PUGET SOUND ECOSYSTEM MONITORING PROGRAM (PSEMP)

TOXICS IN BIOTA

FOCUS STUDY

2016 PORT GAMBLE BAY DAMAGE ASSESSEMENT ENGLISH SOLE SURVEY (TRWL1605)

POST-SURVEY REPORT

June 2016

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1 Background

The Washington Department of Fish and Wildlife (WDFW) is a member of the Puget Sound Ecosystem Monitoring Program (PSEMP), a multi-agency effort to monitor the ecological health of Puget Sound. PSEMP tracks a broad range of status indicators, including submerged aquatic vegetation, sediment qualtiy, fecal contamination in shellfish, and water quality among others. The WDFW PSEMP team (i.e. *Toxics in Biota*) assesses toxic contaminants in marine fish and anadromous species. The WDFW PSEMP-Toxics in Biota team, hereafter referred to as PSEMP, (a) monitors the status and trends of chemical contamination in Puget Sound biota, (b) evaluates the effects of contamination on the health of these resources, and (c) provides information to public health officials to protect fish and shellfish health, ensure seafood safety, and promote ecosystem recovery.

The Port Gamble S'Klallam Tribe (PGST) and Washington State Department of Ecology (Ecology) seek to evaluate toxicopathic damage in fish from Port Gamble Bay, Washington, as part of their effort to clean-up chemical contamination in this bay, and have identified monitoring procedures developed or used by PSEMP as suitable for this purpose. PSEMP conducts long-term contaminant monitoring of the flatfish English sole (*Parophrys vetulus*), a bottom-dwelling species, to assess the status and trends of their exposure to toxic chemicals in the Puget Sound. English sole are useful as an indicator of exposure of benthic biota to contaminants including polycyclic aromatic hydrocarbons (PAHs), which are of the chemicals of concern in Port Gamble Bay. The work proposed herein is based on PSEMP's biennial monitoring of English sole in Puget Sound, essentially treating Port Gamble Bay similarly to the ten index stations currently monitored by PSEMP.

2 Survey Objectives

The goals of this one-time survey were to:

- Collect up to 60 English sole from two stations within Port Gamble Bay.
- Collect up to 60 English sole at PSEMP's Hood Canal index station.
- Collect bile and liver samples from each English sole and analyze for:
    - PAH metabolites in bile by analyzing for biliary Fluorescing Aromatic Compounds (FACs) and hydroxylated PAHs, and
    - PAH-associated liver disease.
- Compare bile FACs and liver lesion results between the Port Gamble stations, the reference station, and against long-term PSEMP index stations.

PSEMP used standard operating procedures for field sampling, chemical analyses, and histopathology, which are standard operating procedures for its normal monitoring.

3 Personnel, Schedule and Staffing

The 2016 Port Gamble Bay English Sole Survey was completed over the course of two days; May 13 and 14, 2016. The duties for the science crew and the vessel crew are explained in detail in Appendix A: Conducting Benthic Fish and Macroinvertebrate Surveys Using a Bottom Trawl in Puget Sound. Table 1 lists the science crew, vessel crew, and other staff involved in this survey. Table 2 details the schedule and staffing during the survey.

Table 1. Survey Contact List

Group	Name	Office Phone	Cell Phone or Email
PSEMP Science Crew	Jim West	360-902-2842 Olympia /206-302-2427 Montlake	206-718-4787
	Laurie Niewolny	360-902-2687	360-556-9919
	Jennifer Lanksbury	360-902-2820	253-312-1119
	Mariko Langness	360-902-8308	360-312-9245
	Robert Fisk	NA	206-498-7820
	Sandie O'Neill	206-860-3483	206-794-0654
Vessel - F/V Chasina	Kurt Dobszinsky	NA	360-808-0015
	Nils Dobszinsky	NA	NA
	Leif Dobszinsky	NA	NA
	Mike Channing	NA	NA
Montlake-NOAA NMFC	Lyndal Johnson	206-860-3345	NA
	Maryjean Willis	206-860-3315	NA
	Mark Myers	206-860-3329	206-909-4290
	Bernie Anulacion	206-860-3340	NA
	Gina Ylitalo	206-860-3325	NA
	Denis da Silva	206-860-3300	NA
WDFW NRB	Front Desk (Ben Power)	360-902-2700	NA
	Fax	360-902-2943	NA
	Colleen Desselle	360-902-2844	360-280-7345
	Craig Burley	360-902-2784	360-489-2640
Section 10 Permit	NMFS-Mitch Daniels	360-753-9580	Mitch.Dennis@noaa.go
	NMFS-Daniel Tonnes	206-526-4643	dan.tonnes@noaa.gov
	WDFW-Val Tribble	360-902-2329	NA

Table 2. Survey Schedule and Staffing

2016 Port Gamble Bay English Sole Survey Schedule

Station	Date	Day	Docking		Staff					Chasina Crew			
			Morning	Evening	Jim	Jen	Mariko	Robert	Sandie	Kurt	Mike	Leif	Nils
Port Gamble Bay 01	13-May	Fri	Port Ludlow Marina	Port Ludlow Marina		x	x	x	x	x	x	x	x
Hood Canal Reference 01	13-May	Fri	Port Ludlow Marina	Port Ludlow Marina	x	x	x	x	x	x	x	x	x
Port Gamble Bay 02	14-May	Sat	Port Ludlow Marina	Port Ludlow Marina	x	x	x	x	x	x	x	x	x

4 English Sole Specimen Collection

During the 2016 Port Gamble Bay English Sole Survey, trawling and specimen collection was performed as detailed in the PSEMP standard operation procedure (SOP) found in Appendix A: Conducting Benthic Fish and Macroinvertebrate Surveys Using a Bottom Trawl in Puget Sound The fishing vessel, F/V Chasina (Figure 1), was chartered to collect English sole at every station. The vessel was outfitted with a 400-mesh Eastern otter trawl, as described in PSEMP's trawling and collection SOP.

Figure 1. F/V Chasina

4.1 Revisions to the trawling and collection process

Trawling and collection followed the PSEMP SOP. Comments about the success and problems encountered at each station and respective trawl data was documented on the Haul Forms (see Appendix A to view general form) and Section 4.3 details these findings.

For this study no catch composition or length frequency data was taken on the entire catch per station; only data on the English sole retained for study purposes were recorded and reported.

4.2 Permit to prevent further impact to Puget Sound endangered species.

Appendix B: NMFS Section 10 Scientific Collection Permit contains the National Marine Fisheries Service (NMFS) Endangered Species Act (ESA) Section 10(a)(1)(A) Research Permit issued to PSEMP in October 2012. This permit is valid for five years from date of issuance and was the permit under which PSEMP operated to conduct the 2016 Port Gamble Bay English Sole Survey. This permit is used to ensure Puget Sound endangered species (i.e., steelhead, Chinook and chum salmon, green sturgeon, and Boccaccio rockfish) were not unduly harmed or impacted while conducting the survey. Scientific Research Permit 16091 specifies the exact number of each endangered species PSEMP is authorized to take if encountered. "Take" is defined as any action which interrupts the everyday activity of said fish, whether or not fish death occurs. Staff were briefed regarding the permit, the species of concern, and the number of allowed "take" prior to the commencement of survey activities.

4.3 Stations

During the 2016 Port Gamble Bay English Sole Survey, English sole were collected at three stations; two in Port Gamble Bay and one in Hood Canal (reference location). The general goal at each station was to collect a total of 60 live English sole greater than 230 mm to process on board the F/V Chasina for liver and bile sample collection. Refer to Section 5 for an accounting of the actual samples created and the labs to which each were sent.

Figure 2 shows a map of Port Gamble Bay and north Hood Canal in the Puget Sound, indicating the trawls performed for this survey. Table 3 provides details of trawling at each of the three the stations in this survey.

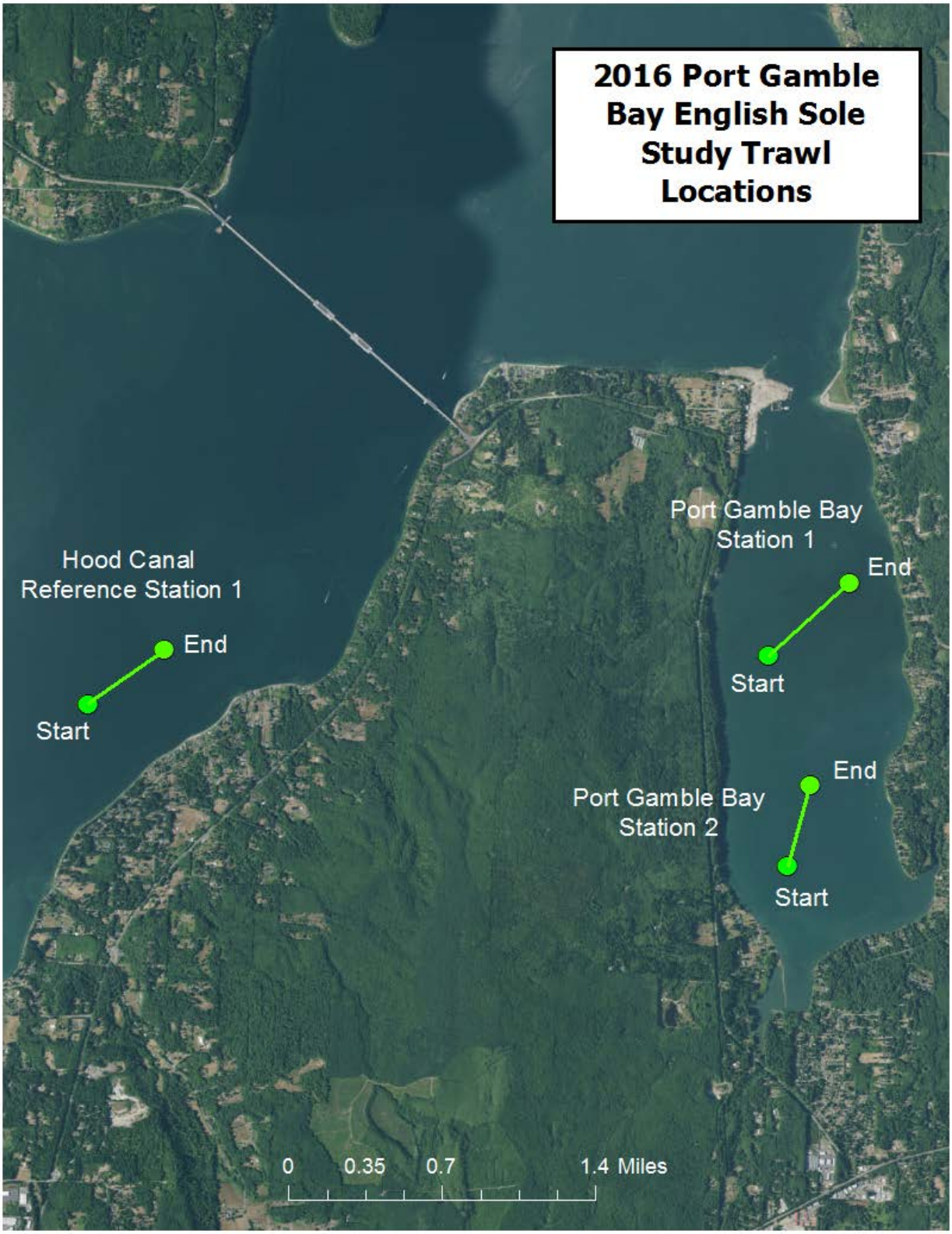


Figure 2. Port Gamble Bay station locations

Table 3. Station information

Haul Effort ID	Date	Coordinates		Cable Out (fathoms)	Maximum Depth (feet)	Duration (minutes)	Enlgish sole collected	Comments
		Start	End					
PGB_01	5/13/2016	47° 50.285, -122° 34.822	47° 50.584, -122° 34.354	15	10.6	12	>70	Tow went well, no hang ups. Got lots of English sole (ES), Dungeness crab, some herring (about 60), and seaweed.
PGHC_01	5/13/2013	47° 50.024, -122° 38.809	47° 50.247, -122° 38.370	50	29.1	9	>100	Tow went well, no hang ups. Got all our ES, a few ratfish, Dungeness crab (kept some).
PGB_02	5/14/2013	47° 49.454, -122° 34.672	47° 49.777, -122° 34.558	8	5	8	>80	Tow went well, no hang ups. Net filled with ES, starry flounder, shiner perch.

PGB_01: Port Gamble Bay Station 1
PGHC_01: Hood Canal Reference Station 1
PGB_02: Port Gamble Bay Station 2

5 English Sole Processing and Sample Collection

At each station, English sole were separated from the catch and were maintained alive in a continuously flowing saltwater tank until processed. All other species were returned to the water. The goal at each station was to randomly select 60 English sole, of 230 mm or greater in total length, from the catch at that station. This minimum total length was necessary to collect sexually mature English sole. To be sure enough live fish were available for sample processing, between 80 to 100 fish (when possible) were placed into the live tank at each station. Any additional live fish remaining at the end of sample processing were set free.

Ambient seawater was maintained in the live tank using a through-hull intake that delivered saltwater. The water pumped into the tank was either continuously flowing, maintained at a specific level using a standpipe when on station or in transit, or held in a static state when at the Port Ludlow Marina.

5.1 On-board Processing

A temporary lab was set up on-board the F/V Chasina where PSEMP staff processed 60 randomly selected English sole from each station. From the 60 fish we collected biometric data (sex and length), and created tissue samples for chemical and histological analyses. Figure 3 shows PSEMP staff working in the on-board lab during a past survey.

Figure 3. On-board Lab on the F/V Chasina

Each English sole selected for processing was tagged with a pre-assigned sequential unique fish identification number (i.e., FishID, see Figure 4), and all the associated samples created from a particular fish were identified through its assigned FishID number. Fish measurements and tissues collected from each fish were recorded on a Specimen form (Figure 5).

Figure 4. FishID tag assigned to an individual English sole

SPECIMEN FORM **Page 1 of 3**

2016 Port Gamble English Sole Damage Assessment Survery (Survey ID: TRWL1605)

Station ID: Fish ID range: Collection Date:

					PSEMP-Mobile Lab Samples						
		Length	Sex		Bile	Liver	Liver & Gonad			Age	
		Total length	0-? 1-M	Maturity Comments (R or NR)	Ind. drops	Ind. Portion for Chem	Histo slice	Histo slice		Interopercle taken	
	FishID	**(mm)**	2-F		**Y/N**	**Y/N**	**Y/N**	**Y/N**	**Field Observations**	**Y/N**	**Lab Observations**
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Comments:

Recorder:

Figure 5. Specimen Form used in the 2016 Port Gamble Bay English Sole Survey

5.2 Samples collected from the dissected fish

In the on-board lab, fish were randomly selected from the live tank and measured to be sure they were of appropriate size (230 mm or greater in total length), and each usable fish was tagged with a FishID. All fish were anesthetized and then euthanized using Tricaine-S (MS-222). After bile and tissues were removed, each dissected fish was bagged with its corresponding FishID and frozen in groups of 20 fish for transport to the WDFW Marine Resources Lab (MRL) in Olympia.

5.2.1 Bile samples

When possible, bile was taken from each individual English sole processed. The gall bladder was located (see Figure 6) and secured using clean forceps and bile was withdrawn using a 1cc/27g tuberculin syringe. Bile from each fish was placed into a pre-labeled 2mL amber glass LC/MS vial. Individual bile samples were stored on ice and frozen at -20 deg. C after processing at each station was complete. Bile samples remained frozen until transfer to the lab.

Figure 6. Fish dissection on F/V Chasina

5.2.2 Histology

A section of the liver and gonad were taken from each English sole. Both tissue sections were placed together in a labeled tissue histocassette (see left photo of Figure 7). The cassette was then placed in a labeled container of Dietrich's solution and stored at ambient temperature until transfer to the analytical lab. Details of the histology collection process are outline below:

- *Liver tissue subsection for determination of cellular abnormalities and disease (histopathology).*

  The liver was removed from the body cavity and positioned in an aluminum pan. The liver was cut bisected twice at its broadest point to excise a 3 to 4 mm wide cross-section. This cross-section was placed in the histocassette. Notes on any noticeable liver abnormalities were added to the comments section of the specimen form. When abnormalities were visible, the tissue section taken included the

border between the normal and abnormal tissue, to include both cellular conditions in the sample. Figure 8 shows English sole livers being prepped for cross-sectioning.

Figure 7. English sole livers removed for histopathology sample

- *Gonad tissue subsection for determination of sexual maturity.*

  If the fish was male, the testes was either removed entirely or sub-sectioned and placed flat in the histocassette. If the fish was female, a cross-section of the middle of the ovary was excised, then cut open and laid flat to expose the interior of the ovary in the histocassette.

5.2.3 Liver samples for Tissue Chemistry

Though not included in the scope of work for the 2016 Port Gamble Bay English Sole Survey contract, the remaining liver tissue from all 60 fish was retained for possible later tissue chemistry (i.e. contaminant) analysis, depending on availability of funds. Liver tissue was placed in pre-cleaned, labeled I-Chem scintillation vials. The samples were stored on ice and frozen after processing was completed.

5.3 Field collection wrap-up

At the end of the survey, all fish samples collected were transported on ice to the respective laboratories detailed in Section 6. The remaining portions of the 60 dissected English sole (i.e. gutted fish) from each station were transported to the MRL for removal of the interopercle, see below, and for possible further dissection.

5.3.1 Age

The age of all 60 English sole will be determined using the eye-side interopercular bone (see Figure 8). For each fish, a portion of the head containing the interopercle will be cut off, placed in a plastic bag along with the fish's FishID tag and frozen. After several days, the interopercle sample will be soaked in hot scalding water and, once cooled, the tissue surrounding the interopercle bone will be sloughed off. After drying, the bone will be placed in a labeled paper envelop and stored at ambient temperature until evaluation by the WDFW Fish Aging unit.

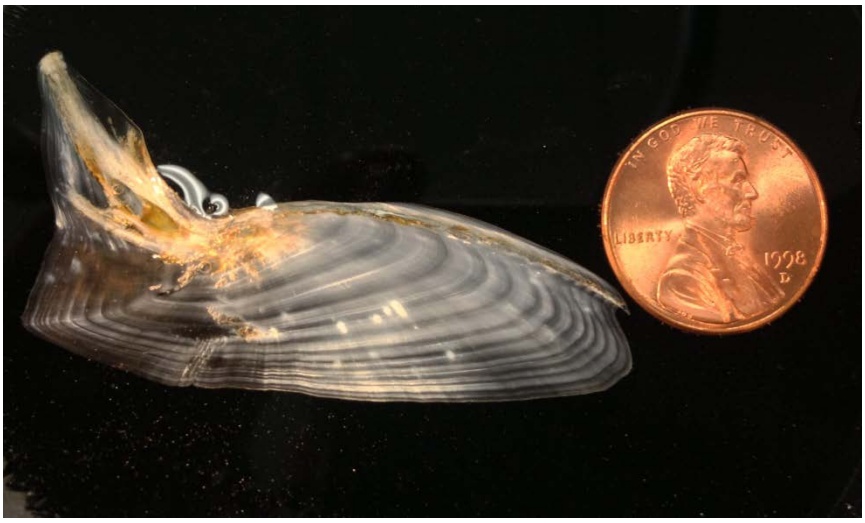


Figure 8. Interopercular bone from the operculum of an English sole

6 Samples Created

Table 4 depicts samples created on the boat and those that were created in the MRL as of June 2016.

Table 4. Samples Created

	Fish Information				Individual Samples Collected				
							Histology		
Station	Total Collected	Number Dissected	Lengths Recorded	Sex (male:female:unk)	Individual Bile	Individual Liver	Liver	Gonad	Interopercles
Port Gamble Bay 01	>60	60	60	18:42:00	60	60	60	60	60
Port Gamble Bay 02	>60	60	60	5:55:00	52	60	60	60	60
Hood Canal Reference	>60	60	60	22:38:00	56	59	60	60	60
				Analytical Lab:	NOAA-NMFC	NOAA-NMFC	NOAA-NMFC	NOAA-NMFC	WDFW

7 Additional Species and Specimens Collected

PSEMP staff also saved a number of male Dungeness crab (*Metacarcinus magister*) of legal catch size for potential contaminants analyses at a future date, if funds become available. Dungeness crab collected included up to fifteen from each of the three locations. All of the Dungeness crab were kept whole and frozen immediately.

Appendix A: Conducting Benthic Fish and Macroinvertebrate Surveys Using a Bottom Trawl in Puget Sound

Standard Operating Procedures

Puget Sound Ecosystem Monitoring Program-Toxics in Biota

Conducting Benthic Fish and Macroinvertebrate Surveys Using a Bottom Trawl in Puget Sound

Steve Quinnell and Laurie Niewolny

Version 02

June 2013

PURPOSE AND SCOPE

This document is the Standard Operating Procedure (SOP) for collecting benthic fish and macroinvertebrate specimens using bottom-trawling gear. This procedure supports Puget Sound Ecosystem Monitoring Program (PSEMP) surveys to collect biota for long-term status and trends monitoring of toxics in the Puget Sound food web. The primary target species is English sole (*Parophrys vetulus*), although a wide range of other species may be taken as each individual study commands such as rockfish species, Dungeness crab (*Cancer magister*), and spot prawn (*Pandalus platyceros*). This SOP describes the trawling operation to the point at which specimens are placed on the deck of the vessel for sorting and are handled until the specimens and samples are brought back to the Marine Resources Laboratory. In depth procedures for processing the catch for species composition and processing the specimens of interest for biological and chemical analysis are described in separate reports, quality assurance project plans (QAPPs), or SOPs as these details are relevant to specific surveys.

TRAWL GEAR

To capture benthic and demersal fish and macroinvertebrates, PSEMP uses a 400-mesh Eastern trawl as described in the Puget Sound Estuary Program (PSEP) protocols for sampling bottomfish. This gear has proven efficient in capturing English sole, other benthic fishes, and macroinvertebrates associated with these habitat types.

To carry out a bottom trawl operation, PSEMP employs a chartered fishing vessel capable of pulling a 400-mesh Eastern trawl at the speeds, configurations and depths required to efficiently fish for target species. In addition the vessel must support the staffing and space requirements demanded by PSEMP bottom trawl operations.

The 400-mesh Eastern trawl used by PSEMP is a modified commercial design, composed of synthetic twine (polyethylene) making up 10 cm meshes, with a 21.4 m head rope, a 28.7 m foot rope and has a 3.2 cm mesh cod-end liner. Below in Table 1, the specifications are outlined. Figures 1 and 2 show the design of the trawl net.

When fishing, the width of the net opening ranges between 9 m and 13 m, depending on speed, amount of trawl cable out (cable out) and trawl depth. A vessel speed between 2 to 3 knots is maintained and the net width is maximized by regulating the scope (fathoms of cable out per fathom of depth) of the cable. A minimum scope of 2:1 is allowed, except for shallow tows for which it is increased to allow maximum spreading of the doors.

Table 1. Specifications for the 400-mesh Eastern trawl net.

Headrope	71 feet with thimbled eyes, of 3/8: 6 x 19 galvanized cable rope served (full wrap) with 3/8" polypropylene rope.
Fishing line (footrope)	94 feet with thimbled eyes of 3/8" 6 x 9 galvanized cable rope served with 3/8" polypropylene rope (web laced or "hung" to the fishing line).
Disc footrope	4" discs (5" – 5 1/2" if 4" don't fit) on 1/2" long link Beacon 7 deck lashing chain.

Breast lines	6 feet of 3/8” 6 x 19 galvanized cable rope served with 3/8” polypropylene rope.
Seams	Side seams shall consist of lacing 3 knots (2 meshes) from each panel with No. 36 nylon twine. Tie each full mesh.
Hanging	Headrope:
	Footrope:
Pucker rings	5/16” by 2 1/4” galvanized steel (approx. 33 pieces), secured with No. 48 braided polypropylene
Splitting rings	1/2” by 4” galvanized steel (4 pieces) set up 12 meshes from bottom
Liner in bag section	1 1/4” mesh, No. 18 nylon; 360 meshes around, 200 meshes deep (leave about 2 feet of liner extending from end of bag)
Chafing gear	Hula skirt chafing, 8” – 5 mm double bar mesh with 300 pounds hula rope
Restrictors	5 pieces 1” polypropylene rope spaced 4 feet apart
Webbing	4” mesh (including one knot) polyethylene, depth stretched and heat set; twine: 2 1/2 mm top - 3 mm bottom
Guard mesh	4 meshes on fishing line, 4 mm double bar mesh; 4 meshes on breastlines, 4 mm double bar mesh
Floats	15, 8 inch Deep Sea floats, evenly spaced (5.5 lbs buoyancy each)
Dandylines	8, 20 fath. 1/2” 6 x 19 galvanized cable rope
Riblines	two 3/4” coated Duralon riblines on cod-end and intermediate hung in at 10% of stretched measure of web, secured to web using benzels every 16”

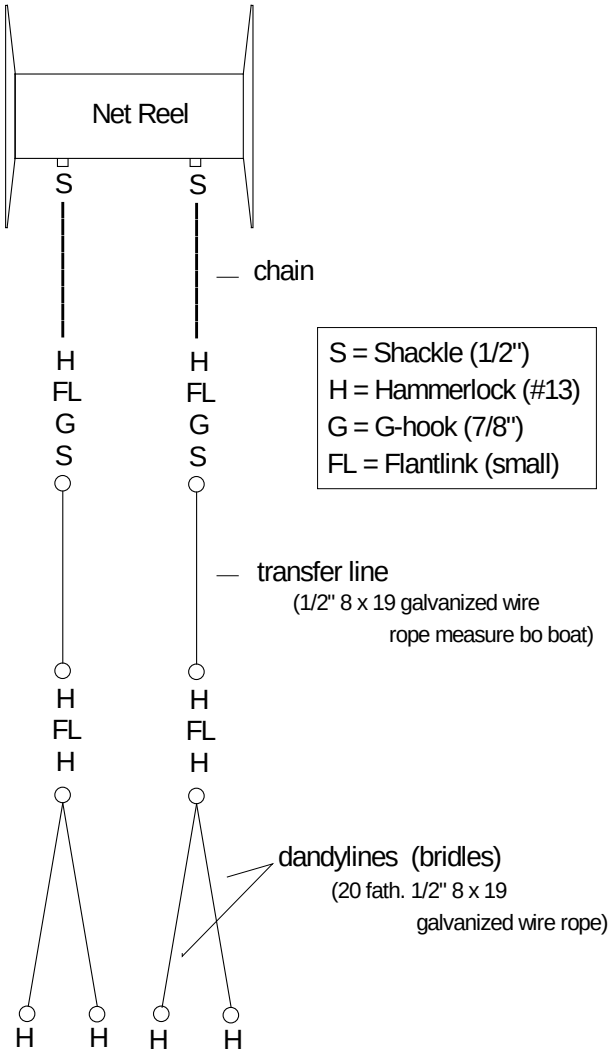


Figure 1. Hardware setup for the 400-mesh Eastern trawl

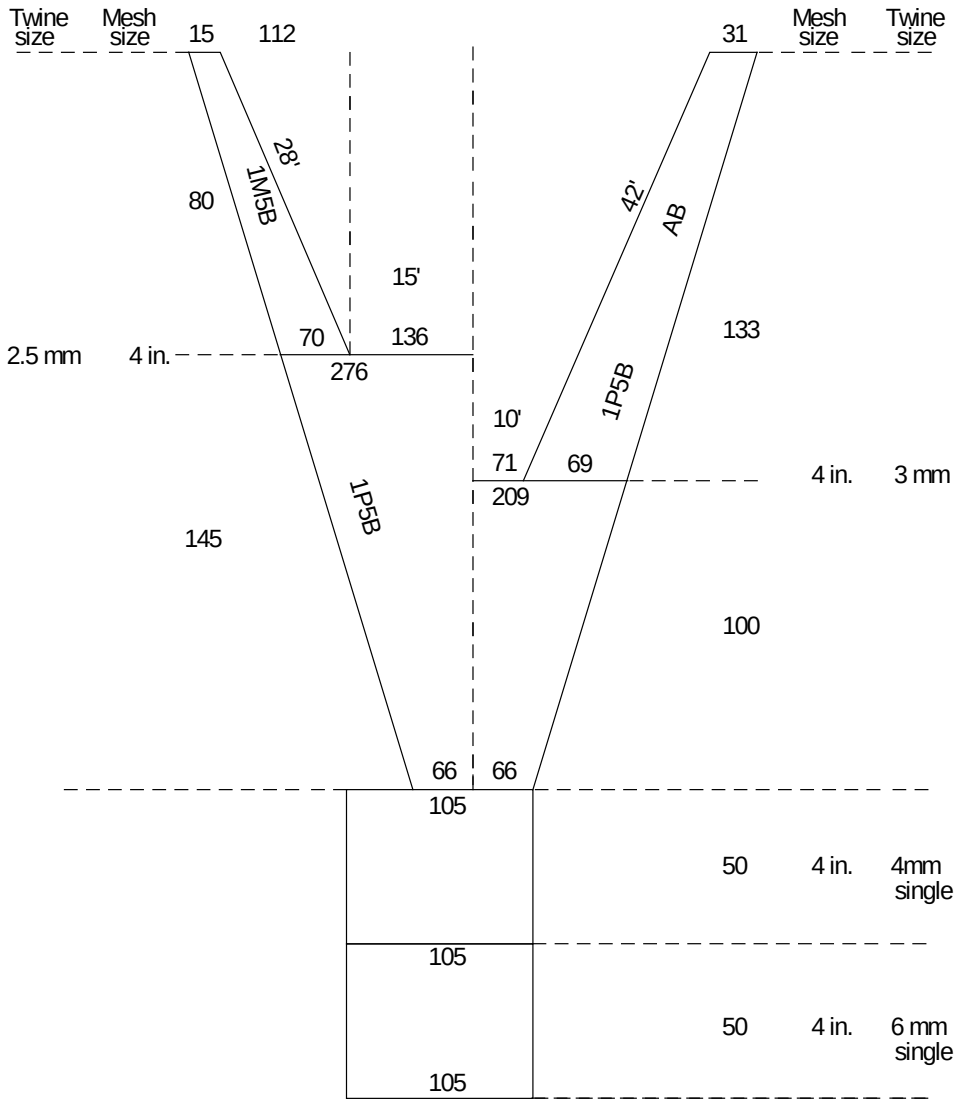


Figure 2. Schematic of the 400-mesh Eastern trawl.

PERSONNEL AND RESPONSIBILITIES

PSEMP assigns a science crew to carry out the survey on the charter vessel while the vessel contractor provides a vessel and qualified crew to carry out the trawl duties. The science crew consists of a lead scientist and three to five WDFW biologists, WDFW technicians, and possibly volunteers and visitors from other state or federal institutions who have vested interests.

A lead scientist in charge of the field operation is present on the vessel at all times. They are responsible for communicating with the vessel captain/operator to ensure the collection occurs as needed. All scientific crew and visitors are under the direction of the lead scientist and the PSEMP team leader. Vessel operation and safety issues are under the authority of the vessel captain/operator. The lead scientist's responsibilities consist of preplanning activities in addition to survey supervision and post survey reporting. The lead scientist at any time can and should delegate responsibility to assure the work is completed. Ideal duties to be delegated are packing up the gear in an orderly fashion and performing one task throughout the survey i.e., GPS trawl tracking or Comp Catch recorder. The following are the tasks assumed by the lead scientist unless delegated:

- Pre-survey planning: This includes finalizing the survey goals with PSEMP team leader, working out timelines with the charter vessel and the science crew, delegating duties amongst the crew, informing the crew of relevant sampling procedures plus survey's goals, and survey gear is ordered, packed and loaded
- Ensuring the survey plan and procedures are followed.
- Maintaining a daily log of survey activities. This includes listing the science and vessel crew present, start and end times for different tasks, how long engines ran, how many specimens were taken and how the samples were stored, etc…
- Providing safety orientation in conjunction with the skipper, for science crew new to the vessel, prior to vessel leaving port.
- Promoting a positive and collegial working relationship between vessel and science crew
- Supervising adherence to all safety procedures.
- Reviewing survey forms to safeguard accuracy and completeness.

Several tasks, while performing the survey, should be given to a single member of the science crew to ensure consistent and accurate recording of data. The "trawlmaster" monitors GPS equipment in the vessel's wheelhouse, records haul information on the Haul Position form, and uses preplanning maps and skipper's historical knowledge to ensure tow location and execution is accurate. The "specimenmaster" coordinates deck work to ensure adequate numbers of the intended species are counted and placed in the live tank. The 'weighmaster" ensures species composition and weights are recorded accurately and consistently on the Catch Composition Form (CCF). Any one of these tasks can be delegated if need be or the crew has changed.

Overall, in addition to the specified duties noted above, the science crew responsibilities also include working together to:

- Accurate completion of data forms
- sort the catch by species and collect/isolate the specimen(s) of interest
- report species and the respective weight, and numbers to the weighmaster
- set up of mobile lab and processing specimens
- label legibly and accurately all samples generated (individual and composites)
- clean sampling equipment and deck area as necessary at the close of work each day
- keeping the boat in good working order for safety and cleanliness

The vessel contractor will provide crew to operate vessel equipment, maintain nets, and cook meals. Contractor crew is under the direction of the skipper and all gear handling and piloting is their responsibility. Difficulties or disagreements between scientific crew and vessel crew/skipper will be reported directly to the lead scientist for resolution.

TRAWL PROCEDURE

The vessel travels to station coordinates provided by the lead scientist to the skipper for each survey station. Once in the vicinity of the target station, the vessel operator and lead scientist refer to a nautical chart/ navigational software and observe conditions (vessel traffic, current direction/speed, wind direction/speed, etc.) to determine the course for a tow. The primary criteria to consider are vessel and worker safety, legal navigation and avoiding charted or known obstructions.

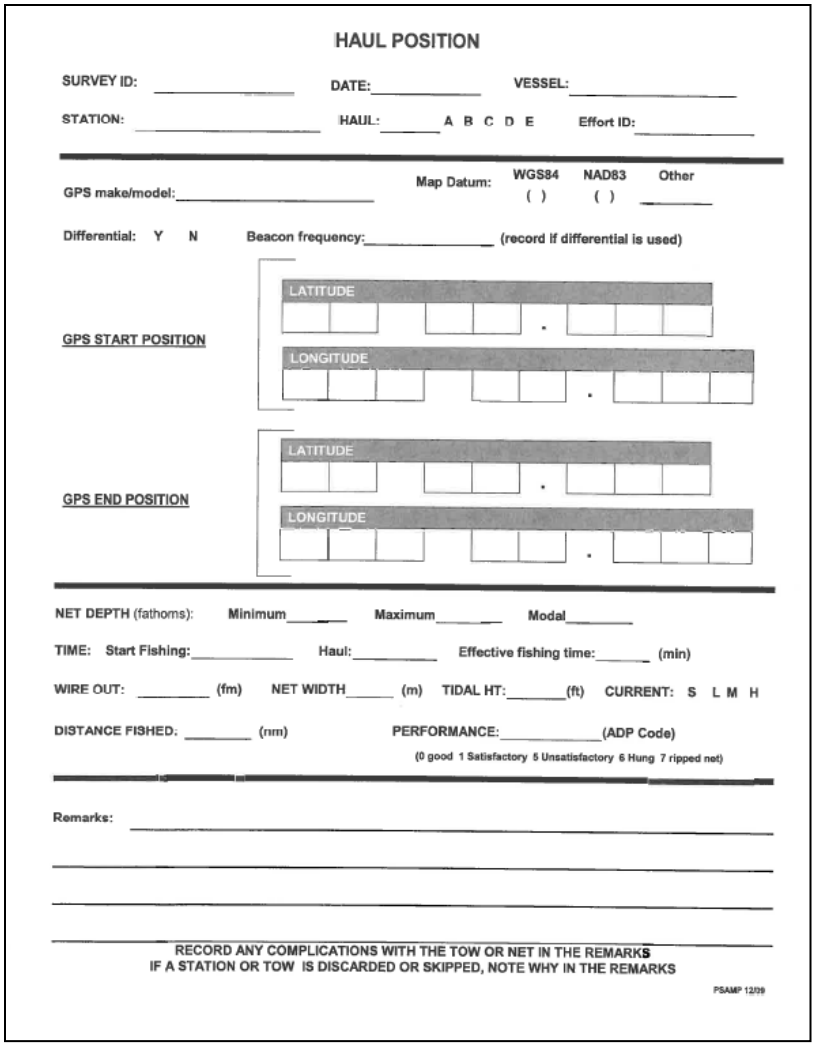
Prior to fishing, the vessel operator pilots the vessel over the proposed tow, watching for other vessel traffic, and using a fathometer to observe for obstructions on the sea floor. Under normal conditions the vessel speed will be between 2 and 3 knots during the tow. For most tows, the vessel/net should be oriented into the current. The duration of time the tow occurs is generally 10 minutes or less to keep the catch at a size that will not exceed the capacity of the sorting table. That is approximately 1,500 pounds.

For all tows, the trawlmaster will complete the Haul Position Form making sure to record the haul number, the start and end position (latitude and longitude), minimum and maximum net depth, tow start, and haul times, cable out, and net performance. Figure 3 is the Haul Form that is recorded on.

A haul number is assigned to each station as it is encountered, beginning with 1. For consecutive hauls at a station, the first haul is assigned the letter "A", the second "B" etc. For example, if three hauls were made at the third station sampled, they would be numbered 3A, 3B, and 3C. Tow start time is the time at which the net is on the bottom and the trawl doors are spreading. Generally, after the trawl winches are locked and the vessel reaches its tow speed of 2 to 3 knots. This will vary with depth, from a few seconds in shallow tows to a minute or two at extreme depths. Haul time is the time at which the vessel slows to retrieval speed and the winches are engaged. Cable out is the amount or length in fathoms of cable fed out as read from the cable counters. Net performance is coded as follows: performance: 0 – good, 1 – satisfactory, 5 – unsatisfactory, 6 – hung and 7 - ripped net.

Station location start and end positions will be taken using GPS. The make and model of the GPS will be recorded on the Haul Position form along with the Map Datum used. Generally, PSEMP uses the WGS84 map datum, but some surveys require use of NAD83. Other observations such as sea and weather conditions, problems encountered and any other information that will help reconstruct what was done and why should also be recorded on the Haul Position form. Additionally, GPS tracking of the entire tow will be monitored and recorded electronically to download post survey. This information will be useful in selecting stations in the future and in analyzing tow results.

Contracted vessel personnel are the only ones allowed to handle the net and operate the trawling equipment. Science crew is to stay in the wheel house, top deck or mobile lab (galley) until the catch is placed on the table. The catch is processed according to the Catch SOP. If one tow was insufficient to capture enough of the target species, more tows may be made, typically not exceeding five for a station.



HAUL POSITION

SURVEY ID: _____ DATE: _____ VESSEL: _____

STATION: _____ HAUL: _____ A B C D E Effort ID: _____

GPS make/model: _____ Map Datum: WGS84 ( ) NAD83 ( ) Other _____

Differential: Y N Beacon frequency: _____ (record if differential is used)

GPS START POSITION
LATITUDE
LONGITUDE

GPS END POSITION
LATITUDE
LONGITUDE

NET DEPTH (fathoms): Minimum_____ Maximum_____ Modal_____

TIME: Start Fishing: _____ Haul: _____ Effective fishing time: _____ (min)

WIRE OUT: _____ (fm) NET WIDTH_____ (m) TIDAL HT: _____(ft) CURRENT: S L M H

DISTANCE FISHED: _____ (nm) PERFORMANCE: _____(ADP Code)

(0 good 1 Satisfactory 5 Unsatisfactory 6 Hung 7 ripped net)

Remarks: _____

RECORD ANY COMPLICATIONS WITH THE TOW OR NET IN THE REMARKS
IF A STATION OR TOW IS DISCARDED OR SKIPPED, NOTE WHY IN THE REMARKS

PSAMP 12/09

Figure 3. Haul Position form

PROCESSING SPECIMENS ON BOARD (CREATION OF THE MOBILE LAB)

On board inside the vessel, the PSEMP science crew converts the gallery into a temporary “mobile lab”. Every survey has specific goals or objectives regarding the tissues to be removed and what analyses will be performed. The QAPP or survey plan covers these details and is communicated directly to the science crew by the lead scientist before the survey takes place. Whereas herein this SOP, the general concepts are covered for who does what, how many are needed, and when certain activities occur and in what order.

All surfaces are covered with foil and dissection stations are set up with appropriately cleaned utensils. All sample containers are labeled in advanced as much as possible. Depending on the science crew numbers, one to or a team of two people obtain fish from the live well, record biological data, and once the specimens are resected, that sample containers and the specimen form are appropriately labeled. Once biological data is recorded, fish are handed over to the dissection personnel for resectioning.

STORING AND PACKAGING OF WHOLE SPECIMENS AND SAMPLES

Once specimens are processed in the mobile lab, the resulting whole bodies, carcasses and/or samples are packaged and stored for transport to the respective labs. Sample handling and storage depends on the matrix and the analyses involved. The specific nature of sample handling and storage are covered in the respective SOP, survey plan, and/or study QAPP.

Appendix B: NMFS Section 10 Scientific Collection Permit

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northwest Region
7600 Sand Point Way NE
Seattle, Washington 98115

October 31, 2012 F/NWR3

Mr. Jim West
Washington Department of Fish and Wildlife
600 Capitol Way N
Olympia, WA 98501

Re: Permit 16091

Dear Mr. West:

Enclosed is Scientific Research Permit 16091 issued to the Washington Department of Fish and Wildlife (WDFW) under the authority of Section 10(a)(1)(A) of the Endangered Species Act. The permit authorizes the WDFW to annually take listed rockfish, salmonids, and sturgeon while conducting Puget Sound Assessment and Monitoring Program Survey. Currently, no take prohibitions are in place for eulachon, canary rockfish, and yelloweye rockfish, so they are not included in this permit. However, our issuance of the permit is based on an analysis of the effects of the research on all ESA listed species. If during the course of the research you should exceed the amount of take included in your permit application for any of the listed species, our biological opinion and decision to issue the permit may no longer be valid. If you exceed any level of take requested in your permit application (or if such an event is likely), you must notify NMFS as soon as possible--and within 48 hours at most.

The National Marine Fisheries Service (NMFS) requires that the individuals acting under the authority of Permit 16091 review the permit before engaging in the permitted activities. Please sign and date the last page then fax a copy of it (or mail a photocopy) to our office to the attention of Mitch Dennis. Our fax number is (503) 230-5441. Please note that you are not authorized to conduct activities under Permit 16091 until our office receives a signed copy of the signature page.

Your attention is directed to Section B(19) which describes the annual report and annual authorization requirements. Permit 16091 is subject to annual authorization based on your reported annual take and compliance with the authorization requirements. Annual reports are due by January 31 each year. Permit 16091 expires on October 2, 2017.

If you have any questions concerning the permit, please contact Mitch Dennis at (360) 753-9580.

Sincerely,

for William W. Stelle, Jr.
Regional Administrator

Enclosure

cc: File copy - [16091], F/EN6 - NMFS Enforcement (Raneses), F/NWC1 - Northwest Fisheries Science Center (Ferguson)