

STOMACH COLLECTION

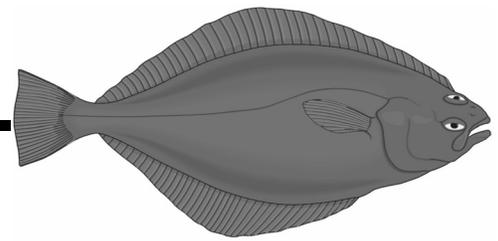


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INTRODUCTION

Stomach collections provide data on predation mortality of commercial stocks of fish and crab, and are used to estimate the degree of this mortality. Stomach data enhances our understanding of spatial, seasonal, and inter-annual patterns in the marine foodweb.

Your comments and suggestions about this duty are important to the Food Habits Lab. Complete the questionnaire at the end of this chapter to assist you in providing comments to the Food Habits Lab.

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Who Collects Stomachs?

Stomach collections are assigned in the BSAI to specific catcher processor vessels. Stomach collections are primarily assigned to vessels that have historically provided an adequate sampling platform.

- Please read all instructions carefully.

- Data for the stomach collections are recorded on the standard Length and Specimen Form, and the data are entered into ATLAS.
- Stop by the Food Habits Lab if you have questions prior to your deployment.

MATERIALS FOR STOMACH COLLECTIONS

- Two 5-gallon buckets containing 10% formalin
- One 5-gallon bucket containing collection materials and supplies
- 5 bucket lids (3 cut and 2 uncut)
- 2 large plastic bags
- Assorted sizes of specimen bags
- 2 bucket labels
- 2 chemical properties stickers
- 200 Stomach Collection Labels
- Eye saline wash
- Safety goggles
- Face shield
- Notice to Observer Handout
- Standard Operating Procedures (SOP): Formalin Handout
- MSDS for 10% formalin



Figure 17-1: Stomach Collection Sample Kit and 2 Buckets of Formalin

Formalin Handling Protocol for Observers

- Formalin is a hazardous chemical and must be handled appropriately to ensure your safety. Stomach collections require only a small quantity of formalin and if the formalin protocol is followed exposure to yourself and others will be well below established safe exposure levels.
- Read the SDS before using formalin to understand its properties. You can find “Safety Data Sheet for 10% Formalin” on page A-72.
- **ALWAYS** wear gloves and rain gear when handling formalin. It is recommended that you wear a different pair of gloves when handling formalin than you do in the factory. This will prevent contamination when working in the factory.
- **ALWAYS** wear both the goggles and face shield provided in the kit when handling formalin.
- **ALWAYS** use formalin on an open deck. **Do not use it in the factory, below deck or in your cabin.**
- Inform captain and crew that you have formalin onboard, where it is stored, location of SDS, potential hazards, and what to do in case of a spill.

- If the formalin is spilled, the quantity you have is small enough that you may dilute it with water and wash it overboard.
- Use extreme caution when opening the bucket containing 10% formalin. To prevent formalin from splashing on you, use the bucket lid as a shield over the bucket opening when adding specimens to the bucket.
- Be cautious when initially opening the formalin bucket. Until several stomachs have been added to the bucket the formalin is more likely to move and splash as the vessel moves. ***Never open the formalin bucket in the factory, below deck or in your cabin.***
- If formalin comes into contact with your skin or eyes, rinse skin immediately and thoroughly with water for 15 minutes as per the SDS. Rinse your eyes with saline provided in kit, then use onboard eye wash (if available) or water as needed to flush eyes for 15 minutes as per the SDS.
- If the formalin is ingested, DO NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Seek medical attention as soon as possible as per the SDS.
- If you are overcome by fumes, move into fresh air. Administer oxygen if necessary and available, as per the SDS.
- If the vessel or plant personnel have concerns about the use of formalin direct them to call NMFS; see “Contact Addresses and Numbers” on page A-53.

Where to Keep Formalin Onboard

Formalin should be stored in a well ventilated space designated by vessel personnel. 10% formalin is not a flammable liquid but it should be stored in an appropriate flammable storage locker with other flammable materials, or in a well ventilated area on a weather deck. The solution will not freeze.

Store your formalin buckets securely tied to an immobile object. Use the *cut* lid when stored. ***Leave the bucket in place and carry specimens to the bucket.*** This will avoid the potential of spilling formalin in the factory and will keep the formalin away from fish processing operations.

Do not submerge your gloves in the formalin when you add specimens to the bucket. If the specimens float, use a pair of forceps or some other tool to submerge the specimens. Rinse the tool with water after formalin contact.

Anytime formalin gets spilled and/or inadvertently comes into contact with any object other than your specimens, flush the object or area with plenty of water.

COLLECTION PROCEDURES

Determining Sex and Spawning Condition

To determine sex and spawning condition in flatfish and gadids, give the abdomen a light squeeze. The extrusion of milt (male) or eggs (female) indicates a fish in spawning condition. If no milt or eggs are released the fish is considered to be in a pre-spawn condition.

Stomach Collection Procedure

1. Prior to the first haul from which you plan to collect stomachs, designate which 10% formalin bucket will be used first. Remove the cut lid to verify the contents of the bucket and to make sure the lid can be removed and replaced with ease.
2. Seal with the cut lid. Add specimens to this bucket as you collect them, one stomach per bag.
3. Collect stomach specimens according to the length of fish (see “Selecting Fish for Your Specimens” on page 17-4).
4. Use the tally sheet (Figure 17-3 on page 17-7) to keep track of the length categories that you need to fill.

Fish must be collected from hauls sampled for species composition.

Collect fish that do not show signs of net feeding or regurgitation. These signs include prey items (fresh or digested) in mouth or gill rakers or flaccid (loose and bloated) stomachs. ***Do not keep these!***



5. Signs of “natural” stomachs include stomachs that are constricted tightly around the prey inside and naturally empty stomachs, which appear tight and

STOMACH COLLECTION: Collection Procedures

contracted. **Keep these!** Determine the weight, sex, fork length, and spawning condition of each fish and collect the stomach without losing any consumed prey.

Record the raw data on your Deck Form (see Figure 17-6 on page 17-10 and Figure 17-7 on page 17-11). Record on the Deck Form which sample the stomach came from and assign it a specimen number.



If a fish is discarded due to regurgitation, take the next fish in the basket. If the subsequent fish has food in its stomach, go ahead and collect the specimen. If the subsequent fish has an empty stomach (naturally empty or regurgitated) discard it and go on to the next fish until a non-empty stomach is encountered. This special note applies only to the fish selected immediately after a regurgitation discard, because we don't want you to replace a regurgitated stomach with an empty stomach. A naturally empty stomach is a valid collection when not collected immediately following a regurgitated stomach.

6. Record all information on a Stomach Collection Label (Figure 17-3 on page 17-7) as described in “Labels and Records” on page 17-5. Place each stomach in an individual cloth bag of the appropriate size and include the Stomach Collection Label. Please close the bag tightly shut with the drawstrings and secure it with a single overhand knot. **Do not double knot the drawstrings!** Place the bag into the bucket.

7. Enter stomach collection data on the Length and Specimen Form in ATLAS.

Stop collecting when you have collected 80 stomachs or the bucket is full when loosely packed. When the collection is complete seal the bucket with the uncut lid.

Selecting Fish for Your Specimens

Stomach specimens should only be collected from fish which were randomly selected for your sex/length samples. Once you have your randomly selected sex/length fish, you should collect stomachs based on the defined size strata. The exception to this is BSAI arrowtooth flounder stomach collections. Because arrowtooth lengths are not collected in the Bering Sea, arrowtooth stomachs will be collected from any arrowtooth within your species composition samples. Although arrowtooth stomach specimens will come from your composition sample, all arrowtooth lengths

associated with a stomach collection in the BSAI must be listed at the haul level. Always use code 4 - “size selected.” **Other than arrowtooth flounder, at no time should you collect fish from outside of your sex/lengths sample for stomach collections.** In addition, do not collect stomach specimens from fish that are also used for otolith collections.

Stratify the stomach collection by size of fish. No more than 5 stomach specimens should be collected per sampled haul. It is acceptable to collect from multiple hauls each day.

Figure 17-3 on page 17-7 shows a tally sheet with species lengths and the number of specimens per size category and haul. There are four length categories. Refer to the following chart to determine the size category breakdown for the species from which you are collecting specimens. Fill in the blanks on your tally sheet according to the appropriate size category.

Collect 5 stomach specimens per haul. The 5 stomachs collected should come from a single size category. The stomach collection should involve 16 hauls total; 4 different hauls per each of the 4 size categories with 5 stomachs collected per haul until the desired numbers are collected. Depending on the catch composition, it may take several weeks to fill all of the size categories.

You may have difficulty finding specimens for a particular size strata (especially if your vessel targets large fish). If this happens, take more from the size categories you are finding (but no more than 5 per haul) or wait a few hauls if you think your vessel may catch a different size group. It is acceptable to take fewer than 5 stomach specimens for these hard to find size categories (*e.g.*, smaller cod). The total number of specimens requested is a maximum. If your bucket is full when loosely packed before you have reached 80 specimens, **stop collecting**. The number which will fit in a bucket will depend on the size and fullness of the stomachs collected.

Pacific cod and arrowtooth flounder:

- | | |
|-------------|-------------|
| 1) <31 cm | 3) 51-70 cm |
| 2) 31-50 cm | 4) >70 cm |

Walleye pollock:

- | | |
|-------------|-------------|
| 1) <30 cm | 3) 40-50 cm |
| 2) 30-39 cm | 4) >50 cm |

Method of Collecting Stomachs from Gadids

1. To examine a stomach for regurgitation, first examine the mouth and gill rakers. If there is no sign of regurgitation, keep the fish and continue with the collection process. If there are signs of regurgitation select a different fish.
2. Cut through the skin of the fish as shown in Figure 17-4. **Be careful not to cut into the stomach.** Open the body cavity at the incision and examine the stomach for any damage. Color plates of Figure 17-4 are in your Species Identification Guide.
3. Excise the stomach by cutting just anterior to the pyloric caeca and posterior to the gill chamber. Include all of the esophagus. Place the stomach in a specimen bag with a Stomach Collection Label and preserve it.

Method of Collecting Stomachs from Flatfish

1. To examine a stomach for regurgitation, first examine the mouth and gill rakers. If there is no sign of regurgitation, keep the fish and continue with the collection process. If there are signs of regurgitation select a different fish. **Be aware that arrowtooth are prone to regurgitation.**
2. Cut through the skin of the blind side of the fish as shown in Figure 17-5. **Be careful not to cut through the stomach.** Color plates of figure 17-4 are in your Species Identification Guide. Lift flap and examine body cavity for any damage; if there is no sign of damage, keep the fish and continue with the collection process.
3. If the fish is less than 20 cm in length, remove the entire head along with the digestive tract attached and put it in a sample bag with a Stomach Collection Label and preserve it. If the fish is less than 10 cm in length place the entire fish in the sample bag.
4. If the fish is 20 cm or larger, remove only the stomach. Place the stomach into a stomach bag with a Stomach Collection Label and preserve it.

LABELS AND RECORDS

- Always use a pencil.
- Fill out a Tally Sheet for your species (see Figure 17-3).

- Raw data must be recorded on the Deck Form. Include specimen number and whether the fish was from sex/lengths or from inside your sample. See Figure 17-6 and Figure 17-7.
- Fill out a Stomach Collection Label for each sample and place it in the bag with the stomach (see Figure 17-2).
- Enter these data into Length and Specimen data in ATLAS.

Length and Specimen Form Stomach Collection Instructions

Record the stomach collection data on the Length and Specimen Form in ATLAS. See “Completing the Length and Specimen Form” on page 13-16 for instructions regarding sex/length entries, specimen entries and specimen number protocols.

Length and Specimen Form instructions specific to the stomach collection are listed below.

- **Sample design:**
 - Cod and pollock stomach collections will come from within your sex/length sample and will have the same design code as the sex/length fish from which they were selected.
 - Arrowtooth collections in the Bering Sea will be the only time you will use design code 4 - size selected. All arrowtooth stomachs will be recorded at the haul level. See “Completing the Length and Specimen Form” on page 13-16 for a more detailed description of sample designs.
- **Specimen Number:** The specimen number for the stomach collection and the associated specimen types (maturity scan and sex/length/weight) must be the same. Follow specimen numbering protocol described at “Specimen Number” on page 13 - 18.
- **Specimen Type:** Each stomach specimen and the associated specimen types must be recorded on three separate lines on the Length and Specimen Form.
 - 3 - Sex/Length/Weight
 - 7 - Maturity Scan (leave the weight field blank for this specimen)

STOMACH COLLECTION: Debriefing Questionnaire

9 - Stomach Specimen (leave the weight field blank for this specimen)

- **Maturity Scan code** for specimen code 7 only:

3 - Pre-Spawn

4 - Spawning

Note: these are the only Maturity Scan codes used with stomach collection data!

Stomach Collection Label

Record the following where indicated (Figure 17-2).

- Vessel permit number
- Cruise number
- Haul number and sample number (if from a sample)
- Specimen number
- Length
- Sex (Male, Female, or Unknown)
- Maturity (Spawning or Non-Spawning)
- Species name
- Collector's initials

When Your Sea Time Is Finished

Label the uncut lid by filling out the label provided with your name, vessel name, species collected, year and fixing the label to the bucket. Seal the bucket with the uncut lid.

When you have completed the stomach project, inform your inseason adviser of your estimated arrival in Dutch Harbor. Your inseason adviser will provide you with specific instructions on what to do with the stomach buckets.

If you cannot contact your inseason adviser, contact field office staff upon arrival in Dutch Harbor for stomach bucket removal instructions. If field office staff are not available the stomach buckets must stay on the vessel until the next offload. Do not attempt to remove stomach buckets from the vessel unless specifically instructed to do so by your inseason adviser or field office staff!

If you are the Lead observer disembarking the vessel and the stomach project has not ended do not contact your inseason adviser for stomach bucket removal instructions. The next Lead observer embarking the vessel will complete the stomach project.

If the vessel is done fishing and you are the last observer onboard, contact your inseason adviser for stomach bucket removal instructions.

Complete the debriefing questionnaire.

STOMACH COLLECTION LABEL	
National Marine Fisheries Service, Trophic Interactions Lab. 7600 Sand Point Way NE, Seattle, WA 98115-0070	
VESSEL	<u>4321</u> CRUISE <u>146991</u> HAUL <u>16</u>
SPECIMEN NUMBER	<u>91</u>
LENGTH (CM)	<u>49</u> SEX: M <input type="radio"/> F <input checked="" type="radio"/> U MATURITY: SP <input checked="" type="radio"/> NSP
SPECIES IDENTIFICATION	<u>Arrowtooth</u>
COMMENTS	<u>Flounder</u>
COLLECTOR'S INITIALS	<u>S.B.</u> PRESERVATIVE _____
★GPO2004 690-454	

Figure 17-2: Stomach Collection Label

DEBRIEFING QUESTIONNAIRE

During debriefing, please give your debriefer your debriefing questionnaire (your answers may be recorded in your daily notes and then photocopied).

Your Name:

Vessel Name:

1. Did you have any problems in carrying out the stomach collection (lack of sufficient equipment, lack of time, etc.)?
2. How long did it take you to collect your specimens from one haul?
3. Was it difficult to collect the expected number of specimens from different size groups?
4. Do you have any suggestions that would improve the sampling procedure?

5. Do you have any suggestions that would make it easier for you to successfully complete this duty?

6. Where were the buckets and formalin stored onboard? Did you have difficulty locating them?

Stomach Collection Tally Sheet

Species Name: _____

<u>Size 1:</u> _____ <u>CM</u>	5	20	5	5
<u>Size 2:</u> _____ <u>CM</u>	5	20	5	5
<u>Size 3:</u> _____ <u>CM</u>	5	20	5	5
<u>Size 4:</u> _____ <u>CM</u>	5	20	5	5
Total:		80		

Reminder: Try to collect one block of 5 stomach specimens at each haul that is sampled for stomachs.

Figure 17-3: Stomach Collection Tally Sheet

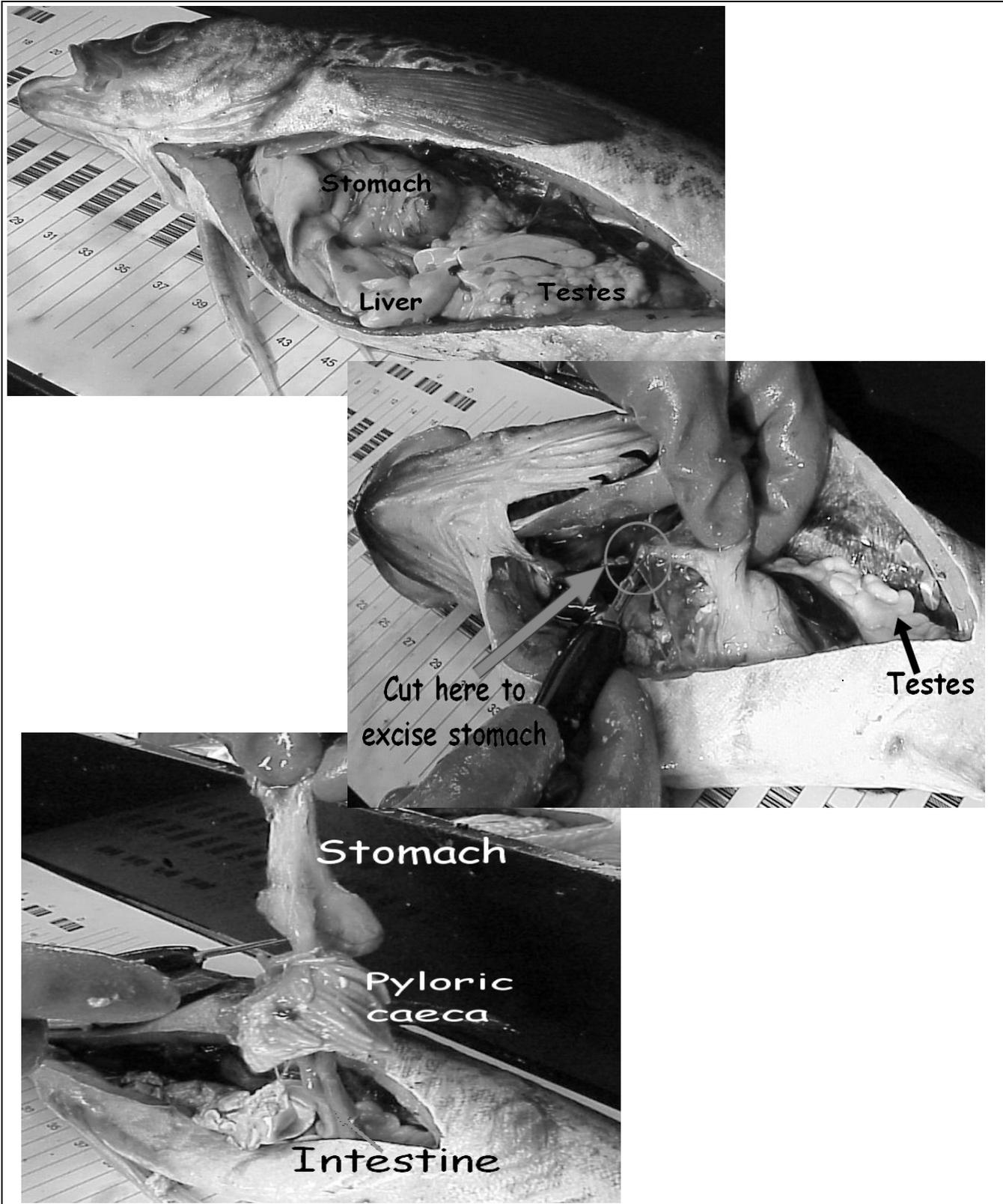


Figure 17-4: Removing a Gadid Stomach (Color photos located in your Species ID Manual)

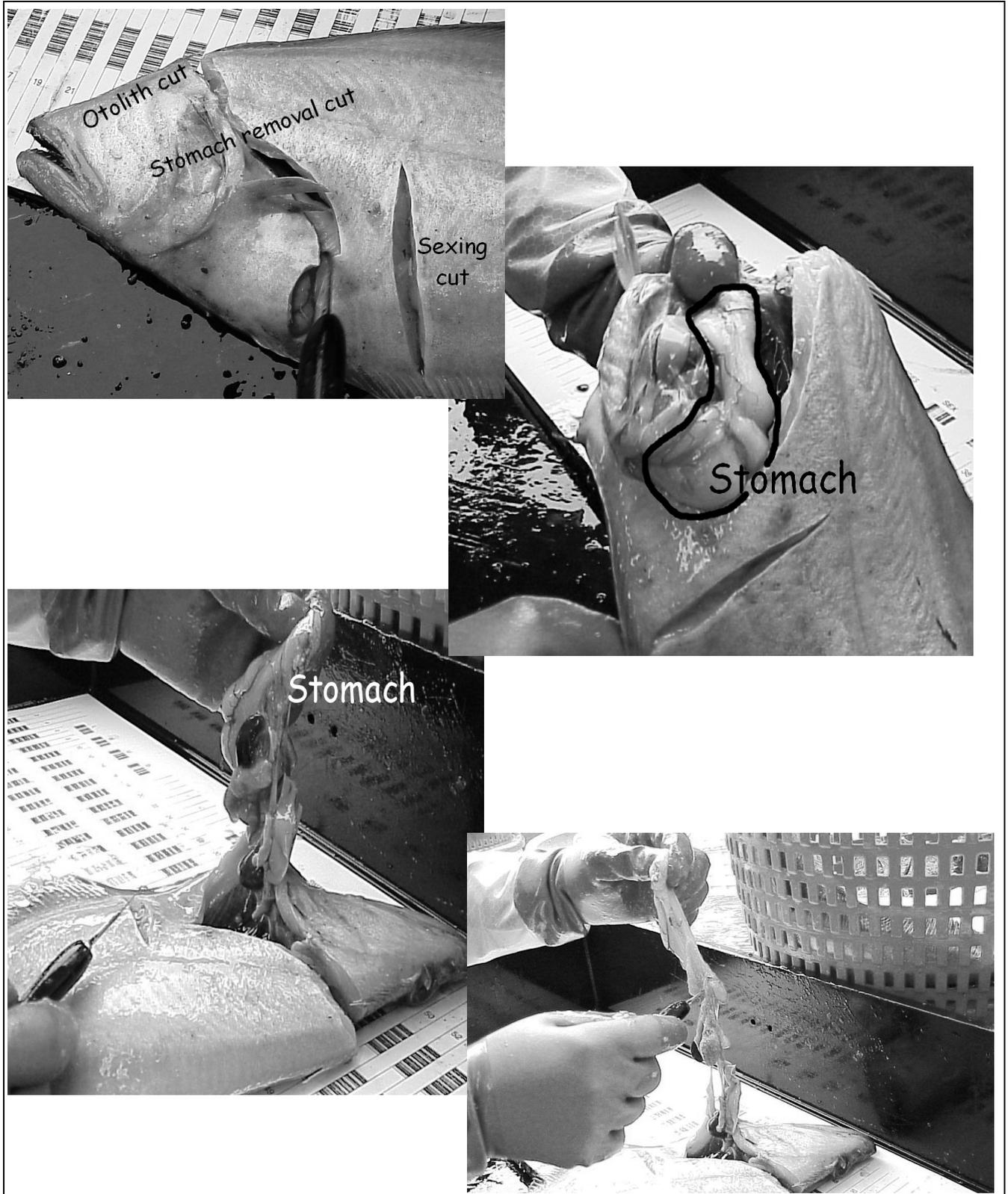


Figure 17-5: Removing a Flatfish Stomach (Color photos located in your Species ID Manual)

STOMACH COLLECTION: Debriefing Questionnaire

DECK FORM

Date	Cruise	Permit	Haul No.	Offload No.	Page <u>2</u> of <u> </u> for Vessel/Plant
6/28/17	19999	5676	187		Page <u>2</u> of <u>3</u> for Haul/Offload

Sample #: <u>2</u>	Sub-Sample #:	Sample Size: <u>15047.0</u>	<small>Kgs Segments pots</small>	# of Sampled Hooks:
Presorted <input type="radio"/>	Combined <input type="radio"/>			No Fish in Sample <input type="radio"/>

Species	Sex	#	Weight	% ret.	Length, viability, injury, specimen, tally data, measurements, bird observations, sample design, notes:
----- KEYPUNCH -----	<input checked="" type="checkbox"/>	<u>210</u>	<u>15047.00</u>	<input checked="" type="checkbox"/>	
Pollock		<u>0</u>	<u>14860.91</u>	<u>100</u>	<p>Start: <u>0</u> End: <u>15047</u> P.P.</p> <p>Total sample wt.: <u>15047.00 kg</u> Bycatch wt.: <u>- 101.94</u> Pollock subset wt.: <u>- 84.15</u> Remainder wt. <u>↓</u> of uncounted Pollock: <u>14860.91 kg</u></p> <p style="text-align: center;"><u>MCP / FlowScale</u></p> <p>Pollock subset Start: <u>8432</u> Tally KP End: <u>8515</u></p>
P. cod		<u>12</u>	<u>27.60</u>	<u>100</u>	
Ak. skate		<u>2</u>	<u>19.60</u>	<u>0</u>	
Herring		<u>12</u>	<u>3.54</u>	<u>0</u>	
Jellyfish		<u>8</u>	<u>5.14</u>	<u>0</u>	
Flathead sole		<u>22</u>	<u>8.04</u>	<u>0</u>	
N. Rocksole		<u>25</u>	<u>10.50</u>	<u>0</u>	
Rocksole u.		<u>63</u>	<u>27.52</u>	<u>0</u>	
Flathead		<u>1</u>	<u>.35</u>	<u>0</u>	
Pollock		<u>36</u>	<u>45.20</u>	<u>100</u>	
Pollock		<u>29</u>	<u>38.60</u>	<u>100</u>	

Sample #:	Sub-Sample #:	Sample Size:	<small>Kgs Segments pots</small>	# of Sampled Hooks:
Presorted <input type="radio"/>	Combined <input type="radio"/>			No Fish in Sample <input type="radio"/>

Species	Sex	#	Weight	% ret.	Length, viability, injury, specimen, tally data, measurements, bird observations, sample design, notes:														
----- KEYPUNCH -----	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>															
					<p style="text-align: center;"><u>POLLOCK S/L</u></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"><u>M</u></td> <td style="width: 50%; text-align: center;"><u>F</u></td> </tr> <tr> <td style="text-align: center;"><u>36-L</u></td> <td style="text-align: center;"><u>28-1</u></td> </tr> <tr> <td style="text-align: center;"><u>37-W</u></td> <td style="text-align: center;"><u>36-□</u></td> </tr> <tr> <td style="text-align: center;"><u>39-1</u></td> <td style="text-align: center;"><u>44-W</u></td> </tr> <tr> <td style="text-align: center;"><u>43-W</u></td> <td style="text-align: center;"><u>(48)-L</u></td> </tr> <tr> <td style="text-align: center;"><u>(46)-1</u></td> <td style="text-align: center;"><u>(49)-1</u></td> </tr> <tr> <td style="text-align: center;"><u>(47)-1</u></td> <td></td> </tr> </table> <p>POLLOCK STOMACHS FROM SAMPLE #2</p> <p>#23 46m .88kg spawn #24 48 F 1.08kg spawn #25 49 F 1.10kg spawn #26 47m 1.08kg prespawn #27 48 F 1.12kg spawn</p>	<u>M</u>	<u>F</u>	<u>36-L</u>	<u>28-1</u>	<u>37-W</u>	<u>36-□</u>	<u>39-1</u>	<u>44-W</u>	<u>43-W</u>	<u>(48)-L</u>	<u>(46)-1</u>	<u>(49)-1</u>	<u>(47)-1</u>	
<u>M</u>	<u>F</u>																		
<u>36-L</u>	<u>28-1</u>																		
<u>37-W</u>	<u>36-□</u>																		
<u>39-1</u>	<u>44-W</u>																		
<u>43-W</u>	<u>(48)-L</u>																		
<u>(46)-1</u>	<u>(49)-1</u>																		
<u>(47)-1</u>																			

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Figure 17-6: Example of Deck Form with Bering Sea Pollock Stomach and Maturity Scan Information Collected from Sex/Lengths

PT

DECK FORM

Date	Cruise	Permit	Haul No.	Offload No.
06/21/17	14000	3456	242	

Page 3 of _____ for Vessel/Plant
 Page 3 of 3 for Haul/Offload

Sample #: 3	Sub-Sample #:	Sample Size: 177.37	<small>Kgs Segments pots</small>	# of Sampled Hooks:																																	
Presorted <input type="radio"/>	Combined <input type="radio"/>	Unable to Follow Design <input type="radio"/>	No Fish in Sample <input type="radio"/>																																		
Species	Sex	#	Weight	% ret.	Length, viability, injury, specimen, tally data, measurements, bird observations, sample design, notes: s/L collection <table border="1"> <tr> <th colspan="2">Flathead</th> <th colspan="2">N. Rock Sole</th> </tr> <tr> <th>M</th> <th>F</th> <th>M</th> <th>F</th> </tr> <tr> <td>6-1</td> <td>17-1</td> <td>13-1</td> <td>17-1</td> </tr> <tr> <td>18-1</td> <td>19-L</td> <td>16-1</td> <td>22-1</td> </tr> <tr> <td>25-L</td> <td>22-L</td> <td>29-1</td> <td></td> </tr> <tr> <td>27-L</td> <td>24-L</td> <td></td> <td></td> </tr> <tr> <td>29-L</td> <td>25-1</td> <td></td> <td></td> </tr> <tr> <td></td> <td>26-1</td> <td></td> <td></td> </tr> </table> Halibut 52 U 48 U Start: 17849 End: 18027	Flathead		N. Rock Sole		M	F	M	F	6-1	17-1	13-1	17-1	18-1	19-L	16-1	22-1	25-L	22-L	29-1		27-L	24-L			29-L	25-1				26-1		
Flathead		N. Rock Sole																																			
M	F	M	F																																		
6-1	17-1	13-1	17-1																																		
18-1	19-L	16-1	22-1																																		
25-L	22-L	29-1																																			
27-L	24-L																																				
29-L	25-1																																				
	26-1																																				
----- KEYPUNCH -----	<input checked="" type="checkbox"/>	248	177.37	<input checked="" type="checkbox"/>																																	
Flathead sole		63	32.66	100																																	
Flathead sole		68	33.24	100																																	
Flathead sole		52	28.34	100																																	
Arrowtooth		28	38.22	0																																	
Pollock		14	27.33	100																																	
N. Rock sole		17	5.78	100																																	
Halibut		2	2.71	0																																	
Bigmouth		1	3.70	0																																	
AK. Plaice		1	1.17	0																																	
Plain sculpin		1	1.00	0																																	
P. cod		1	3.22	100																																	

Sample #:	Sub-Sample #:	Sample Size:	<small>Kgs Segments pots</small>	# of Sampled Hooks:									
Presorted <input type="radio"/>	Combined <input type="radio"/>	Unable to Follow Design <input type="radio"/>	No Fish in Sample <input type="radio"/>										
Species	Sex	#	Weight	% ret.	Length, viability, injury, specimen, tally data, measurements, bird observations, sample design, notes: Arrowtooth lengths For Stomachs Sample # 3 <table border="1"> <tr> <th>M</th> <th>F</th> </tr> <tr> <td>54-1</td> <td>50-1</td> </tr> <tr> <td></td> <td>51-1</td> </tr> <tr> <td></td> <td>52-L</td> </tr> </table> Stomach # 121-51 F e 1.44kg pre spawn 122-52 F e 1.50kg pre spawn 123-54 M e 1.68kg pre spawn 124-52 F e 1.82kg pre spawn 125-50 F e 1.40kg pre spawn	M	F	54-1	50-1		51-1		52-L
M	F												
54-1	50-1												
	51-1												
	52-L												
----- KEYPUNCH -----	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>									

Arrowtooth stomachs in the Bering Sea selected from outside your random sex/length collection are given sample design code 4-Size Selected. See page 17-6 for a description of sample design codes.

Figure 17-7: Example of Deck Form with Arrowtooth Stomach and Maturity Scan Information Collected Outside of Sex/Lengths

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