoding Data
- IV. Observer Logbooks
- V. Data Collected
- VI. Catch Categories
- VII. Data Forms
- VIII. Weight Methods and Sample Methods
- IX. Introduction to Random Sampling Theory

I. Introduction

This chapter presents the foundations of duties, sampling, and documentation of WCGOP Observers. The application of the principles will be discussed in Chapters 4 and 5.

II. Duties and Priorities

Observer duties are listed below in order of priority. Observers should use this list as a reminder of all the different tasks that need to be accomplished for each haul and to recognize which are of a higher priority. There will be times when all the listed duties cannot be accomplished during a single haul. If all the duties listed cannot be completed due to lack of time, illness, or bad weather, concentrate on duties with higher priority. Observer duties in order of priority are:



1. Record incidental takes of endangered species and marine mammals. Collect appropriate biological specimens.
2. Estimate total catch weight, even for tows with 100% discard.
3. Estimate the weight of catch categories.
4. Document reasons for discard for each species and/or catch category.
5. Sample discarded catch to determine species composition for each catch category.
6. Record weight, length, sex, and take necessary dissections from tagged fish.

7. Take biological samples such as sexed lengths, otoliths, stomachs, etc.
8. Sample retained catch to determine species composition for each catch category.
9. Maintain the Observer Logbook, including: Daily notes, sampling techniques (in a clear, legible and logical manner); scale tests, and sample area diagrams.
10. Record weight, length, and viability of Pacific Halibut.

III. Recording Data

Eleven standardized forms and an Observer Logbook are used for data documentation. This section provides the basic rules that ensure consistency between all Observers' data.

Completing and Organizing Forms

During an average day on a vessel, Observers will fill out at least three different forms (usually several of each!). **All data forms should be completed in pencil.** Only Observer Logbooks should be completed in ink.



TIP* Always have the manual near when filling out paperwork. Review the form instructions prior to completing forms and refer to the examples often. This will save time by ensuring the forms are filled out correctly and completely the first time.

Legibility

It is required that all data be clear and legible. If the data documentation is unclear, it could be entered into the database incorrectly. During debriefing, these errors will need to be fixed and if the debriefer is unsure of a number, the Observer will need to be present to interpret all the data. This will lengthen the debriefing process and, if questions cannot be resolved, may cause some data to be lost. To ensure legibility:

- Write carefully in clear, dark writing.
- Record the data in an organized manner.
- Document formulas and label all calculations.

Recording Time

When recording time, use the 24-hour clock (0000-2359) and Pacific Standard Time (PST). Note that no colons are used with the 24-hour clock and should not be recorded on any forms.



TIP* Some digital watches can be set to a 24-hour clock, which can make tracking and recording time easier.

Rounding Data Rules

When performing a calculation, carry the numbers out full field until the final product is determined. Full field is all the numbers on the calculator. Rounding within a calculation reduces its precision. Do not round any numbers within the calculation!

To round the final product:

- Look only at the first digit to the right of the number being rounded.
- If $X \geq 5$ round up, if $X < 5$ round down.

For Example:

Observer counts 49 fish but can only weigh 12 fish.

The weight of 12 fish = 54.63 lbs.

The calculated average weight = $54.63/12 = 4.5525$ lbs.

- **INCORRECT:** Weight of 49 fish if average weight is rounded to 2 decimal places: $49 \text{ fish} * 4.55 \text{ lbs.} = 222.95 \text{ lbs.}$
- **CORRECT:** Weight of 49 fish if average weight is kept full field: $49 \text{ fish} * 4.5525 \text{ lbs.} = 223.0725 \text{ lbs.}$ This value would be rounded to 223.07 lbs.

If average weight were rounded, an incorrect value would be recorded on the data form for the weight of the 49 fish.

IV. Observer Logbooks

Observer Logbook Entries

The Logbook is probably the single most important piece of data an Observer will return with because it contains detailed and supportive information about all other data. Have the Logbook present whenever paperwork is completed so notes regarding data collection and compliance issues can be documented.



TIP* Many Observers make notes on their deck forms in order to jog their memory of particular events that happened while they were out on deck. Set aside time each day to write in the Daily Notes section. Remember that events that seem ordinary on this vessel may be unusual to the fleet or fishery, so don't hesitate to write down any information that affects sampling or day-to-day life aboard a vessel.

The Observer Logbook is a field biology notebook and must be treated as such; do not use it as a personal journal. Document any interference or inappropriate behavior but avoid venting frustrations or making derogatory remarks. The Logbook must be kept private while on the vessel, but it is a public document and is turned over to NOAA Fisheries during debriefing. The contents of the Logbook and the Observers' name may be released if a Freedom of Information Act (FOIA) request is approved.

The Logbook as Evidence

Logbooks are archived and used as a reference to give more information about the data. They may also be used as evidence if regulatory infractions were noted. If corrections need to be made, draw a single line through the incorrect word(s) and continue with the correct wording.

Do not black out anything, use correction fluid, or tear out pages or parts of pages! Always use INK!

If any part of an original entry is completely obscured, it leaves the reader wondering what was originally documented. This may affect the validity of the Logbook and data.

Completing the Logbook

Logbooks are to be completed on a trip limit basis and are mailed along with completed data at the end of each two month period. The Observer Logbook is made up of twelve sections, each of which should be completed before mailing. Below is a brief description of each section.

Title Page

The Observers' name and the date range of the trip limit period for which the Logbook was used should be clearly indicated here.

List of Vessels

This section is used to list each vessel the Observer embarks on and the dates associated with the vessel. It is very likely that more than one vessel will be observed during each trip limit period. List the vessel names and USCG registration number or the state registration number, as applicable. Write the name of the captain that ran the vessel. If there was more than one skipper during a trip limit period, indicate this and include all names. In the "Inclusive Dates" lines, list the dates on which the vessel embarked as well as the dates the vessel returned to port. **It is only necessary to list each vessel once.**

Calendar

A calendar is provided for Observers to use.

Vessel Safety

Prior to boarding a vessel for the first time, the Observer is required to check the vessel for safety equipment required by U. S. Coast Guard regulations. The "Vessel Safety" section lists items that should be inspected before leaving on the first trip on the vessel. The "Vessel Safety Orientation Checklist" pages should be used to document that each item was checked, to make comments on each

item, and to document the appropriate dates associated with some items.

A copy of the Vessel Safety Orientation Checklists must be mailed to the Observer's coordinator prior to leaving on the first trip onboard the vessel. Logbook pages should never be torn out, rather photocopies should be made.



TIP* It may prove useful to carry pre-addressed, stamped envelopes with you.

Observer Safety Equipment Checklist

Each Observer is issued safety equipment by the WCGOP. All equipment must be maintained and inspected on a regular basis to ensure that it is in proper working condition. The "Observer Safety Equipment Checklist" should be completed on a monthly basis. Document the actual date of the gear inspection and go through the list with the equipment at hand. It is important to notify the Observer coordinator or PSMFC if any of the items do not pass inspection.

Scale Calibration Record

To calibrate the Chatillon Platform Scale:



1. Test the Chatillon platform scale every 5th observed day at a minimum.
2. Test the scale with two different weights:
 - 5 lbs weight provided by WCGOP
 - Three, one gallon sealed bottles of water purchased from the grocery store

TIP* Buy three sealed one gallon water jugs prior to the first fishing trip. Use the same three gallons of water throughout your contract as a

West Coast Observer, since there may be a weight variance between gallons.

3. Use the bars in the appropriate manner.
 - First, use the 5 lbs bar to get the weight to the nearest 5 lbs.
 - Second, use the 1 lb bar on the left to get the weight to the nearest pound.
 - Finally, use the tenth bar on the right to get the weight to the tenth of the pound.
 - Record the tested weights in the appropriate section in the Observer Logbook.

IF THE SCALE READS + or - 5% FROM WHAT IT SHOULD FOR EITHER THE 5 LB WEIGHT OR THE 3 WATER JUGS, CONTACT A COORDINATOR IMMEDIATELY!

Vessel Diagrams

Vessel diagrams should be done for each vessel observed. These diagrams help detail the layout of the vessel and help debriefers better understand the Observer's sampling conditions while onboard. It is especially important to thoroughly document any vessels and gear types that are not typically observed. Diagrams should be large, detailed, and well labeled. All calculations and formulas used should be documented in the "Vessel Diagram Calculations" pages.

Description of Observer Total Catch Sampling

This section is used to indicate which weight methods were employed to estimate OTC and to detail how each method was applied. This section is used to describe a general sampling frame and any deviations from this frame must be

documented in the “Daily Notes” section. Each method will likely be used more than once and on more than one vessel. There are spaces provided to list each vessel on which a particular method was employed.

Description of Catch Category Sampling

This section is similar to the previous one, however it is used to describe weight methods used to estimate catch category weight. Again, these descriptions will generally describe a general sampling frame. It is very important that random sampling be detailed.

Communication Log

The “Communication Log” can be used to aid in tracking communications with vessels, coordinators, other Observers, AOI, or any other program related staff. This log is not mandatory but may be helpful for reference. It is important to note that all communications with *vessels* MUST be entered into the database system. Vessel communications may be listed here as well, but it is not required. Communications listed here may include:

- Calls to WCGOP staff regarding sampling problems.
- Calls to other Observers regarding data or vessel coverage.
- Calls to NMFS enforcement.
- Calls to the Coast Guard.
- Calls to port biologists and port samplers.
- Calls to harbor masters.
- Calls to PSMFC state liaisons.

Photo Log

Each contract, a disposable camera will be issued for taking photos of marine mammals and work-related activities. These cameras are not for personal use. The Photo Log should be used to document photographs taken. It is best to document each photo soon after taking the picture. When issued, the camera should have a barcode label. Note the number on the barcode label in the Photo Log. All cameras should be returned to the Seattle field office for developing.

Daily Notes Section

Use the Daily Notes section to record specific notes on problems that occur while aboard vessels and any illnesses or injuries suffered. Record the circumstances surrounding any violation witnessed. Any problems or challenges encountered while sampling should also be documented here, including times in which the Observer was unable to sample. Make an entry for each day, describing the day's events, even if it was considered an "ordinary day." The more self-explanatory the trips are, the better. Logbooks may be referred to months, or even years, after the trips are completed.



V. Data Collected

There are 5 data types Observers can provide for managers. These are as follows:

1. **Fishing Effort Information** – This data is used by managers to understand where people fish, gear used, and target species.
2. **Catch Information** – This information includes how much was caught, what species made up the catch, and how much of each species was retained and discarded.
3. **Species Composition** – Species composition data is used to estimate relative abundance of each species in a haul. It includes the species specific weights and counts.
4. **Biological Data** – Biological data is used by stock assessors to gauge the age composition of the population, the length to age ratio, the potential spawning population, and the male to female ratio. It includes sex, lengths, weights, and otoliths for individual fish.
5. **Other** – This includes data not necessarily used by fisheries managers but important to ecosystem management. This data type includes information about marine mammals, sea turtles, and seabirds.

VI. Catch Categories

Catch information on the West Coast is categorized in a unique way. Due to the difficulty of identifying rockfish species, processors often group them in easy to identify assemblages (groupings) based on their coloration or cohabitation. These groupings are referred to as market or catch categories. Market categories are used by both buyers

and vessels to record landed catch. From now on, these categories will be referred to as Catch Categories.

Catch categories are species groupings that are based on either marketing categories or naturally occurring associative species complexes. A catch category may be confined to a single species or may include several species.

Observer data must be recorded in catch categories in order to be analyzed in conjunction with landing data.

VII. Data Forms

Eleven standardized forms are used to record data. Each form functions to collect specific information related to one of the 5 data types managers need.

1. **Trip Form** – This form is used to record fishing effort information. This includes latitude, longitude, depth, date and time, target species and gear used. Observers also record total catch estimates, hook counts (when needed), and gear performance. A trip form is completed for every fishing trip observed.
2. **Catch Form** – Catch category information is recorded on one of the two versions of the Catch Form:
 - Trawl/Prawn Catch Form is used on vessels using trawl or other net gear and all vessels targeting prawns. It records the **total weight** of each catch category in the haul.
 - Fixed Gear Catch Form is used when sampling (on most) vessels using hook or pot gear. It records the **Observer sample weight** of each catch category in the haul.



3. **Species Composition Form** - This form is used to record the composition of the haul by catch category and the reason each species is discarded.
4. **Length Frequency Form** – This form is used to record sexed and unsexed lengths of fish when no other biological data is collected.
5. **Biospecimen Form** – This form is used when biological information on individuals other than simple sexed lengths is taken and any time a dissection is taken.
6. **Trip Discard Form** – This form is used to document any discarded fish that cannot be attributed to a specific haul. For example, a vessel may decide to discard fish that have already been put into the hold. These fish can only be attributed to the trip as a whole, not to a specific haul.
7. **Species Identification Form - Observers are required to fill out a species identification form for every new species encountered.** (There are three different Species Identification Forms:
 - Rockfish Species Identification Form (See Appendix V)
 - Flatfish Species Identification Form (See Appendix U)
 - Miscellaneous Species Identification Form (See Appendix W)

Observers' data quality hinges on the ability of the Observers to correctly identify fish to species. Observers are trained in species identification during the initial training. They are also required to take yearly fish identification tests and complete Species Identification Forms for every new species

encountered. These procedures provide the WCGOP evidence of each Observers fish identification competency.



TIP* When filling out species ID forms, it is imperative that Observers are still holding the fish. Do not fill out the forms using only the fish books after the fish has been discarded. There are certain characteristics that are important to document, such as head spine counts on rockfish or the presence of an accessory dorsal branch and its length on flatfish. Be concise and document as much information as possible. If the fish is similar to others, be sure to include distinguishing characteristics.

If a species is encountered in a haul that cannot be identified **REMEMBER: Never guess on the identification of a species.**

UNIDENTIFIED FISH

If there is an individual fish or crab that cannot be identified, fill out a Species Identification Form with as much information as possible. Observers may come across a more identifiable specimen of the same species later, so organize the unidentified fish descriptions with names such as “unidentified black rockfish #1,” or “mystery fish #5” as appropriate. Use these same names on the Species Composition Deck Form, so that the data can be changed if the fish is identified later. Always take some photographs of the specimen for ID purposes and bring the specimen back to NOAA Fisheries.

If a species caught is not listed in the species code list in the manual or in the database, contact a coordinator and database manager and they will add it to the species list in the database.

8. **Marine Mammal Sighting and Interaction Form** – This form is used to document sightings of marine mammals as well as interactions that occur between marine mammals and fishing operations.
9. **Sea Turtle Information Form** – This form is used to document specific characteristics of Sea Turtles that have interacted with the fishing operations.
10. **Tagged Fish Form** – This form is used to record specific information from tagged fish.
11. **Seabird Sighting and Interaction Form** – This form is used to document sighting of seabird species of interest and banded seabirds. It also documents interactions between seabirds and fishing operations.

Page Numbering

It is important to use a standardized method of page numbering for the data forms for each trip. All Observers must use the same page numbering method for their data forms. This allows debriefers to easily and quickly review data and aids data editors in detecting missing information.

Trip Form: Haul Locations/ Hauls

These forms are numbered sequentially within a trip.

Trip Discard Form

These forms are numbered sequentially within a trip.

Catch Form, Species Composition Form, Length Frequency Form, and Biospecimen Form- These forms are numbered sequentially within a haul.

Marine Mammal, Sea Turtle, Seabird and Tagged Fish Forms – These forms are not numbered.

For Example: The observed fishing trip lasts one day, and there are two hauls that were sampled. On the way to the processor, the vessel discarded some fish from the hold. The page numbering would be:

Trip Form – 1 of 1

Trip Discard form – 1 of 1

	<u>Haul 1</u>	<u>Haul 2</u>
Catch form –	1 of 5	1 of 3
Species Composition form –	2 & 3 of 5	2 of 3
Length Frequency form –	4 of 5	none
Biospecimen form –	5 of 5	3 of 3

VIII. Weight Methods and Sample Methods

It is important that Observer data is clearly documented as to which sampling protocols were used so that present day and future data users are able to easily determine how the Observer sampled. Weight Methods and Sample Methods are used to this end. A brief description of each weight and sample method follows. More detailed explanations are included in Chapters 4 and 5.

Weight Methods

Weight methods are used on the Trip Form to explain how the weight of the total catch was determined. Weight methods are also used on the Catch Form to explain how the weight of each catch category was determined. Because the WCGOP covers a very diverse fleet, 13 weight methods have

been developed to obtain total catch and/or catch category weights.

Some of the factors that lead to such diversity in the fleet include:

- **Vessel Size** – The covered fleet ranges from kayaks to 90-foot trawlers.
- **Gear Type** – Vessels that use line or pot gear differ substantially from those using net gear.
- **Total Weight Caught** – Trawl catches range in size from 100 lbs to over 20,000 lbs. In the open access fisheries, less than 1000 lbs of fish can be landed per day.

Weight Methods

1 - Actual Weight: When everything within a catch category or a haul is weighed, it is an actual weight. This method can be used for total catch and catch category weights.

2 - Bin/Trawl Alley Volume: For large catches, weighing everything is impossible. If the total catch or a catch category is placed within a measurable unit, then a volume and density can be used to calculate the total weight. This method can be used for total catch and catch category weights.

3 - Basket Weight Determination: All of the individuals within a catch category or haul are placed in Observer baskets. Only a portion of the baskets are actually weighed (5 baskets out of 10 baskets, for instance). An average weight of an Observer basket is applied to the total number of baskets filled. This method can be used for total catch and catch categories.

4 - Visual Estimates: Visual estimates can be based on experience or they can be based on a known. This method is used extensively for catch categories on net vessels. This method can also be used for total catch weight.

5 - OTC – Retained: Subtracting retained estimates from Observer total catch weight (OTC) gives the total discard weight. This method is used when a haul is not sampled due to injury or illness on net vessels. This method can be used for discarded catch category weight only.

6 - Other: This can mean a variety of things. The most important thing when using a weight method of OTHER is to thoroughly document how sampling was done. This method can be used for total catch and catch category weights.

7 - Vessel Estimate: The vessel estimates how much is caught by catch category. This method is used for total catch and retained catch categories.

8 - Extrapolation: The total number of individuals of a species is multiplied by an average weight to estimate the catch category weight. In situations where weighing all individuals of a species is impossible but it is possible to count them, this method is used. A variation of this method can also be used to estimate total catch on fixed gear vessels.

9 - Length/Weight Conversion: The lengths of individual Pacific halibut are visually estimated or actually measured. A length-to-weight conversion table is then used to arrive at a weight. This method is used only for Pacific halibut catch categories.



10 - Codend Estimate: The codend is measured and a density is taken to calculate the total weight of fish in the codend. This method is used on net vessels only. This method is used for total catch and catch category weight estimates.

11 - Retained + Discarded: If all of the catch is sampled on a hook or pot vessel, the sum of the catch categories is used for total weight. This method is used for total catch only.

13 - Tally Sample: The weight of catch categories that are tally sampled is the sum of the species weights in the catch category. This method is used for catch categories on hook or pot vessels only.

Sample Methods are also used on Length Frequency and Biological Specimen Forms. Refer to Chapter 6 for more information.

Sample Methods

Sample methods are used to explain the method used to take a species composition sample of a catch category. One of the following sample methods is documented on the Species Composition Form for each catch category sampled:



1 - Whole Haul – When all individuals within a catch category are weighed and counted.

2 - Single Basket – When a single basket species composition sample is taken from a catch category.

3 - Multiple Basket – When more than one basket is taken for a species composition sample of a catch category.

4 - Fixed Gear Sample – When all individuals within a catch category are counted and multiplied by average weights to obtain total species weights.

This was a basic introduction to the key concepts of sampling for the WCGOP. These concepts will be applied to specific situations in Chapters 4 and 5.

IX. Introduction to Random Sampling Theory

Observers take samples from a population when it is not possible to count, weigh and/or measure every individual within the population. By using a random selection method to draw a sample from the population, you ensure that *every member of the population has an equal probability of occurring in the sample*. If every member of the population is equally likely to occur in your sample, then when you repeat the sampling over time, these repeated samples are representative of the population and can be used to draw conclusions about the population from which they are taken.

Advantages of Random Sampling

The use of a random sample method eliminates all subjectivity and ensures managers, fishers, and other end users that Observer samples are not biased for or against the fleet.

When random sampling methods are used to collect data, the NOAA Fisheries is justified in using statistical methods for estimating population parameters based upon that data.

Steps in Taking a Random Sample:

1. **Define the population.** The population is the total set of items that we wish to draw inferences about. Populations Observers take samples from include:
 - All the individuals in a haul.

- All the individuals in a Catch Category.
2. **Define a sampling frame.** A sampling frame is a conceptual framework, which divides the population into independent, countable sampling units. There are two general categories of sampling frames: spatial and temporal.
- **Spatial** – Based on a unit of space or a unit of gear. Examples are:
 - Space - Bin, Trawl Alley, or Baskets.
 - Gear - Skate, Tub, Pole, Stick, or Pot.
 - **Temporal** – Based on units of time. Examples are:
 - Sample 20 minutes of a 60-minute set.
 - Collect a sample at a pre-selected point in time.
3. **Define your sample segments.** Sample segments are the separate portions of the sampling frame. It must be possible to collect *all* individuals within a single segment. Be sure not to use sample segments that are so large it may be impossible to collect all individuals.
- **Spatial** – A trawl alley is divided into 6 sections. Each of the six sections is a sample segment.
 - **Temporal** – A one-hour sort time is divided into 10-minute sample segments.
4. **Number all of the sample segments in your sampling frame.** If your segments are sections of deck or individual baskets, assign a number to each. If your segments are time increments, number them

consecutively. Gear segments on fixed gear vessels can also be numbered consecutively.

5. **Pick random numbers to choose which segments to sample.** Generate random numbers between 1 and your maximum sample segment number (inclusive) to determine which sample segment(s) to select. You will be given a random number table during training, there is one in the WCGOP Field Manual, and another can be found in Appendix H. Dice, the second hand of a watch, and numbered pieces of paper are other options for generating random numbers.
6. **Select the sample segments corresponding to the random numbers.** This is your sample.
 - **Spatial** - Collect all of the individuals from each randomly selected deck section or gear unit.
 - **Temporal** - Collect all individuals during the time increment.

Random Systematic Sampling

Another way to take a random sample is to set up a random systematic frame. Random systematic sampling can only be used when you know, or have a reasonable estimate of, the total number of sample segments in a set. Systematic sampling involves taking a sample during every “ n^{th} ” defined sample segment. For a random systematic frame, randomize the selection of your first sample segment and then take every “ n^{th} ” sample thereafter.. The steps for taking a random systematic sample are as follows:

1. Define the population.
2. Define a sampling frame.

3. Define the sample segments and determine the total number of sample segments in the set.
4. Number all of the sample segments in the sampling frame.
5. Determine how many of the sample segments you want in your sample.
6. Divide the total number of sample segments by the number of segments you want in your sample. This gives you your value for “n”.
7. Randomly select a number between 1 and n. This will be the first sample segment in your sample.
8. Sample every n^{th} sample segment thereafter.

Example:

There are 100 baskets of fish that need to be sampled.

1. Define population – 100 baskets of fish.
2. Define sampling frame – Spatial Systematic, using baskets.
3. Define sample segments – Individual baskets of fish.
4. Number all sample segments – Baskets numbered as 1 – 100.
5. Determine how many sample segments to sample – Decide to sample 20 baskets.
6. Calculate value of “n”: $100/20 = 5$.
7. Randomly select a number between 1 and “n” – Use random number table to select 2.
8. Sample baskets 2, (2+5), (7+5), (12+5)...(92+5).

Chapters 4, 5, and 6 contain in depth discussions on applying random sampling protocols.

Chapter
4



Trawl and Prawn Sampling

Focus Questions:

- What is a trawler and how does it operate?
- What gear types do prawn vessels use and how do they operate?
- How is information collected on these gear types and what forms are used?

Chapter Outline:

- I. Trawl and Prawn Pot Gear and Fishing Strategy Description
- II. Collecting and Documenting Trip Information
- III. Sampling Catch
- IV. Collecting and Documenting Species Composition
- V. Examples

I. Trawl and Prawn Pot Gear Fishing Strategy Description

Trawlers

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

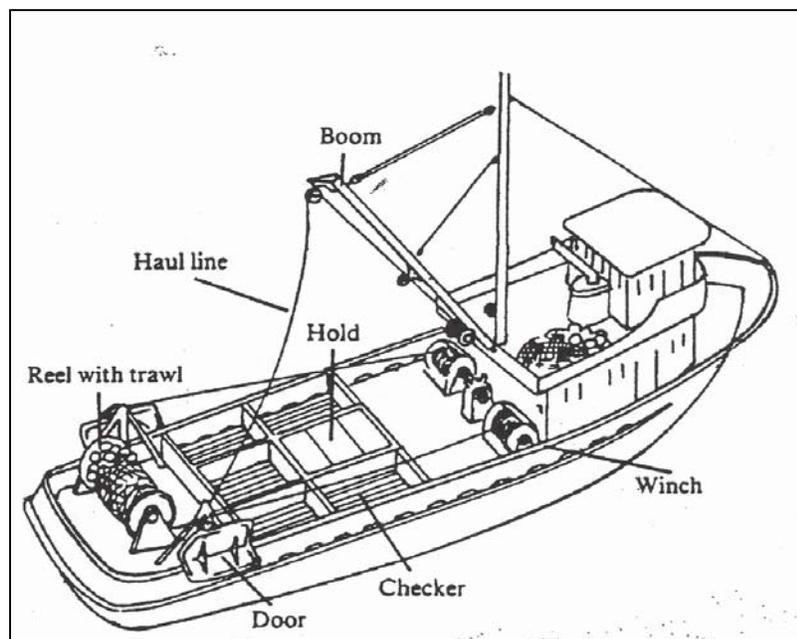


Figure 4- 1: Trawl Vessel

Trawling involves the towing of a funnel-shaped net behind the fishing vessel (See Figure 4 – 2). 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, holds 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.

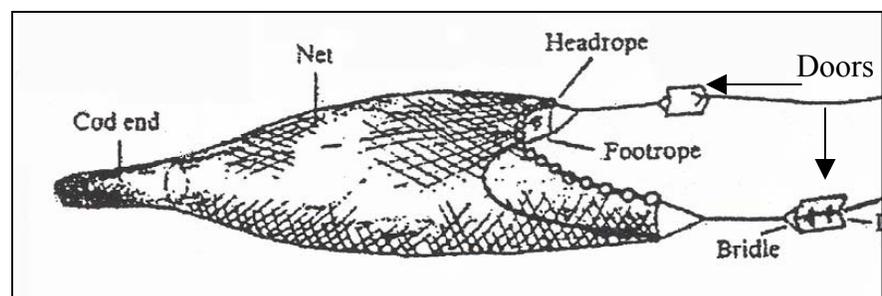


Figure 4- 2: Trawl Net

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 or spot prawns) 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 4-3).

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.

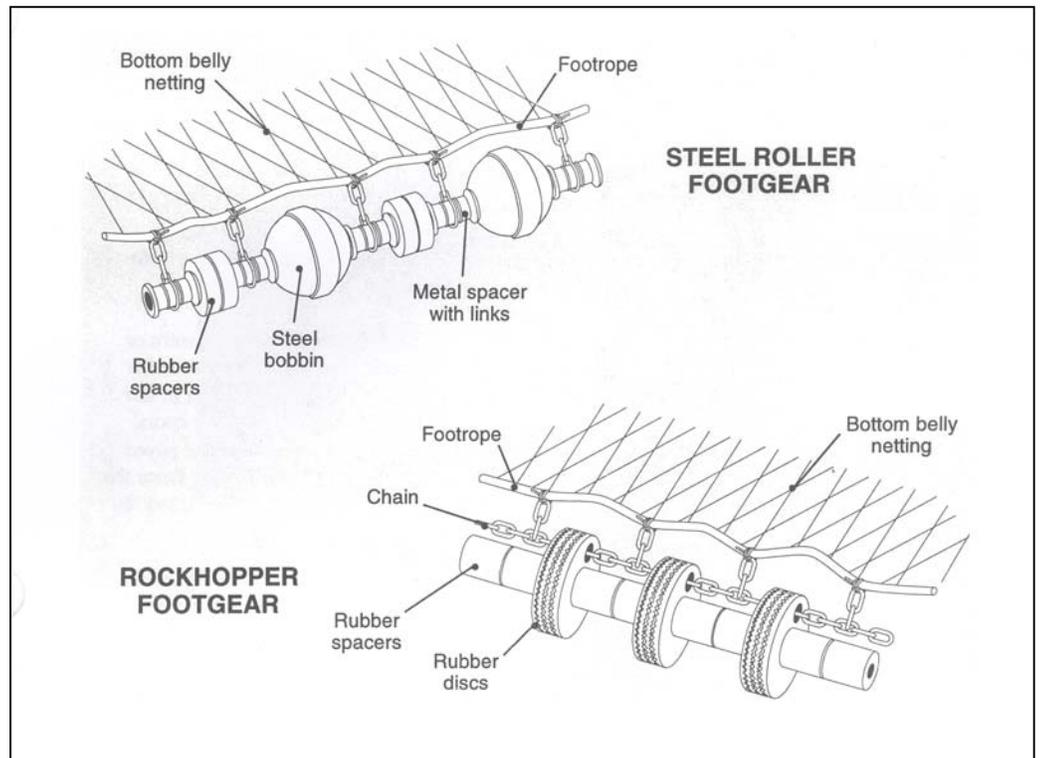


Figure 4- 3: Roller Gear

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.

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

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 prawn/shrimp fishing.

Midwater Trawl – The requirements for a midwater net include a protected footrope and no bobbins or rollers on the net. 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.

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

Prawn/Shrimp (Pink, Spot and Ridgeback Prawns)

California Halibut

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

Prawn Pot

The words “pot” and “trap” are used interchangeably to mean baited cages set on the ocean floor to catch fish and shellfish. They can be circular, rectangular or conical in shape. The pots may be set out individually or as strings with multiple pots attached to a groundline.

All pots contain entry ports and escape ports that allow undersized or unwanted species to escape. Additionally, all pots used must have biodegradable escape panels or fasteners that prevent the pot from continuing to fish if lost.

Strings of pots are marked at each end with a pole and flag and sometimes a light or radar reflector. Individual pots are marked with surface buoys.

Prawn pots (e.g. spot prawn and coonstripe) have small mesh. The coonstripe prawn pot uses various configurations, the most common being a rectangular pot with two circular openings. The pots are set in depths ranging from 23-28 fathoms in strings of between 20 to 30 traps. Fishermen will use 300 to 400 pots during the fishing season. The pots are baited with herring, sardine, and mackerel.

Diversity of Fleet and Effects on Sampling

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

Groundfish Trawl Vessels on the West Coast range from 40 feet to 80 feet.

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 the entire discard. Therefore, the vessel may sort the discard directly out a scupper, over the side or down the stern ramp. It is possible to do an actual weight for a subset of species within the discard (i.e. rockfish or prohibited species) but the majority of the discard weight will be visually estimated.

Groundfish Trawl tows range from 45 minutes to 20 hours.

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. This allows one of the more precise methods to be used for estimating catch category weights. On the other hand, a vessel that hauls every hour or two reduces the options for weight estimates.

Groundfish Trawl tows range in size from 100 lbs to 40,000 lbs.

3. **Size of tow** – Vessel size and size of tow are related. Generally speaking, if a large vessel has a large tow, over 8000 lbs., it is possible to estimate discard weight by a volumetric estimate. If a small vessel has a large tow, the vessel may be sorting the catch overboard. This may necessitate the use of a visual estimate for the weight of a discarded catch category.

Groundfish Trawl tows can have as few as 5 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 a scupper – retained fish are taken out of the flow of fish while discards are flushed right off the vessel.
3. Crew sorts retained into bins or baskets and tosses or scoops discard overboard.
4. Crew presorts certain species.
5. Crew sorts from chute that discards fish directly over the side.

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.
5. **Sorting technique of crew** – Each vessel will have a unique sorting method. Talk with the crew upon boarding to discuss how they sort and the best way to collect the samples. Communicating with the crew that samples will be collected from **discard only** is key to fulfilling sampling requirements.

All of the factors above are interrelated. For example, if a small vessel has a short tow duration and tows are large, the Observer will need to consider how each of these factors will affect sampling procedures.

II. Collecting and Documenting Trip Information

Fishing Effort information includes where vessels are fishing, 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.

Groundfish trawlers are required to record fishing activities in a current NOAA Fisheries “Washington-Oregon-California Groundfish Logbook”. Observers copy this

record to complete the Trip Form for groundfish trawlers. Unfortunately, vessels targeting prawns/shrimp are not necessarily required to keep a Logbook. Most captains will keep a personnel log, however. Observers should ask to view this in order to record the required information. If the vessel does not document their activities, it may be necessary to collect this information personally.

Instructions for Completing the Trip Form on Trawl and Prawn Vessels

An entry must be made for every tow a vessel makes. The Trip form is separated into two sections (See Figure 4-6 and 4-7):

Trip Form – Haul Locations

Trip Form – Hauls

Most of the information on the Trip form will not require sampling. The exception is the Observer Total Catch Estimate. Following the form instructions, procedures for obtaining Observer Total Catch Estimates on trawlers and prawn pot vessels is discussed.



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 – Haul Locations

Starred (*) topics below indicate information that can be obtained from the “Washington-Oregon-California Groundfish Logbook”.

- **Fishery Type** – Circle the fishery the vessel was participating in. If the vessel was participating in an EFP fishery, document the name of the EFP in the Trip Notes.
- **Page #** - All Trip Forms are numbered together. (If there are 5 Trip forms, number them 1 – 5.)
- **Coast Guard Number** – All Limited Entry groundfish trawl vessels and most prawn trawl vessels will 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 entry field blank and fill in the State Registration Number field.**
- **Trip Number** – This is an automatically generated number by the database. Complete this field once the trip has been entered 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.

- **Observer Name** – Record your first and last name.
- **Year** – Record the year as YYYY.
- **Vessel Name** – Record the full name of the vessel.

Question: Why do Observers record the “Washington-Oregon-California Groundfish Logbook” page number?

Answer: 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.

- ***“Washington – Oregon – California Groundfish Logbook” Number** - The Vessel Logbook number is the page number(s) that the skipper is recording the trip information on. The vessel Logbook number is on the lower left corner of the Logbook page. Do not record the number of the entire Logbook!



Tip*“Washington-Oregon-California Groundfish Logbook” Number is highlighted in gray (See Figure 4 – 4).

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	LEPN	SSPN	W00W	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	45.5											
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	W00W					16,000	500		
	up	2200	46	54.1	124	53.6											
	set																
	up																
	set																
	up																
	set																
	up																
	set																
	up																
	set																
	up																

REMARKS:

Signed: John Doe

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

39761

Figure 4- 4: Washington-Oregon-California Groundfish Logbook

- **Skipper First Name** – Record the first name of the skipper.
- **Skipper Last Name** – Record the last name of the skipper.
- **State Registration Number** – Use this field **only** if the shrimp or prawn 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. **This field will be blank on groundfish trawlers because they all have USCG numbers.**
- **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 and State Agency Code** – 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!** The state agency code will be C - for California deliveries, O – for Oregon deliveries, or W – for Washington deliveries.
- **Trip Notes** – Document any information pertinent to understanding the trip.
- **Haul/Set Number** – Number hauls consecutively, starting with 1 for each trip.

Question: Why are Observers required to record Fish Ticket Numbers?

Answer: 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).

- **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.

Loran

If the vessel is using Loran C, document the Loran coordinates. Send these to a coordinator in an Excel spreadsheet and they will return the latitude and longitude



Tip* When an Observer boards a vessel that has a GPS, check to be sure the it's recording in degrees, minutes, 1/100th of a minute. If it's not, ask the captain to change the view to 1/100th of a minute instead of seconds. (See Figure 4 – 5)

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



Figure 4- 5: GPS Showing Latitude and Longitude

Fathoms:
1 Fathom = 6 Feet

- **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, not whether it’s fished mid-water or on the bottom. If the vessel is using a type of trawl gear not listed, please contact a coordinator for instructions.

- 1 - Groundfish Trawl, Footrope < 8 inches (small footrope)
- 2 - Groundfish Trawl, Footrope > 8 inches (large footrope)
- 3 - Midwater Trawl
- 4 - Danish/Scottish Seine
- 5 - Other Trawl Gear
- 11 – Prawn Trawl
- 12 – Shrimp Trawl, Single Rigged (one net)
- 13 – Shrimp Trawl, Double Rigged (two nets)
- 14 – All Net Gear Except Trawl
- 17 – Pineapple Trawl

****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.****

- **Target Strategy** - Enter the vessel’s target strategy. Refer to Appendix E 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 in the comments other recorded target strategies.

LE OA _EFP

TRIP FORM - HAUL LOCATIONS

Page ____ of ____

USCG #

Observer name _____ Year _____

Trip Number

Vessel Name _____

Logbook # _____

Skipper First Name _____

Skipper Last Name _____

State Registration # (OA only)

Departure Date/Time _____

Departure Port _____

Landing Date/Time _____

Landing Port _____

Fish Tickets State Agency
 Code

Trip Notes:

Haul/ Set #	DATE	TIME (24-hour clock)	LATITUDE		LONGITUDE		Depth of catch (fathoms)	Gear Type	Target Strategy
			Month	Day	Degrees	Minutes			
	Start ¹			.		.			
	End ²			.		.			
	Start ¹			.		.			
	End ²			.		.			
	Start ¹			.		.			
	End ²			.		.			
	Start ¹			.		.			
	End ²			.		.			
	Start ¹			.		.			
	End ²			.		.			
	Start ¹			.		.			
	End ²			.		.			
	Start ¹			.		.			
	End ²			.		.			
	Start ¹			.		.			
	End ²			.		.			
	Start ¹			.		.			
	End ²			.		.			

Start¹ - Time the brake is set End² - Time the brake is set

Figure 4-6: Trip Form – Haul Locations

Trip Form – Hauls Instructions

- **Haul/Set Number – Document the haul/set number** that corresponds to the Haul Location information on the front of the form.
- **Observer Total Catch Estimate (OTC) –** Record the total catch estimate to two decimal places. Observer Total Catch estimate is recorded in pounds.
- **Volume of Codend or Trawl Alley/Bin –** Document the volume of the codend or bin/rawl alley, to two decimal places, when weight methods “2 – Bin/Trawl Alley Estimate” or “10 – Codend Estimate” are used to determine Observer Total Catch Estimate.
- **Density –**Record density, to two decimal places, when weight methods “2 – Bin/Trawl Alley Estimate” or “10 – Codend Estimate” are used to determine Observer Total Catch Estimate.
- **Weight Method –** Enter the number for the weight method used to obtain the Observer Total Catch Estimate. The weight methods that may be used for Trawl/Prawn Pot OTC’s are as follows:
 - 1 - Actual Weight
 - 2 - Bin/Trawl Alley Estimate
 - 3 - Basket Weight Determination
 - 4 - Visual Estimate
 - 6 – Other
 - 7 - Vessel Estimate

10 - Codend Estimate

11 – Retained + Discarded

Question: If pots are lost, do I document the number of pots originally set in the Total Hooks/Pots column or the number there were after some were lost?

Answer: Document the total number of pots originally set.

- **Total Hooks/Pots** – Document the total number of pots in the set on **prawn pot vessels**. This column will be blank on groundfish and prawn/shrimp 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

- **Beaufort Scale** – This is not a required field at this time. Do not fill in unless otherwise directed by program staff.
- **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** – This is required for the Observer Total Catch Estimate field. Add all of the OTC's for an entire trip and record total weight of trip in the OTC keypunch check box (If there is

more than one Trip form, add total catches of ALL hauls to obtain keypunch check.).

- **Total Hooks/Pots Keypunch Check** – On prawn/shrimp vessels, this is required for the Total Hooks/Pots field. Add all of the Pot counts for an entire trip and record total pot count of trip in the Total Hook/Pot keypunch check box (If there is more than one Haul form, add total pot counts of ALL hauls to obtain keypunch check.)

Observer Total Catch Estimates (OTC)

As mentioned earlier, it is necessary to sample in order to obtain an independent OTC. OTC's should be obtained for all hauls!! Although there are eight weight method options for OTC on Trawlers and Prawn Pot vessels, only three of them are commonly used. In order of preference, the weight methods commonly used for OTC on Trawl and Prawn Vessels are:

- Weight Method 2 - Bin Volume/Trawl Alley Estimates
- Weight Method 10 – Codend Estimates
- Weight Method 4 – Visual Estimates

Volumetric Estimates

There are two weight methods that employ volumetric estimates:

- 2 – Bin Volume/Trawl Alley Estimates
- 10 - Codend Estimates

Volumetric estimates for OTC should be made on all groundfish trawlers and prawn pot vessels unless:

- The codend is irregular in shape, such as a blob, and it is not dumped into a bin/alley.
- Codend is irregular in shape and is dumped into a bin/alley but the height of fish in the bin/alley is too low to take a good measurement.
- Vessel or weather conditions make volumetric estimates unsafe.

Prawn Pot Vessels OTC estimates will most likely not employ volumetric estimates because of how the catch is handled.

Bin/Trawl Alley estimates are much easier, produce better results, and are safer to take than Codend estimates. If there is more than one way to estimate the OTC, use the Bin/Trawl Alley estimate rather than Codend estimate.

There are two steps in obtaining volumetric estimates.

1. Obtain the volume of the codend or bin/trawl alley where the fish reside.
2. Obtain a density for the fish.

Trawl Alley or Checker Bin Estimates

1. **Determine the appropriate volume formulas for each area of the bins and trawl alley.** Most bins and trawl alley will be rectangular, however, some will have odd shaped areas (See Figure 4-8 and Figure 4-9).
2. **Measure the area of the empty bins and trawl alley in meters.** It is easiest to measure the area of the bins and trawl alley prior to leaving the docks. If the bins and trawl alley have easily definable sections, measure them independently. Often times, a catch only fills up a portion of the total area. From these measurements, the total area of the bin will be available.



$$\text{Total Area (m}^2\text{)} = \sum \text{Areas (m}^2\text{) of all bins}$$

3. **Measure the height of the catch in the bin in meters.** The height of the fish in the bin provides the final dimension needed to obtain the volume of the catch. 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:



$$\text{Average Height of Fish in Bin (m)} = \frac{\text{Height A (m)} + \text{Height B (m)} + \text{Height C (m)} + \dots}{\text{\# of Height Measurements Taken}}$$

4. **Calculate and record catch volume.** Record measurements and calculations on the back of the Catch form. Make sure that all of the measurements are as precise as possible and describe the methods in the Observer Logbook. To obtain volume of the catch:



$$\text{Volume of Catch (m}^3\text{)} = \text{Total Area of Bin (m}^2\text{)} \times \text{Average Height of Fish in Bin (m)}$$

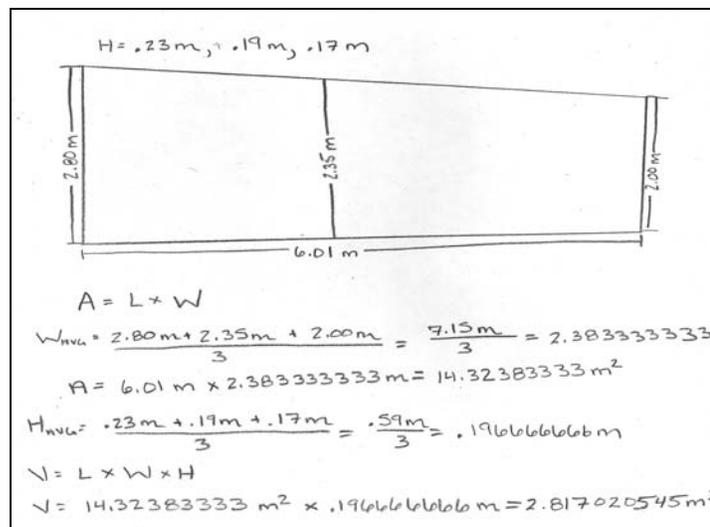


Figure 4- 8: Bin Volume Calculation



Figure 4- 9: Trawl Alleys and Bins

Codend Estimates

When measuring a codend, always remember that **safety is the first concern** (See Figure 4-10). Nets tend to slide and roll. Be careful not to get caught between the net and the trawl alley. Ask crewmembers for assistance; their help will make the task easier and safer. Follow the steps listed below to take an accurate codend measurement.

1. **Determine the appropriate geometric shape(s) and decide on the appropriate formula(s) to use.** Using the formula, determine which dimensions will be measured in order to obtain a volume. Refer to “Area, Volume, and Product Formulas” in Appendix I. for the formulas required to calculate the various volumetric shapes.
2. **Measure the various dimensions of the codend using actual measurements and/or reference points.** Take height and width measurements from several segments to obtain an average height and width for the net. It may be necessary to acquire a long stick, or a similar item, and mark it for use as a height gauge. When sighting across the net for a height, the Observer's eyes should be level with the top of the net.
3. **On the back of the Catch form, record the method, formula, dimensions, and calculations used in obtaining the volumetric estimate.** To calculate the total volume of the codend:



$$\text{Volume (m}^3\text{)} = (.7854) \text{ L(m)} \times \text{W(m)} \times \text{H(m)}^*$$

*Most measurable codends require the use of the ellipsoidal formula above. This is used as an example formula and is not the formula used for every codend shape.



Figure 4- 10: Codends

Measuring Large Codends

Occasionally, a full codend is larger than the trawl deck and must be brought on board and emptied in several sections. To determine the codend volume in this situation, measure the codend sections that are brought onboard. Use the reinforcing cables, or “expansion straps” around the circumference to divide the codend into sections. Determine a volume for each segment of the net measured and add them together for a total volume of the codend. Do not apply a predetermined or constant volume to the number of codend segments to calculate the OTC!

Obtaining Densities for Total Catch Calculations

Once the volume of bin/alley or codend has been obtained, it will be necessary to determine the density of fish in that area. Density is weight per unit of volume. For our purposes, it is expressed in pounds per meter³. Densities will need to be estimated from each haul where a bin/alley or codend estimate is used for OTC estimate.



$$\text{DENSITY} = \text{WEIGHT (LBS)} / \text{VOLUME (M}^3\text{)}$$

Density Requirements

It is necessary to measure both the volume and weight of a sample of the catch to estimate density. The Observer baskets are an excellent density container. Use **TWO** or more Observer baskets for the density sample for each volumetric estimate. Densities should be taken for every volumetric estimate. When taking density samples:

- Be sure to take a random sample of unsorted catch. Document random sampling method in the Observer Logbook.
- Take the sample prior to any sorting of fish.
- Try to minimize the interstitial spaces and fill the containers to the same level.
- If using Observer baskets, fill them all the way to the top ($.044 \text{ m}^3$) or to the top of the last line of holes ($.032 \text{ m}^3$). (See Figure 4-11)
- Weigh each density basket and record this weight on the deck sheets.
- Document calculations used to determine density on the back of the Catch form. Be sure to include the formulas used.

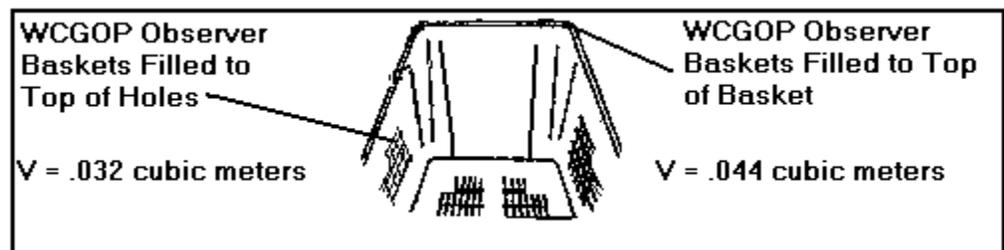


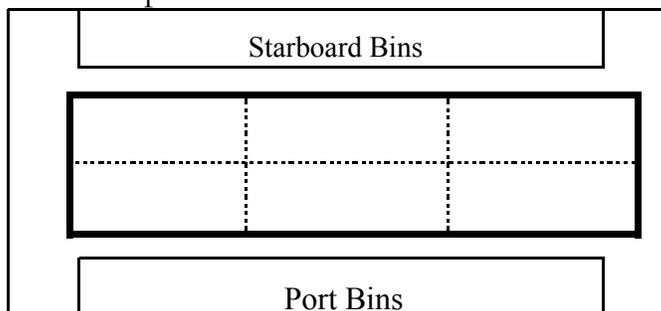
Figure 4- 11: Observer Basket Volumes

Procedure for Calculating Density

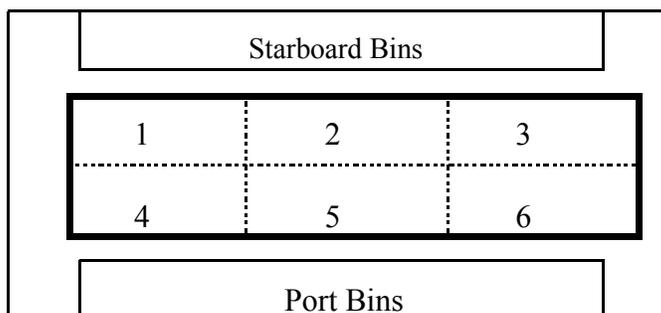
After the codend is dumped or after the height measurements for bin/alley estimates have been completed, randomly select area(s) to take density baskets. Below is an example on how to implement random selection for density baskets.

1. Split the trawl alley into sections of equal size.

For example:



2. Number the sections



3. Use a clock or numbered pieces of paper to determine which section(s) to take the sample from. It's better to take baskets from two randomly selected sections than just one due to the possibility of stratification.



TIP* Use a clock by assigning each section a ten second time period (i.e. section one equals 0-9 seconds) and then glance at the watch twice to determine which sections to take baskets from. Or tear up six pieces of paper, number them 1-6, and pick two prior to the haul back.

3. Fill baskets to either the top of the holes in the basket or the top of the basket. Use individuals from selected section(s). Working from one corner of the section, take all of the fish, working down to the deck until the basket is “full”.
4. Weigh baskets.
5. Determine the average basket weight.



$$\text{Ave Basket Wt(lbs)} = \frac{\text{Wt of Basket A(lbs)} + \text{Wt of Basket B(lbs)..}}{\text{\# of Baskets weighed}}$$

6. Determine the density of the catch.



$$\text{Density (lbs/m}^3\text{)} = \frac{\text{Average Weight of Baskets (lbs)}}{\text{Volume of Basket (m}^3\text{)*}}$$

*The volume of the basket is a known. The volume of a basket filled to the top of the holes equals .032m³ and the volume of a basket filled to the top equals .044m³.

OTC Calculation

Use the bin/alley or codend volume and the density to calculate OTC.



$$\text{OTC(lbs)} = \text{Vol. of Codend or Bin/Alley(m}^3\text{)} \times \text{Density (lbs/m}^3\text{)}$$

Review of Steps for Obtaining a Volumetric OTC (See Figure 4-12):

1. Codend is brought aboard. If using bin/trawl alley volumes, codend is dumped in trawl alley or bins.
2. Decide which formula best describes codend or bin.
3. Take all length, height and width measurements required for the formula.
4. Take a minimum of two baskets of randomly selected, unsorted catch for densities.
5. Multiply density by the volume of codend or bin/alley to calculate OTC.

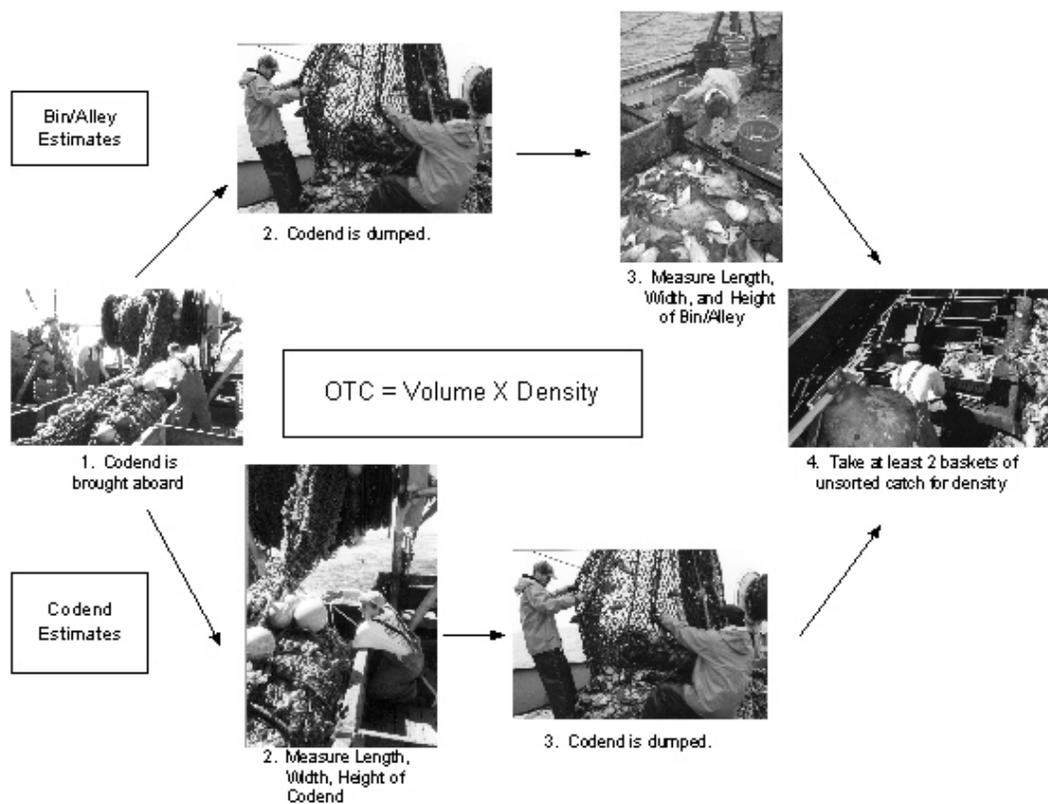


Figure 4- 12: Schematic of discard sampling on a trawl vessel

Visual Estimates

Observers must do visual estimates of OTC for every haul on net vessels. Record the visual estimate on the back of the Catch form. Visual estimates will only be recorded as the OTC if a volumetric estimate is not possible.

Other Acceptable OTC Methods

As mentioned earlier, there are five more weight methods that can be used for total catch estimates.

Weight Method 1 – Actual Weight

Weight Method 3 – Basket Weight Determination

Weight Method 6 – Other

Weight Method 7 – Vessel Estimate

Weight Method 11 – Retained + Discarded

Weight Method 1 – Actual Weight

If all of the catch is weighed, then an actual weight has been obtained. This is not a preferred weight method because the analysts can sum the catch category weights to get the same value. Therefore, recording visual or volumetric estimates of OTC provides a second piece of data to the analysts.

Weight Method 3 – Basket Weight Determination

All of the individuals within a haul are placed in Observer baskets. Only portions of the baskets are actually weighed (5 baskets out of 10 baskets for instance). An average basket weight is applied to the total number of baskets filled. This method is rarely used for OTC because it requires basketing UNSORTED catch that cannot be used for later samples (all other samples MUST come from sorted catch).

Weight Method 6 – Other

The most common reason this method is used is when a combination of two weight methods is used. This could happen when a vessel dumps part of a codend on deck and the Observer gets a volumetric estimate while some of the catch is discarded at sea and is visually estimated.

This weight method should only be used when the other weight methods cannot be applied. If this method is used, document the circumstances in the Observer Logbook and on the paperwork.

Weight Method 7 – Vessel Estimate

The vessel estimates how much is caught by catch category. This weight method should only be used when the Observer is unable to obtain an independent estimate. Remember, vessels do not document total catch weight so the Observer must ask them for an estimate.

Weight Method 11 – Retained + Discarded

All of the catch categories on the Catch Form are added together to obtain an OTC. This method is used when obtaining a volumetric estimate is impossible AND a visual estimate was not done. This method should be rarely, if ever, used **on net vessels** and an explanation of why this method was used should be in the Observer Logbook.

OTC's on prawn pot vessels will often be estimated using this method.

General Rules for the Recording of OTC

- Any time a volumetric estimate is taken for OTC, use it!!!!
- If the catch was weighed and the volumetric estimate determined, record the volumetric estimate for the OTC.

- Never record an actual weight for the OTC estimate. The visual estimate should be recorded before an actual weight.

III. Sampling Catch

After the density baskets are taken, THE CREW will sort the catch into retained and discarded. They will place the retained catch in baskets, bins, or other holding containers and either remove the discard from the vessel or relocate it to a location out of their way. Each state has port samplers who obtain information from the retained catch at delivery. **Therefore, the Observers primary responsibility is to sample the discarded portion of the catch.**

Catch Categories

Chapter 3 discussed catch categories briefly. This section provides a review and more specific information regarding catch categories on groundfish trawl and prawn pot vessels. There are two rules that always apply to catch categories:

1. Retained and discarded individuals are always in separate catch categories.
2. Pacific halibut is always in it's own catch category.

Retained Catch

The crew places retained species in catch categories and on groundfish trawlers records them in the “Washington – Oregon – California Groundfish Logbook”. When observing on groundfish trawlers, always record retained catch categories exactly the same as in the Logbook unless:

- Vessel does not record catch category (often happens with species retained in small quantities)

- Vessel uses an invalid PacFin code (Select most applicable name from Catch Category list in Appendix E)

There may be instances when Observers sample retained catch **but it should only be done when a complete and comprehensive sample of the discard has been taken.** When sampling retained catch, keep species in the same catch categories as the vessel has them in.

The priority for sampling retained catch categories is:

1. Species not recorded by the vessel
2. Mixed Species - A lot of vessels will mix flatfish or rockfish species. If the crew is mixing species, take a species composition sample from the mixed group and do not separate the species into their own catch categories!!

Discarded Catch

The amount of fish discarded on trawlers is extremely variable, from close to 0% to 100%. In some circumstances, the Observer will not be able to weigh the entire discard. Catch categories allow for the sorting of specific species or groups of species out of the whole (See Figure 4-13). This allows extremely accurate weights to be obtained for some of the discarded catch categories while using a less accurate method for the rest of the discard. Generally, importance is placed on prohibited species, rockfish, and other overfished species. A discussion of sampling priorities follows the explanation of estimating catch category weight.

There are three factors that distinguish catch categories from each other on trawl and prawn pot vessels:

- Vessel Sorting – If the entire discard is not weighed and the crew sorts species different

Vessel Sort Example:
 Often vessels will presort some species. This means they remove them from the deck immediately. Presorted species would fall into a separate catch category than those not presorted.

ways, then the species will fall into catch categories based on the way the crew sorted them.

- Weight Method – The method used to obtain the weight estimate of the catch category is the primary factor when determining the number of discarded catch categories. If portions of the catch have different weight methods this requires them to 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.

When sampling, the primary sort will be to catch category. Observers must make an estimate of the weight of each discarded catch category. See Appendix E for a listing of catch categories.

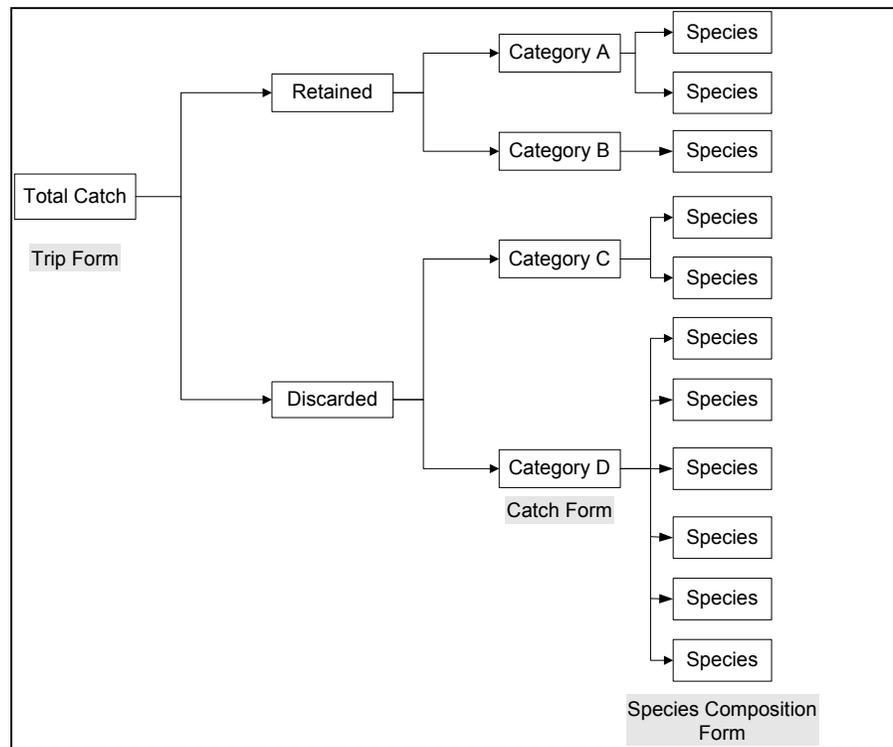


Figure 4- 13: Components of the Catch

Methods for Estimating Catch Category Weights

There are 10 weight methods that can be used to determine catch category weights on trawlers and prawn vessels.

- 1 - Actual weights
- 2 – Bin Volume/Trawl Alley Estimate
- 3 - Basket Weight Determination (BWD)
- 4 - Visual Estimate
- 5 - OTC – Retained
- 6 - Other
- 7 – Vessel Estimates (Retained only)
- 8 – Extrapolation
- 9 – Pacific Halibut length/weight
- 10 – Codend Estimates

The weights obtained by these methods are recorded on the Catch form.

Weight Method 1 – Actual Weights

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.



$$\Sigma \text{ Baskets weights (lbs)} = \text{Total weight of catch category (lbs)}$$

OR

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



$$\text{Catch Category Wt} = \sum \text{All species groups in catch category}$$

Weight Method 2– Bin Volume \ Trawl Alley **Estimates**

1. Take measurements of the trawl alley and/or bins.
2. Multiply measurements by appropriate volumetric formula.
3. For each bin measured, take a minimum of two density baskets.
4. Find the average weight of the density baskets, then divide by the volume of one basket to get density (lbs/m³).



$$\text{Total Vol (m}^3\text{) X Density (lbs/m}^3\text{) = Total Wt of catch category (lbs)}$$

Refer to the section on volumetric estimates for OTC for more detailed instructions.

Weight Method 3– Basket Weight Determinations (BWD)

1. Visually estimate the number of baskets it will take to hold the entire catch category.
2. Devise a sampling plan to randomly select baskets to use for average basket weight determination. Use a spatial, systematic, or temporal frame.
Specifics on implementing each type of

sampling frame are in “Methods to Randomly Select Baskets”.

3. Place **all** catch into baskets to obtain the total basket count. Each basket should be filled to the same level and contain a random sample of discard.
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.
5. Calculate average basket weight. Use this weight to calculate weight of all full baskets.
6. If a partial basket remains, record the weight and add it to the calculated BWD estimate.
7. All of the species in the baskets will be included in one catch category.



$$\text{Ave. Basket Weight (lbs)} = \frac{\sum \text{Basket Weights}}{\text{Number of Baskets Sampled}}$$



$$\text{Catch Category Wt.} = (\# \text{ of Full Baskets} \times \text{Ave Basket Wt}) + \text{Wt. Partial Basket}$$

Method to Randomly Select Baskets

Systematic (preferred)

- a. Break the catch category into sampling units (n) by dividing the visually estimated number of total baskets by the number of baskets to be used for average weight baskets. For example, there are 15 baskets and 5 are going to be sampled resulting in a sampling unit of 3 ($15/5$).

- b. Choose which skate to start sampling from by selecting a random number between 1 and the sample unit (n).
- c. Take the nth basket for average weights and every nth basket after that.

Systematic Random Sampling Frame

Example:

The Observer estimates that the total number of baskets it will take to hold the entire catch category is 12. At least four baskets need to be weighed. A random sampling frame is designed as follows:

1. Visual estimate # of baskets/# of baskets want to weigh: $12/4 = 3$ (This means that one of every three baskets is taken to weight)
2. Using the random number table, a number between 1 and 3 is selected: 2
3. Observer collects the following baskets for weight: 2, (2+3), (5+3), and (8+3).

Spatial

- a. Visually divide area holding catch category into equal units.
- b. Randomly select 1 or more units to take average weight baskets from.
- c. Baskets filled from randomly selected area are used for average weights.

Temporal

- a. Estimate the amount of time it will take to sort through catch.
- b. Randomly select individual minutes within sort time.
- c. Baskets being filled during randomly selected minutes are used for average weights.

Weight Method 4 – Visual Estimates

Visual estimates are the least preferred option for obtaining a catch category weight but are sometimes the only option available. Visual estimates fall into two categories. There are visual estimates where a “known” is used to determine the total catch category weight and visual estimates where the Observer makes the best possible determination based solely on experience.

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

Visual Estimates based on a “known” - There are three acceptable methods for obtaining visual estimates based on a “known” value.

- **Basket Estimate** - Estimate the number of baskets it would take to hold the entire catch category to obtain an estimate of catch category weight.

A **subsample** is a portion of a population. It can be used to make inferences about the population as a whole if collected in a random fashion.

1. Take a representative random **subsample** of the catch category using a spatial, systematic or temporal frame. (See discussion on random selection of baskets for Weight Method 3 for more detail)
2. Weigh each subsampled basket.
3. Derive the average basket weight for the catch category.

4. Visually estimate the number of baskets it would take to hold the entire catch category and multiply by the average basket weight.



Catch Category Wt = Ave Basket Wt (lbs) X Visual Estimate of Total # of baskets

- **Spatial Estimate** - Estimate the weight of a catch category by taking a subsample of the discard from a randomly selected spatial unit.
 1. Visually divide area holding catch category into equal units.
 2. Randomly select 1 or more units to take average weight baskets from.



TIP * Remember, baskets must be taken from SORTED catch!

3. Visually estimate the portion or fraction of the total discard that was taken from the subsample.
4. Weigh subsample.



Catch Category Wt = $\frac{\text{Weight of subsample (lbs)}}{\% \text{ of total area subsample represents}}$

- **Temporal Estimate** - Estimate the time it would take to sort the entire catch in relation to a subsample to obtain an estimate of catch category weight. Temporal estimates can be used when vessel is sorting discard out a scupper.
 1. Estimate the amount of time it will take for crew to sort catch.

2. Randomly select a time unit to take a subsample from.
3. Weigh subsample.



$$\text{Catch Category Weight} = \frac{\text{Wt of subsample (lbs)}}{\text{Time to take subsample (min)}} \times \text{Total time for vessel to sort catch}$$



TIP* Temporal Estimates can be used when vessel is sorting discard out a scupper.

Visual Estimates Based Solely On Experience

This method will be employed when Observers are unable to use a “known” value to determine total catch category weight. An example of when to employ this method is for codends that are fully or partially dumped at-sea. Observers will be unable to take any measurements or “known” values for the codend. Base the visual estimate on codends seen in the past.



Tip* If a catch category does not have a species composition sample, use the most descriptive PacFin code possible.

Weight Method 5 – OTC – Retained

This weight method is to be used ONLY if the discarded catch is not sampled due to illness or injury.

- Estimate OTC - It is preferred *Weight Method 2 – Bin/Trawl Alley Volume* or *Weight Method 10 – Codend Estimate* be used.
- Estimate weight of retained fish using one or more of the weight methods.



$$\text{Catch Category Wt(lbs)} = \text{OTC – Retained Species Wts(lbs)}$$

Weight Method 6 – Other

The most common reason to use this method is when a combination of two weight methods is used to determine catch category weight. This weight method should never be intentionally used. It creates confusion to end users and debriefers because it does not give an accurate idea how the catch category weight was actually derived. If this method is used, document what was done in the Logbook and on the paperwork.

Weight Method 7 – Vessel Estimates

This weight method is used for **retained fish** only. Groundfish trawlers are required to record retained weights in their “Washington-Oregon-California Groundfish Logbooks”. **Since discard is the priority, Observers usually use this weight method for all or most of the retained fish on groundfish trawlers.** If a vessel is not making estimates of retained catch, one of the other weight methods must be used to make these estimates.

- Copy retained catch category estimates from “Washington-Oregon-California Groundfish Logbook”.
- Ask skipper for retained catch category estimate.

Weight Method 8 – Extrapolation

Presort –

Vessels will attempt to get harder 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.

This weight method is commonly used for fish that are **presorted** in the trawl fishery. The most common presorted species are Pacific halibut, sablefish, and lingcod.

1. Count the number of individuals, by species.
2. Devise a sampling plan to randomly select individuals for average weights. Use a systematic, spatial, or temporal frame. **Specifics on**

implementing each type of sampling frame are in “Methods for Randomly Selecting Individuals.



TIP* A minimum of 15 individuals should be collected for average weights. For species caught in large quantities, count and weigh at least 50 individuals

3. Apply the average weight to the total number of individuals of that species caught to obtain the catch category weight.



$$\text{Average Weight} = \frac{\text{Sum of individuals weighed (lbs)}}{\text{\# of individuals weighed}}$$



$$\text{Catch Category Wt} = \text{Average Weight} \times \text{Total number of individuals caught}$$

Methods for Randomly Selecting Individuals

Systematic Selection (preferred method)

Select individuals based on when they leave deck.

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 3, (3+4), (3+7)...individuals for average weights.

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. Collect the n^{th} fish. Then collect every n^{th} individual after that.

5. Weigh selected individuals. Obtain an average weight per individual using the following equations:

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. Place all selected individuals in baskets.

Temporal Selection

Select all individuals sorted or on deck during a unit of time.

1. 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.

Weight Method 9 – Pacific halibut Length/Weight

This weight method is used ONLY for Pacific halibut.

1. Visually estimate or Actually Measure the length for each Pacific halibut caught.
2. Use the Pacific halibut length/weight conversion table to obtain a weight for each individual (see Appendix J).
3. Sum the weight of all the Pacific halibut.



<p>Catch Category Wt(lbs) = \sum Pacific Halibut Wts from Length/Weight Conversion Table</p>

Weight Method 10 – Codend Estimates

If a codend estimate was done for OTC and all of the catch was discarded, this method is used. This rarely occurs! Refer to the section on volumetric estimates for OTC's for detailed instructions.



$$\text{Catch Category Wt} = \text{Volume (m}^3\text{)} \times \text{Density (lbs/ m}^3\text{)}$$

Weight Method Guidelines

Due the variety of circumstances Observers face, it is difficult to give definitive guidelines for when to use each weight method. Remember, it may be necessary to use more than one method for each tow. As a guide, here are some general rules.

- If the total discard weight is less than 500lbs, the discard weight estimate should be obtained by an actual weight.
- If the total discard weight is less than 1500lbs, the discard weight estimate should be obtained by Basket Weight Determination.
- If a discarded catch category is held within a bin or trawl alley, a volumetric estimate should be used to determine the catch category weight.
- If an actual weight, basket weight determination, or volumetric estimate cannot be taken for a catch category weight, a visual estimate should be used.

Sampling Priorities

Certain discarded catch is rated as a higher priority than other discarded catch. When time permits, Weight Method 1 - Actual Weights, should be used for catch categories containing:

- Prohibited species – Pacific Halibut, salmon species, and Dungeness crab (North of Point Arena)
- Overfished Species – Cowcod, Dark-blotched rockfish, Pacific Ocean Perch, Lingcod, Canary rockfish, Yelloweye rockfish, Bocaccio rockfish, Widow rockfish (Not Pacific hake)
- Rockfish species
- Species that are both retained and discarded – Because some species are high-graded or have size restrictions, a sample of the discarded individuals is very important.

Catch Form

The Catch Form is the standardized form used to document Catch Weight and Catch Weight methods. A Catch Form should be completed for all hauls (See Figure 4-14).

Catch Form Instructions

- **Haul Number** – Record the number of the haul.
- **Date** – Record the date as MM/DD/YY.
- **Trip Number** – Record the trip number generated by the database system.

- **Coast Guard Number** – Record the USCG vessel number for Limited Entry trawlers and fixed gear vessels (if they have one). If the vessel does not have a USCG number, leave this field blank.
- **Catch #** - 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 with an R – Retained or D – Discarded.
- **Catch Category** – Record in capital letters the catch category sampled in the 4-letter PacFin code. For a list of PacFin catch category codes, see Appendix E.
- **Weight** – Record the total weight of the catch category to two decimal places. Weight unit is pounds (lbs).
- **Volume** – If the catch category is estimated volumetrically (bin, trawl alley, or codend), record the measured volume in m³. Record entry to two decimal places.
- **Density** – If the catch category is estimated volumetrically (bin, trawl alley, or codend), record the density used in lbs/m³. Record entry to two decimal places.
- **Number of Fish** – Record the total number of fish in the catch category if weight methods 4 – Visual Estimate, 8 – Extrapolation, or 9 – Length/Weight Conversion were used. Do not

Record numbers of fish for Weight Method 4 – Visual Estimate when the actual count of individuals has been done.

Do not record extrapolated numbers on the Catch form.

record the total number of fish for weight methods other than 4, 8, and 9.

- **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

4 - Visual Estimate

5 - OTC-Retained

6 - Other

7 - Vessel Estimate

8 - Extrapolation

9 - Length/Weight Conversion
(Pacific halibut only)

10 - Codend Estimate

- **Catch Purity** – 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's/crew's reason for discard for unsampled (no species composition sample taken) discarded catch categories only.

1 - Prohibited – Only Salmon, Pacific Halibut, and Dungeness Crab.

2 - Size – High-graded fish.

3 - Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc.



TIP* Species which are unlikely to be retained, such as eelpouts, sculpins, and grenadiers are given a reason for discard of '3 - Market'.

4 - Regulation – Any regulatory reason including size, over quota, etc.

5 - Other – Document in comments actual reason for discard.



Tip* Invertebrates such as starfish, anemones, and sea pens are given a reason for discard of '5 - Other'.

7 – Predation – Caught fish that are eaten by any predator including marine mammals, seabirds, or sand fleas.

- **Vessel Estimate** – Fill in the vessel estimate (from the Vessel Logbook) in this column ONLY if an independent estimate of the 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 vessel estimate in the catch weight column.
- **Comments** – Document anything important about each category. Important information could include the composition of a mixed (less than 95% 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.

- **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.

IV. Collecting and Documenting Species Composition

Once the catch has been placed into catch categories, a species composition sample can be taken from all, a few, or only one of the catch categories (See Figure 4 – 16). Species composition samples can consist of every individual in the catch category or be a subsample of the individuals in the catch category. Subsamples must be:

1. Representative of the entire catch category.

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 Subsample

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 Subsample

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



TIP* Keep track of the number of baskets used in the species composition sample. It is necessary to record the actual or estimated number of baskets in the subsample in the ‘# of baskets’ column on the Species Composition Form.

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.

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

It's important to realize that not all baskets used to determine the catch category weight need to be used for species composition sample. For example, if Weight Method 1 – Actual Weight is used for catch category weight a subsample can be used for species composition. **Try to collect a minimum of 500lbs for species composition samples from catch categories that weigh over 500lbs.**

Average Number Calculations

On trawl and prawn pot vessels, all species on the Species Composition Form **MUST** have an actual weight. In some cases, however, Observers do not have to count every individual in a species composition sample. Estimate the number of individuals by using an average number calculation when:

- The catch category contains a species that is physically very small and the quantity of the species in the haul is high, i.e. 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, i.e. flatfish species.
- The species is with a **multiple species catch category**.



Tip* When doing an average number calculation, count and weigh as many individuals as possible. At minimum, 15 individuals should be weighed and counted. For species that are caught in large quantities, count and weigh at least 50 individuals.



$$\text{Total Sample \#} = \frac{\text{\# of Individuals Actually Weighed}}{\text{Weight of Subsample (lbs)}} \times \text{Total Sample Weight (lbs)}$$

Species Composition Form Instructions

The species composition information collected is recorded on the Species Composition Form (See Figure 4-15).

- **Haul Number** – Record the number of the haul that the sample came from.
- **Date** – Record the date as MM/DD/YY.
- **Trip Number** – Record the trip number generated by the database system.
- **Coast Guard Number** – Record the USCG vessel number on Limited Entry trawlers and fixed gear vessels (if they have one). If the vessel does not have a USCG number, leave this field blank.
- **Catch #** - Record the number that corresponds to the catch category on the Catch Form.
- **Sample Method** – Record the method used to sample the catch category.
 - 1 – Whole Haul
 - 2 – Single Basket
 - 3 – Multiple Baskets
- **# of Baskets** – ONLY For Sample Method 3 – Multiple Baskets, record the approximate or actual number of baskets the sample would fill.

- **Catch Category** – Record in capital letters the catch category sampled using the 4-Letter PacFin code.
- **KP Weight and KP Number** – Sum the total weight of all species in the catch category sample and place the total weight in the Key punch (KP) Weight box. Sum up the total number of all species in the catch category sample and place the total number in the Key punch (KP) Number box.
- **R or D** – Record whether the catch category sampled was **R** – Retained or **D** – Discarded.
- **Species** – Record the common name of the species in the sample. This column must be filled in with the species name. Do not only enter the species code! The common name listed on the paperwork must match the common name used in the database. See Appendices A, B, C and D for lists of species.
- **Species Code** – Record the species code of the corresponding species. This can be done prior to entering and not on deck. See Appendices A, B, C and D for lists of species and 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 calculated.
- **Reason for Discard** – Record the skipper's/crew's reason for discard for each discarded species.

1 - Prohibited – Only Salmon, Pacific Halibut, and Dungeness Crab

2 - Size – High-graded fish

3 - Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc.



TIP* Species which are unlikely to be retained, such as eelpouts, sculpins, and grenadiers are given a reason for discard of ‘3 - Market’.

4 - Regulation – Any regulatory reason including size, over quota, etc.

5 - Other – Document in comments actual reason for discard.



Tip* Invertebrates such as starfish, anemones, and sea pens are given a reason for discard of ‘5 - Other’

7 – Predation – Caught fish that are eaten by any predator including marine mammals, seabirds, or sand fleas

- **Basket Weight and Number** – Use this column on deck for species that require multiple basket weights to get a total weight. These columns are not required. Be sure to fill the “Sample Weight” column in with the total weight of the species in the sample only!

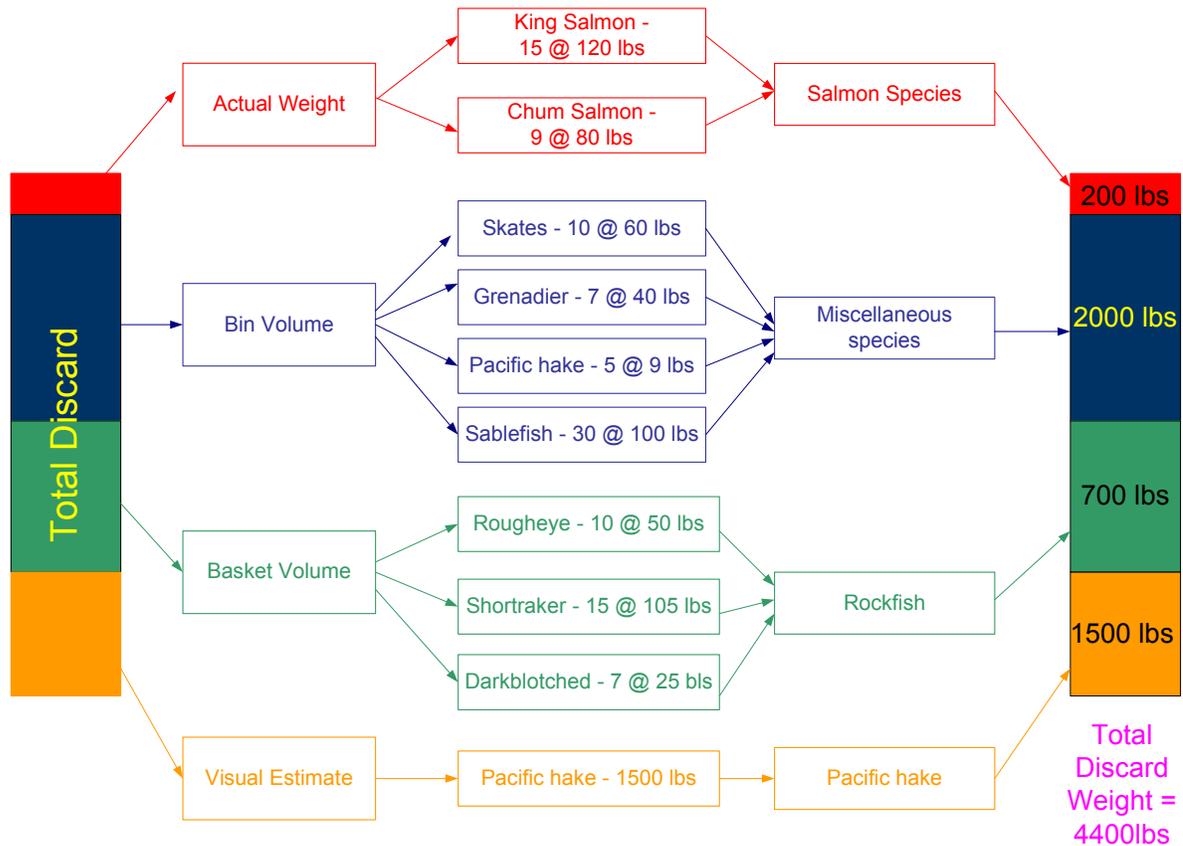


Figure 4- 16: Schematic of discard sampling on a trawl vessel

Unsamped Hauls

There may be times when Observers are unable to sample a haul due to illness, injury, or weather conditions. When Observers are unable to sample a haul, complete the following:

Trip Form

- Record location and catch 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.
- For discarded catch categories, place all species in one category, miscellaneous (ZMIS). Subtract the visual estimate of OTC from vessel estimate of retained species. Use Weight Method 5 – OTC – Retained to obtain an estimate on the discarded catch weight.
- Document the reason for discard as 5 - other.

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 4-17).

Trip Discard Form Instructions

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 Number** – Record the trip number generated by the database system.
- **Coast Guard Number** – Record the USCG vessel number on Limited Entry trawlers and fixed gear vessels (if they have one). If the vessel does not have a USCG number, leave this field blank.
- **Date** – Document the month and day that the trip discard took place

- **Time** – Document the time, in Pacific Standard Time, that the trip discard took place.
- **Species** – Document the species that was discarded.
- **Weight** – Document the weight, in pounds, of species discarded.
- **# of Fish** – Document the number of fish discarded.
- **Weight Method** - Document the weight method used to estimate the species weight.
 - 1 - Actual Weight
 - 2 - Bin/Trawl Alley Estimate
 - 3 - Basket Volume Determination
 - 4 - Visual Estimate
 - 5 - OTC-Retained
 - 6 – Other
 - 7 - Vessel Estimate
 - 8 - Extrapolation
- **Discard Reason** - Record the skippers/crews reason of discard for each species.
 - 1 - Prohibited – Only Salmon, Pacific Halibut, and Dungeness Crab
 - 2 - Size – High-graded fish

- 3 - Market – Any market driven reason such as size (too big or small), no market, market price is too low, etc
 - 4 - Regulation – Any regulatory reason including size, over quota, etc.
 - 5 - Other – Document in comments actual reason for discard
 - 7 – Predation – Caught fish that are eaten by any predator including marine mammals, seabirds, or sand fleas
- **Comments** – Document any additional information that is important.

V. Examples

Groundfish Trawl Trip Example

Macy Fields was aboard a limited entry trawler called F/V Allegiance (USCG # 769243), a 63 foot dragger. The vessel was using a net with a footrope less than 8 inches in diameter. The trip she was on (# 27 in the database) had two hauls. The vessel completed the following logbook page:

Vessel Name Allegiance Departure: Date 04/14/02 Time 1930 Port Westport
 Federal Document No. 769243 Return: Date 04/16/02 Time 1535 Port Westport
 Crew Size (including Captain) 3 Buyer(s) Bornstein

DATE mo/day	Tide local 24-hour clock	LATITUDE		LONGITUDE		Ave. depth of catch (ft/oms)	NET TYPE	Target Strategy	Estimated pounds retained each tow - enter 4-letter code from species code list provided							
		Degrees	minutes	Degrees	minutes				SABL	DOVR	LEPN	SSPN				
4/15	set	1300	47 58.7	125	47.3	75	B	DTS	300	4,000	500	100				
	up	1730	48 02.6	125	45.5											
4/16	set	0800	47 20.3	125	28.3	89	B	DTS	100	5,000	800	150				
	up	1400	47 46.4	125	34.4											
	set															
	up															
	set															
	up															
	set															
	up															
	set															
	up															
	set															
	up															
	set															
	up	05459														

REMARKS: 65459

Signed: John Doe

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

Haul 1:

As the codend came aboard, she visually estimated it at 5300 lbs. The crew pulled the zipper and dumped the codend into a rectangular trawl alley. She had premeasured the deck and found the length to be 2.6 meters and the width to be 1.4 meters. The catch varied in height throughout the trawl alley so Macy took three measurements, .7 meters, .9 meters, and .6 meters. Before the crew began to sort, Macy took two representative density baskets, filling each basket to the top of the holes. They weighed 64.92 lbs and 67.04 lbs.

The crew then began to presort Pacific halibut. She asked the crew to give her all Pacific halibut that were caught. She pulled out a tape measurer and took lengths of all the Pacific halibut, 65cm, 43cm, 62cm, 73cm, 91cm, 61cm, 74cm, 71cm, 56cm, 59cm, 25cm, 123cm, and 59cm.

Macy decided to use vessel estimates for retained catch categories. She whole hauled for discarded lingcod and rockfish. For the remaining discard, she did a Basket Weight Determination. She visually estimated that it would take 18 baskets to hold the entire discard and decided to take 6 baskets for average weights and species composition. The discard filled a total of 19 full baskets and one partial basket that weighed 27.62 lbs. She weighed the six randomly selected baskets, 56.92lbs, 54.07lbs, 39.64lbs, 45.71lbs, 59.36lbs, and 42.44lbs.

The species composition of the rockfish and lingcod was:

Darkblotched RF – 25 @ 76.42lbs

Greenstriped RF – 3 @ 8.61lbs

Canary RF – 1 @ 4.73lbs

Splitnose RF – 21 @ 7.10lbs

Lingcod – 4 @ 15.62lbs

The composition of the 6 baskets of discard she had collected was:

English sole – 2 @ 4.46lbs

Spiny dogfish shark – 8 @ 73.82lbs

Squid – 4 @ 9.15

Sablefish – 41 @ 92.93lbs

Arrowtooth flounder – 6 @ 12.04lbs

Skates – 16 @ 90.13lbs

Spotted Ratfish – 8 @ 8.99lbs

Jellyfish – 1 @ 4.60lbs

The skipper told Macy that the rockfish and lingcod were discarded due to regulations. The English sole, spiny dogfish shark, arrowtooth flounder, skates, squid, and ratfish were discarded because there was no market for them. All the sablefish were too small to be marketable.

Haul 2:

Macy visually estimated it to be 8000 lbs. The crew unzipped the codend and dumped it into the trawl alley. She knew the length and width had not changed so she just took two height measurements, 1.2 meters and 1.5 meters. She randomly took two density baskets that weighed 56.94 lbs and 51.06 lbs. She had filled the baskets to the top of the holes again.

The catch was large and diverse in species. She again used vessel estimates for retained catch categories. The crew was sorting the discard right through a scupper because there was too much of it to retain on deck. Macy estimated that it would take 2 hours for the crew to sort through the

entire catch. She employed a random temporal frame for species composition and catch category weight. It ended up taking her 13 minutes and 20 seconds to take eight baskets of discard. She weighed the baskets, 56.23 lbs, 47.82 lbs, 45.92 lbs, 46.97 lbs, 51.26 lbs, 48.72 lbs, 50.41 lbs, and 55.23 lbs. The species composition of the eight baskets was:

Sablefish – 1 @ .46lbs
 Skates – 62 @ 186.64lbs
 Spotted Ratfish – 28 @ 35.35lbs
 Sculpins – 5 @ .70lbs
 Spiny dogfish shark – 3 @ 4.53 lbs
 Arrowtooth flounder – 42 @ 33.06lbs
 Rex sole – 42 @ 13.68lbs
 English sole – 35 @ 15.37lbs
 Dover sole – 64 @ 36.49lbs
 Flathead sole – 123 @ 40.01lbs
 Pacific sanddab – 13 @ 5.49lbs
 Slender sole – 43 @ 9.46lbs
 Dungeness crab – 1 @ 2.40lbs
 Darkblotched RF – 65 @ 15.17lbs
 Sunstars – 35 @ 2.86lbs
 Greenstriped RF – 13 @ 1.43lbs
 Anemone – 3 @ 1.41lbs

The total sort time of the haul was 2 hours and 11 minutes.

The skipper told her the sablefish, skates, and all the flatfish were discarded because they were too small. The ratfish, spiny dogfish shark, and greenstriped RF were discarded because there was no market. The darkblotched was discarded due to regulations.

She then completed the Trip form. The gear performed without any problems during both hauls. (She received the fish ticket from the skipper after returning. The fish ticket number was X943691):

LE OA EFP

TRIP FORM - HAUL LOCATIONS

Page 1 of 1

USCG # 7 6 9 2 4 3

Observer name Macy Fields Year 2002

Trip Number 2 7

Vessel Name Allegiance

Logbook # 65459

Skipper First Name John

Skipper Last Name Doe

State Registration # (OA only)

Departure Date/Time 04/14/02 1930

Departure Port Westport, WA

Landing Date/Time 04/16/02 1535

Landing Port Westport, WA

Fish Tickets State Agency Code W

X 9 4 3 6 9 1

Trip Notes:

Haul/ Set #		DATE		TIME (24-hour clock)	LATITUDE		LONGITUDE		Depth of catch (fathoms)	Gear Type	Target Strategy
		Month	Day		Degrees	Minutes	Degrees	Minutes			
1	Start ¹	04	15	1300	47	58 . 7	125	47 . 3	75	1	DTS
	End ²	04	15	1730	48	02 . 6	125	45 . 5	75		
2	Start ¹	04	16	0800	47	20 . 3	125	28 . 3	89	1	DTS
	End ²	04	16	1400	47	46 . 4	125	34 . 4	89		
	Start ¹					.		.			
	End ²					.		.			
	Start ¹					.		.			
	End ²					.		.			
	Start ¹					.		.			
	End ²					.		.			
	Start ¹					.		.			
	End ²					.		.			
	Start ¹					.		.			
	End ²					.		.			
	Start ¹					.		.			
	End ²					.		.			
	Start ¹					.		.			
	End ²					.		.			

Start¹ - Time the brake is set End² - Time the brake is set

CHAPTER 4

TRIP FORM - HAULS

Weight UM: LBS

Volume UM: M³

Density UM: LBS/M³

Haul/ Set #	Observer Total Catch Estimate	Volume of Codend or Trawl Alley/Bin	Density	Weight Method	Total Hooks/ Pots	Gear Perf	Beaufort	Comments
1	5503.83	2.67	2061.88	2		1		
2	8292.38	4.91	1687.50	2		1		
Key- punch Check	13796.21							

Trip Form v. 2 January 2004

CHAPTER 4

Official Total Catch Calculations

Method: 2 - Bin Volume

Visual Estimate = 5300 lbs

Measurements:

$$L = 2.6\text{m}$$

$$W = 1.4\text{m}$$

$$h = .7\text{m}, .9\text{m}, .6\text{m}$$

$$h_{\text{avg}} = \frac{.7\text{m} + .9\text{m} + .6\text{m}}{3}$$

$$h_{\text{avg}} = .733333333\text{m}^3$$

Density Samples:

$$64.92\text{lbs}$$

$$+67.04\text{lbs}$$

$$131.96\text{lbs}$$

$$\underline{131.96\text{lbs}} = 65.98\text{lbs}$$

2 baskets

$$\text{Density} = \frac{\text{Weight (lbs)}}{\text{Volume (m}^3\text{)}} =$$

$$\text{Density} = \frac{65.98\text{lbs}}{0.032\text{ m}^3} = \frac{2061.875\text{lbs}}{\text{m}^3}$$

Formula:

$$\text{Volume} = \text{Length} \times \text{Width} \times \text{Height} = 2.6\text{m} \times 1.4\text{m} \times .733333333\text{m} = 2.669333331\text{m}^3$$

Additional Calculations:

$$\text{OTC} = \text{Volume} \times \text{Density} = 2.669333331\text{m}^3 \times \frac{2061.875\text{lbs}}{\text{m}^3}$$

$$\text{OTC} = 5503.831661\text{ lbs}$$

Haul # 0 1

SPECIES COMPOSITION FORM

Page 2 of 2

Date 0 4 1 5 0 2

Trip Number 2 7

USCG # 2 6 9 2 4 3

Catch #	Catch Category	Sample Method	Basket #	KP Weight	R or D	Species	Species Code	Sample Weight	Fish #	Discard Reason	Basket Weight	#	Basket Weight	#
				KP Number										
1	ZMIS	1		112.48	D	Darkblothched Rf	311	76.42	25	4				
				54		Greenstriped RF	313	8.61	3	4				
						Canary RF	314	4.73	1	4				
						Splitnose RF	315	7.10	21	4				
						Lingcod	603	15.62	4	4				
2	ZMIS	3	6	296.12	D	English sole	108	4.46	2	3				
				86		Spiny Dogfish	66	73.82	8	3				
						Squid	50	9.15	4	5				
						Sablefish	203	92.93	41	3				
						Arrowtooth Flounder	141	12.04	6	3				
						Skates	90	90.13	16	3				
						Spotted Ratfish	99	8.99	8	3				
						Jellyfish	35	4.60	1	5				

Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample
Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation

Species Composition Form v.3
January 2004

Species Composition Measurements and Calculations

R or D	Catch Category	Density Samples	Measurements, Formulas, and Calculations	Total Weight														
D	ZMIS 2	<p>Average Weight Baskets =</p> <table style="margin-left: 20px;"> <tr> <td>56.92 lbs</td> <td>54.07 lbs</td> </tr> <tr> <td>39.64 lbs</td> <td>45.71 lbs</td> </tr> <tr> <td>59.36 lbs</td> <td>42.44 lbs</td> </tr> </table> <p>= 298.14 lbs</p>	56.92 lbs	54.07 lbs	39.64 lbs	45.71 lbs	59.36 lbs	42.44 lbs	<p>BWD = Avg basket weight X # of baskets Avg Basket Weight = $\frac{298.14 \text{ lbs}}{6 \text{ baskets}} = 49.69 \text{ lbs}$ BWD = (49.69 lbs X 19 baskets) + 27.62 lbs =</p> <p>ZMIS 2 Weight = 971.73 lbs</p>	971.73 lbs								
56.92 lbs	54.07 lbs																	
39.64 lbs	45.71 lbs																	
59.36 lbs	42.44 lbs																	
D	PHLB		<table style="width: 100%;"> <tr> <td>65 - 6.90 lbs</td> <td>74 - 10.49 lbs</td> </tr> <tr> <td>43 - 1.81 lbs</td> <td>71 - 9.19 lbs</td> </tr> <tr> <td>62 - 5.93 lbs</td> <td>56 - 4.25 lbs</td> </tr> <tr> <td>73 - 10.05 lbs</td> <td>59 - 5.05 lbs</td> </tr> <tr> <td>91 - 20.53 lbs</td> <td>25 - .31 lbs</td> </tr> <tr> <td>61 - 5.62 lbs</td> <td>123 - 54.48 lbs</td> </tr> <tr> <td>59 - 5.05 lbs</td> <td></td> </tr> </table>	65 - 6.90 lbs	74 - 10.49 lbs	43 - 1.81 lbs	71 - 9.19 lbs	62 - 5.93 lbs	56 - 4.25 lbs	73 - 10.05 lbs	59 - 5.05 lbs	91 - 20.53 lbs	25 - .31 lbs	61 - 5.62 lbs	123 - 54.48 lbs	59 - 5.05 lbs		13 @ 139.66 lbs
65 - 6.90 lbs	74 - 10.49 lbs																	
43 - 1.81 lbs	71 - 9.19 lbs																	
62 - 5.93 lbs	56 - 4.25 lbs																	
73 - 10.05 lbs	59 - 5.05 lbs																	
91 - 20.53 lbs	25 - .31 lbs																	
61 - 5.62 lbs	123 - 54.48 lbs																	
59 - 5.05 lbs																		

Official Total Catch Calculations

Method: Bin Volume

Visual Estimate = 8000 lbs

Measurements:

L = 2.6m

W = 1.4m

h = 1.2m, 1.5m

$$h_{avg} = \frac{1.2m + 1.5m}{2}$$

$h_{avg} = 1.35m^3$

Density Samples:

56.94lbs

+51.06lbs

108.00lbs

108.00lbs = 54.00lbs

2 baskets

Density = $\frac{\text{Weight (lbs)}}{\text{Volume (m}^3\text{)}} =$

Density = $\frac{54.00\text{lbs}}{0.032 \text{ m}^3} = \frac{1687.50\text{lbs}}{\text{m}^3}$

Formula:

Volume = Length X Width X Height = 2.6m X 1.4m X 1.35m = 4.914m³

Additional Calculations:

OTC = Volume X Density = 4.914m³ X $\frac{1687.50\text{lbs}}{\text{m}^3}$

OTC = 8292.375 lbs

Haul # 0 2

SPECIES COMPOSITION FORM

Page 2 of 2

Date 0 4 1 5 0 2

Trip Number 2 7

USCG # 7 6 9 2 4 3

Catch #	Catch Category	Sample Method	Basket #	KP Weight	R or D	Species	Species Code	Sample Weight	Fish #	Discard Reason	Basket Weight	#	Basket Weight	#
				KP Number										
1	ZMIS	3	8	404.51	D	Sablefish	203	.46	1	2				
				578		Skates	90	186.64	62	2				
						Spotted ratfish	99	35.35	28	3				
						Sculpins	400	.70	5	3				
						Spiny Dogfish	66	4.53	3	3				
						Arrowtooth Flounder	141	33.06	42	2				
						Rex Sole	105	13.68	42	2				
						English sole	108	15.37	35	2				
						Dover sole	107	36.49	64	2				
						Flathead sole	103	40.01	123	2				
						Pacific sanddab	137	5.49	13	2				
						Slender sole	111	9.46	43	2				
						Dungeness Crab	12	2.40	1	1				
						Darkblotched RF	311	15.17	65	4				
						Sunstars	24	2.86	35	5				
						Greenstriped RF	313	1.43	13	3				
						Anemone	55	1.41	3	5				

Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample
 Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation

Species Composition Form v.3
 January 2004

Species Composition Measurements and Calculations

R or D	Catch Category	Density Samples	Measurements, Formulas, and Calculations	Total Weight								
D	ZMIS 1	<p style="text-align: center;">Basket Weights</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">56.23 lbs</td> <td style="width: 50%;">47.82 lbs</td> </tr> <tr> <td>45.92 lbs</td> <td>46.97 lbs</td> </tr> <tr> <td>51.26 lbs</td> <td>48.72 lbs</td> </tr> <tr> <td>50.41 lbs</td> <td>55.23 lbs</td> </tr> </table> <p style="text-align: center;">= 402.56 lbs</p>	56.23 lbs	47.82 lbs	45.92 lbs	46.97 lbs	51.26 lbs	48.72 lbs	50.41 lbs	55.23 lbs	<p style="text-align: center;">Temporal Estimate</p> <p>Total sample time = 13 min, 20 sec Total sort time = 2 hr, 11 min Total sample weight = 402.56 lbs</p> <p style="text-align: center;">Sample Time = $(13 \text{ min} \times \frac{60 \text{ sec}}{1 \text{ min}}) + 20 \text{ sec} = 800 \text{ sec}$</p> <p style="text-align: center;">Total Sort Time = $(2 \text{ hr} \times \frac{60 \text{ min}}{1 \text{ hr}} \times \frac{60 \text{ sec}}{1 \text{ min}}) + 11 \text{ min} = 7211 \text{ sec}$</p>	
56.23 lbs	47.82 lbs											
45.92 lbs	46.97 lbs											
51.26 lbs	48.72 lbs											
50.41 lbs	55.23 lbs											
			<p style="text-align: center;">ZMIS 1 = $\frac{\text{Sample Wt} \times \text{Sort Time}}{\text{Sample Time}}$</p> <p style="text-align: center;">ZMIS 1 Weight = $402.56 \text{ lbs} \times \frac{7211 \text{ sec}}{800 \text{ sec}} = 3628.5752 \text{ lbs}$</p>	3628.58 lbs								

Prawn Pot Trip Example

Lance Jones was aboard the Pit Stop (CF4976EF), an open access shrimper. The skipper was Pete Lamprey. Lance recorded the following departure information:

Depart date/time: 07/01/02 0600 from Eureka

Lance recorded the following location information on the back of the Catch Form:

Haul Start: 0915 Position: 43 49.06 126 15.26
Haul End: 1036 Position 43 49.01 126 15.28

The set had 15 pots.

Lance whole hauled for discard. He found:

<u>Species</u>	<u>#</u>	<u>Weight</u>
Starfish:	30	17.38
Snailfish	5	.31
Hermit Crab	414	6.89
Inverts, Unid	1	29.35
Octopus, Unid	4	1.14
Coonstripe shrimp	230	2.35
Pacific Cod	2	.24
Hagfish	3	1.20
Sculpin	1	.10
Poacher	2	.04
Dungeness Crab	3	.17
Greenling, Unid	1	.25
Lingcod	2	.24

Vessel estimate of retained shrimp = 30.00lbs (asked skipper)

Reasons for Discard (asked skipper)

Coonstripe shrimp, and P.cod was because they were too small (high-grading)

Lingcod because it was too small according to regulations

Everything else because there was no market

The vessel returned on 07/01 at 1600 to Eureka. The fish ticket number for the trip was V477562.

CHAPTER 4

Haul #

TRAWL/PRAWN CATCH FORM*

Page 1 of 2

Date

Trip Number

USCG #

Catch #	R or D	Catch Category	Catch Weight	Volume	Density	#'s of Fish 1. Req. for wt. methods 8,9 2. Req. if actual # for wt. methods 4,6	Weight Method	Catch Purity	Discard Reason	Vessel Estimate	Comments
1	R	SRMP	30.00				7	P			
2	D	ZMIS	59.66				1	M			
Keypunch Check			89.66								

*Gear Types 1, 2, 3, 4, 5, 11, 12, 13, 14, 18

January 2004
Trawl/Prawn Catch Form v. 4

Official Total Catch Calculations

Method: 11- Retained + Discarded Visual Estimate = 100 lbs

Measurements:

Density Samples:

$$\text{OTC} = 30.00 \text{ lbs} + 59.66 \text{ lbs} = 89.66 \text{ lbs}$$

Haul start: 0915 Position: 40 49.06 124 15.26

Haul end: 1036 Position: 40 49.01 124 15.28

of Pots:

/// /// ///

Formula:

Additional
Calculations:

Haul #

0	1
---	---

SPECIES COMPOSITION FORM

Date

0	7	0	1	0	2
---	---	---	---	---	---

Trip Number

1	3
---	---

USCG #

--	--	--	--	--	--	--	--

Catch #	Catch Category	Sample Method	Basket #	KP Weight	R or D	Species	Species Code	Sample Weight	Fish #	Discard Reason	Basket Weight	#	Basket Weight	#
				KP Number										
2	ZMIS	1		59.66	D	Starfish	20	17.38	30	5				
				698										
						Snailfish	500	.31	5	3				
						Hermit Crab	15	6.89	414	5				
						Inverts, Unid	13	29.35	1	5				
						Octopus, Unid	60	1.14	4	3				
						Coonstripe Shrimp	71	2.35	230	2				
						P. Cod	202	.24	2	2				
						Hagfish	77	1.20	3	3				
						Sculpin	400	.10	1	3				
						Poacher	450	.04	2	3				
						Dungeness Crab	12	.17	3	3				
						Greenling, Unid	390	.25	1	3				
						Lingcod	603	.24	2	4				

Method : 1-Whole haul species 2-Single basket 3-Multiple basket 4-Fixed Gear Sample
 Reason for discard: 1-Prohibited 2-Size 3-Market 4-Regulation 5-Other 6-Drop-off 7 - Predation