

## 2015 Stomach Sampling (scan & collection) In the Gulf of Alaska

Seven people associated with REFM's Resource Ecology and Ecosystem Modeling (Food habits lab) Program will be participating in RACE's summer trawl survey in the Gulf of Alaska in 2015. They will **do stomach scans and collect stomachs on FV Sea Storm, and FV Cape Flattery.**

**Species and numbers of stomachs to be scanned on FV Sea Storm: see Table 1.**

**Species and numbers of stomachs to be collected on FV Cape Flattery: see Table 2.**

### **Stomach scan procedure on board FV Sea Storm.**

1. At every haul, after the catch has been dumped in the bin and the major species in the catch are evident, choose the species from **Table 1**. The species should be abundant enough for stomach sampling purposes (about 1 full basket). Set the baskets in a cool, shaded area until the rest of the catch has been processed.
2. Do **eight** stomachs per haul (by following the sampling plan in Table 1, the numbers needed for each species of each size group in each depth and region). Make a tally of what you have done in Table 1 (by strata, predator species, and the size groups). At the end of your leg, fill in your collections in Table 1 and pass that information onto the next stomach person.
3. Individual fish should be checked for signs of regurgitation (i.e., food items in mouth or gills and/or a flaccid stomach). If the fish is determined to have regurgitated, select another fish from the sample.
4. Record your name, date, predator name, vessel (e.g. 143=Sea Storm), cruise (201501), haul number, and depth.
5. Record specimen numbers: starts from 1 in each haul for each predator species throughout your leg (e.g. pollock specimen numbers, 1-10, Haul 5).

6. Record fork length in whole cm (right-justified).
7. Record sex (1=males, 2=females, 3=Unknown) and maturity (1=spawning, 0=not spawning) on the scan form.
8. Open the stomach from esophagus to pyloric caeca, and note the fullness from 1 to 7 (1=E=empty, 2=Tr=trace, 3=<25% full, 4=25-50% full, 5=51-75% full, 6=76-100% full, 7=distended).
9. Weigh the total stomach content weight to the nearest 0.5 gram. If the stomach appears to weigh more than 3kg, use RACE scales that have a higher capacity.
10. After measuring the stomach content weight, dump the stomach contents into a larger container (e.g. a tub, a beaker, or a Petri-dish) and add enough water to separate individual prey item by using forceps to stir the stomach contents around. (This procedure is important because it will separate most the digested greasy mush from the prey items and let you identify the prey much easier). Some stomachs may contain excess mucous, the sieve can be used to rinse the contents and isolate the solid prey parts. The excess mucous should be included in the total stomach contents weight.
11. Record prey common names on the scan form, add prey code when you have time or when you are back Seattle
12. Weigh prey fish and the commercially important crabs. Enter the weight in the Prey Name column along with the prey name. Convert the prey weight to % volume when you have time.
13. Treat the rest of the stomach content as a 100% sub-sample and estimate the percent volume of each prey item in the prey name area. Extrapolate these prey volumes after you converted the prey fish and crab weights to % volume, and then record the value in the columns for % vol; these should add up to 100%.
14. Record the state of digestion of each prey item by using code numbers from 1-6 (1=empty, 2=trace, 3=<50% intact,

- 4=50-75% intact, 5=75-100% intact, 6=no digestion).
15. Record the number of prey fish and commercially important crabs and estimate the number of other prey.
  16. Record prey size when possible, for all fish prey and commercially important crabs. Measure standard length for fish, carapace length for King crabs, and carapace width for *Chionoecetes* spp. and Korean horse hair crabs. Measure carapace length for commercially important shrimp. Measure the mantle length of squids and the beak length of the octopus. Use extra lines if there are more than three measurable prey items in the category. If pollock are highly digested and otoliths are found in the stomachs, measure the otolith length with calipers, record it on the form then make a remark in front of the record to remind you that you need to convert the otolith length to the pollock standard length when you get back to the lab in Seattle.
  17. Repeat the above steps for each stomach scanned in the haul. Use the back of the form as well, but only for the same species. Use new scan forms for each different species per haul. Put the forms in a three-hole binder.
  18. For all the unidentifiable fish, the unidentified commercially important crab and shrimp, give a voucher number in front of the record. Preserve the specimen by putting it in a stomach bag with a specimen label showing the vessel, cruise, haul, predator name, specimen number, and prey voucher number (write in the comments space). If you have more than one specimens for the same unknown prey, you need to give each specimen a different voucher number. Unidentifiable prey should be preserved individually in Bags. Put these bags in the wax box marked with 'Food habits lab'. Store the wax box in the freezer. In other words, if you can not identify a fish to the species level, just freeze it and bring it back.

**Beginning and End of the Leg:**

1. If you are the first one to do the stomach scan, copy Table 1 (the numbers of the stomachs to be scanned) from a thumb drive (or a CD) to the survey computer on board.
2. At the end of each leg, enter your number of collections (by Species, region, depth, and size groups) to the Excel file In the computer, so the next person knows what he/she should do for the next leg.
3. At the end of the leg, bring back the finished scan forms with you.
4. Bring back the wax box with you. The wax box should be shipped back as a frozen package.
5. Clean and dry the sampling equipment.
6. If you are on the last leg of a survey, refer to the End of Survey Checklist and pack the equipment. The equipment should be brought back with the RACE supply.

#### **Stomach collection procedure on FV Cape Flattery**

1. At every haul, select predator species as needed from **Table 2** (a waterproof copy will be provided and should be put on deck).
2. Stomachs will be preserved individually in bags placed in 10% buffered Formalin solution. To make the Formalin solution, add sea water into the 5 gallon bucket about half full, then add one liter 37% of Formalin (i.e. 100% full strength of Formaldehyde) in the bucket. add one rounded 1/8 cup of baking soda per bucket.
3. Individual fish should be checked for signs of regurgitation (i.e., food items in mouth or gills and/or a flaccid stomach) and net feeding (e.g. a prey fish stuck out of the mouth). If no such signs, collect this stomach.
4. If the fish is determined to have regurgitated, select another fish from the sample. If the fish has a truly empty stomach (non-regurgitated), then that sample should be kept.
5. Put the collected stomach in a cloth bag. Each bag should contain a specimen label, which notes the species, cruise, haul, and specimen number. A specimen form is also filled out for each species sampled at a station which should list species, cruise, haul (and depth), size, and sex, spawning condition, and specimen number of each fish sampled for stomach content analysis (individual fish weight does not have to be taken).

6. Use a pencil to mark what you collected on the plastic-coated tally sheet.
  7. Put stomachs of ATF, PCOD, PLK, PH, POP, spiny dogfish each in a different bucket.
  8. Use the broken lids (used) to cover the bucket each time you add some stomach collections into it. Mark the species name on the broken lids. Seal the bucket (by using the unbroken lid) only till the bucket is full or till the end of the cruise. Approximate sample size for each leg is about 1,100 stomachs. The total number of stomachs to be collected in one haul is about 15. Use the permanent mark pen to write the species name, vessel, the address (Alaska Fisheries Science Center, Food Habits Lab, Bldg. 4, 7600 Sand Point Way NE, Seattle, WA 98115-0070) on the unbroken lid each time you seal a bucket.
  9. Put the finished specimen forms in a binder. At the end of your leg, bring back the specimen forms to Mei-Sun Yang.
10. At the end of the survey (the end of the 3rd leg), unload collected buckets from the vessel and transfer to the RACE van in Ketchikan and ship back to Seattle.

**Equipment for stomach collection on FV Cape Flattery**

3500 Specimen labels	1 clipboard
700 Specimen forms	4 knives
60 Five-gallon buckets w/unbroken lids	6 broken lids
16 gallons Formalin	3 cups baking soda
1 measuring cup	
4 pair forceps	1 safety glasses
2 markers	60 10% formalin stickers
2 MSDS 100% formalin	60 luggage tags
3500 stomach bags (1400 small, 1400 medium, 700 large)	

**Equipment for stomach scanning on FV Sea Storm**

500 Specimen labels	1 clipboard
1200 Scan forms (2-sided)	4 knives
1 sieve (333 micron)	

1 magnifying glass	1 sieve (1.0 mm)
4 pair forceps	1 power receptacle
4 permanent markers	2 25' extension cord
4 beakers (500 ml)	2 squirt bottles
10 large Petri-dish	1 electrical tape
10 small petri-dish	2 measuring tape
2 plastic tub	2 scalpel handles
1 specimen table	10 scalpel blades
1 scale screen	1 digital scale
1 splicing tape self-fusing	2 caliper
2 hemostats	3 trauma shears
1 outlet adapter	3 tally boards
3 freezer boxes	1 3-ring binder
510 plastic bags (13x18 Ziploc 10, 8x8 Ziplocs 100, 4x4 Ziplocs 400)	

### **End of the Survey Checklist**

Please do the following things at the end of the survey:

1. Clean and dry all stomach sampling gear, especially pay attention to the electronic scale.  
Pack all sampling gear, store in the tote, and load into the van for transportation.
2. Make sure that all of your frozen samples have been taken care.  
Make shipping arrangement if necessary and contact Geoff.

Table 1. Number of stomachs to be scanned on FV *Sea Storm* in 2015 GOA RACE summer trawl survey, by 15 strata, and predator sizes

Subareas	Shumagin (170 <sup>0</sup> -159 <sup>0</sup> W)			Chirikof (159 <sup>0</sup> -154 <sup>0</sup> W)			Kodiak (154 <sup>0</sup> -147 <sup>0</sup> W)			Yakutat (147 <sup>0</sup> -140 <sup>0</sup> W)			Southeast (140 <sup>0</sup> -130 <sup>0</sup> W)			Total
	Shelf	Gully	Slope	Shelf	Gully	Slope	Shelf	Gully	Slope	Shelf	Gully	Slope	Shelf	Gully	Slope	
Depth (m)	<100	100-199	≥200	<100	100-199	≥200	<100	100-199	≥200	<100	100-199	≥200	<100	100-199	≥200	
Expected stations	31	17	13	30	26	7	49	53	12	10	13	5	3	9	14	292
Expected stomachs	248	136	104	240	208	56	392	424	96	80	104	40	24	72	112	2336
<b>Species</b>																
<b>Walleye pollock</b>																
< 30 cm	5	5	5	5	5	0	5	15	5	5	5	0	5	5	5	75
30-44 cm	20	10	5	20	10	5	20	20	5	5	10	5	5	5	5	150
45-54 cm	20	10	5	20	10	5	20	20	5	5	10	5	5	5	5	150
≥ 55 cm	20	10	5	20	10	5	20	20	5	5	5	5	0	5	5	140
<b>subtotal</b>	<b>65</b>	<b>35</b>	<b>20</b>	<b>65</b>	<b>35</b>	<b>15</b>	<b>65</b>	<b>75</b>	<b>20</b>	<b>20</b>	<b>30</b>	<b>15</b>	<b>15</b>	<b>20</b>	<b>20</b>	<b>515</b>
<b>Pacific cod</b>																
< 30 cm	5	5	5	5	5	0	10	20	5	5	5	0	5	0	0	75
30-44 cm	15	10	5	15	10	5	20	20	5	5	10	5	0	10	5	140
45-59 cm	15	10	5	15	10	5	20	20	10	5	10	5	0	10	5	145
≥ 60 cm	15	10	10	15	10	5	20	20	10	5	10	5	0	10	5	150
<b>subtotal</b>	<b>50</b>	<b>35</b>	<b>25</b>	<b>50</b>	<b>35</b>	<b>15</b>	<b>70</b>	<b>80</b>	<b>30</b>	<b>20</b>	<b>35</b>	<b>15</b>	<b>5</b>	<b>30</b>	<b>15</b>	<b>510</b>
<b>Atf + Kf</b>																
< 30 cm	10	10	10	10	10	5	10	10	10	10	10	5	5	5	10	130
30-49 cm	25	10	10	20	10	5	25	25	10	10	10	5	5	5	10	185
≥ 50 cm	25	10	10	20	10	5	25	25	10	10	10	5	5	5	10	185
<b>subtotal</b>	<b>60</b>	<b>30</b>	<b>30</b>	<b>50</b>	<b>30</b>	<b>15</b>	<b>60</b>	<b>60</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>30</b>	<b>500</b>
<b>Pacific ocean perch</b>																
<b>all size</b>	<b>40</b>	<b>30</b>	<b>20</b>	<b>40</b>	<b>30</b>	<b>10</b>	<b>40</b>	<b>40</b>	<b>20</b>	<b>10</b>	<b>20</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>320</b>
<b>Pacific halibut</b>																
< 40 cm	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	50
40-69 cm	15	10	10	10	15	10	20	20	10	5	10	10	5	5	5	160
≥ 70 cm	15	10	10	10	15	10	20	20	10	5	10	10	5	5	5	160
<b>subtotal</b>	<b>35</b>	<b>25</b>	<b>20</b>	<b>25</b>	<b>35</b>	<b>20</b>	<b>45</b>	<b>45</b>	<b>20</b>	<b>15</b>	<b>25</b>	<b>20</b>	<b>15</b>	<b>15</b>	<b>10</b>	<b>370</b>
<b>Spiny dogfish</b>																
<35 cm	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	50
35-60 cm	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	50
>60 cm male	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	50
<b>subtotal</b>	<b>15</b>	<b>15</b>	<b>0</b>	<b>15</b>	<b>15</b>	<b>0</b>	<b>15</b>	<b>15</b>	<b>0</b>	<b>15</b>	<b>15</b>	<b>0</b>	<b>15</b>	<b>15</b>	<b>0</b>	<b>150</b>
<b>Total</b>	<b>265</b>	<b>170</b>	<b>115</b>	<b>245</b>	<b>180</b>	<b>75</b>	<b>295</b>	<b>315</b>	<b>120</b>	<b>110</b>	<b>155</b>	<b>70</b>	<b>70</b>	<b>100</b>	<b>80</b>	<b>2365</b>

Table 2. Number of stomachs to be collected on FV Cape Flattery in 2015 GOA RACE summer trawl survey, by 15 strata, and predator sizes

Subareas	Shumagin (170 <sup>0</sup> -159 <sup>0</sup> W)			Chirikof (159 <sup>0</sup> -154 <sup>0</sup> W)			Kodiak (154 <sup>0</sup> -147 <sup>0</sup> W)			Yakutat (147 <sup>0</sup> -140 <sup>0</sup> W)			Southeast (140 <sup>0</sup> -130 <sup>0</sup> W)			Total
Strata	Shelf	Gully	Slope	Shelf	Gully	Slope	Shelf	Gully	Slope	Shelf	Gully	Slope	Shelf	Gully	Slope	
Depth (m)	<100	100-199	≥200	<100	100-199	≥200	<100	100-199	≥200	<100	100-199	≥200	<100	100-199	≥200	
Expected stations	35	16	8	16	16	11	21	36	13	4	12	15	4	7	6	220
Expected stomachs	525	240	120	240	240	165	315	540	195	60	180	225	60	105	90	3300
<b>Species</b>																
<b>Walleye pollock</b>																
< 30 cm	25	5	5	5	5	5	25	25	5	5	5	5	5	5	5	135
30-44 cm	25	20	5	20	20	5	25	25	5	5	10	5	5	5	5	185
45-54 cm	25	20	5	20	20	5	25	25	5	5	10	5	5	5	5	185
≥ 55 cm	25	20	5	20	20	5	25	25	5	5	5	5	5	5	5	180
subtotal	100	65	20	65	65	20	100	100	20	20	30	20	20	20	20	685
<b>Pacific cod</b>																
< 30 cm	15	5	5	5	5	0	15	20	5	5	5	0	5	0	0	90
30-44 cm	25	15	10	25	15	10	25	25	10	5	10	10	5	10	5	205
45-59 cm	25	15	10	25	15	10	25	25	10	5	10	10	5	10	5	205
≥ 60 cm	25	15	10	25	15	10	25	25	10	5	10	10	5	10	5	205
subtotal	90	50	35	80	50	30	90	95	35	20	35	30	20	30	15	705
<b>Atf + Kf</b>																
< 30 cm	25	20	10	20	20	10	25	25	20	10	10	10	5	5	10	225
30-49 cm	25	20	10	20	20	10	25	25	20	10	20	10	10	10	10	245
≥ 50 cm	25	20	10	20	20	10	25	25	20	10	20	10	10	10	10	245
subtotal	75	60	30	60	60	30	75	75	60	30	50	30	25	25	30	715
<b>Pacific ocean perch</b>																
all size	50	40	30	50	40	10	50	50	30	10	40	10	10	10	20	450
<b>Pacific halibut</b>																
< 40 cm	10	10	5	5	5	5	10	10	5	5	5	5	5	5	5	95
40-69 cm	25	20	10	15	15	10	15	20	10	5	10	10	5	5	5	180
≥ 70 cm	20	10	10	10	15	10	10	20	10	5	10	10	5	5	5	155
subtotal	55	40	25	30	35	25	35	50	25	15	25	25	15	15	15	430
<b>Spiny dogfish</b>																
<35 cm	5	5	0	5	5	0	5	5	0	5	5	0	5	5	0	50
35-60 cm	10	10	5	10	10	5	10	10	5	10	10	5	10	10	5	125
>60 cm male	10	10	5	10	10	5	10	10	5	10	10	5	10	10	5	125
subtotal	25	25	10	25	25	10	25	25	10	25	25	10	25	25	10	300
<b>Total</b>	<b>395</b>	<b>280</b>	<b>150</b>	<b>310</b>	<b>275</b>	<b>125</b>	<b>375</b>	<b>395</b>	<b>180</b>	<b>120</b>	<b>205</b>	<b>125</b>	<b>115</b>	<b>125</b>	<b>110</b>	<b>3285</b>

## **Formalin Handling Procedures.**

### **Formalin Handling Protocol**

- Formalin is a relatively hazardous chemical and must be handled appropriately to ensure your safety. You are dealing with a small quantity of formalin and if these guidelines are followed your exposure will be well below established safe exposure levels.
- Read the Material Safety Data Sheet (MSDS) before using formalin to understand its properties.
- ALWAYS wear gloves, rain gear, and goggles/safety glasses when directly using formalin.
- ALWAYS use formalin on an open deck---DO NOT use below decks or in your cabin.
- Inform captain and crew that you have formalin onboard, where it is stored, location of Material Safety Data Sheets (MSDS), potential hazards, and what to do in case of spill.
- IF spilled--this is a small enough quantity to dilute with water and wash overboard.
- Add formalin to bucket that is already half full with seawater, rather than adding seawater to the formalin. This will ensure that the formalin is quickly diluted, and will lessen the chance of getting formalin splashed on you.
- Use extreme caution when adding formalin to bucket with seawater, hold the bucket lid over as much of the bucket as possible while pouring the formalin, creating a 'shield'.
- IF formalin comes into contact with your skin or eyes—rinse immediately, and thoroughly, with water for 15 minutes as per MSDS.
- IF ingested--consume large quantities of water, do not induce vomiting, seek medical attention as soon as possible as per MSDS.
- IF overcome by fumes--move to fresh air, administer oxygen if necessary and available as per MSDS.

### **Where to Keep Formalin Onboard?**

- Formalin should be stored in a well ventilated space. 100% formalin should be stored at or above, below this temperature it will lose its potency as a component of the formalin precipitates from the solution. Pure formalin is considered a flammable material and should be stored in an appropriate flammable storage area until it has been diluted as described above. Once diluted to a 10% solution, formalin can, and should be stored on a weather deck if possible. It won't freeze.
- It is best to store your bucket securely tied to an immobile object. Leave the bucket in place and carry samples to the bucket after you are done with your sampling. This will avoid the potential of spilling formalin in the factory and will keep the formalin away from fish processing operations.
- Do not to submerge your gloves in the formalin when you add samples to the bucket. If the samples float, use a pair of forceps or some other sampling tool to submerge the samples. Rinse with water after formalin contact.
- Anytime formalin gets spilled and/or inadvertently comes into contact with any object other than your samples, flush the object or area with plenty of water.

COMMISSIONER OF  
FISHERIES  
GENERAL INVESTIGATIVE  
DIVISION  
1000 2<sup>ND</sup> AVENUE  
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SEATTLE, WA  
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## INTERNATIONAL PACIFIC HALIBUT COMMISSION

ESTABLISHED BY A CONVENTION BETWEEN CANADA  
AND THE UNITED STATES OF AMERICA

DIRECTOR  
BRUCE M. JEAMAN  
2000 2<sup>ND</sup> AVENUE  
SEATTLE, WA 98104-2000  
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### To Whom It May Concern:

The Alaska Fisheries Science Center, Resource Ecology and Fisheries Management Division (National Marine Fisheries Service) is authorized to capture and retain for scientific purposes up to 800 halibut (*Hippoglossus stenolepis*) per year in each of three areas, using research trawls, handlines, or longlines, during the calendar years 2011 through 2015. The place and manner of capture will be determined in accordance with the Center's research plans concerning food habits and will include the areas of the eastern Bering Sea, Gulf of Alaska, and Aleutian Islands. Collection may be from research vessels or by research staff aboard domestic commercial fishing vessels. The principal investigator for this study is Dr. Kerim Aydin.

Halibut obtained under this permit may not be retained for purposes other than scientific research and may not be sold. Halibut captured in excess of the limits specified in this permit must be returned to the sea with a minimum of delay and injury.



Bruce M. Jeaman, Ph.D.  
Executive Director

ATTACHMENT : Permission to collect Pacific halibut