



DEPARTMENT OF
ECOLOGY
State of Washington

Standard Operating Procedure

EAP009, Version 1.3

Field Collection, Processing, and Preservation of Finfish Samples at the Time of Collection in the Field

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Purpose of this Document

The Washington State Department of Ecology develops Standard Operating Procedures (SOPs) to document agency practices related to sampling, field and laboratory analysis, and other aspects of the agency's technical operations.

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SIGNATURES AVAILABLE UPON REQUEST

Please note that the Washington State Department of Ecology's Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical and administrative experts. Their primary purpose is for internal Ecology use, although sampling and administrative SOPs may have a wider utility. Our SOPs do not supplant official published methods. Distribution of these SOPs does not constitute an endorsement of a particular procedure or method.

Any reference to specific equipment, manufacturer, or supplies is for descriptive purposes only and does not constitute an endorsement of a particular product or service by the author or by the Department of Ecology.

Although Ecology follows the SOP in most instances, there may be instances in which the Ecology uses an alternative methodology, procedure, or process.

SOP Revision History

Revision Date	Revision History	Summary of changes	Sections	Reviser(s)
08/30/06	V1.0	SOP Publication	all	P. Sandvik
10/19/10	V1.0	Three year review, minor changes		
10/21/10	V1.0	QA approval, recertified		
03/20/14	V1.0	Three year review, minor changes		
04/21/14	V1.1	QA approval, recertified		
04/20/17	V1.2	Three year review, minor changes		P. Sandvik
5/5/2017	V1.2	Recertification	all	W. Kammin
4/30/19	V1.2	added recertification date	cover, p. 1	J. Ponzetti
10/15/21	V1.3	Revised in new template. Updated and added accessibility.	all	Sandvik, Kaza

1.0 Purpose and Scope

- 1.1 This document is the Environmental Assessment Program (EAP) Toxics Study Unit (TSU) Standard Operating Procedure (SOP) for collection, processing and preservation of finfish samples in the field. A separate SOP on resecting samples in the laboratory is also available (SOP #007 *Procedures for Resecting Finfish Whole Body, Body Parts, or Tissue Samples*).
- 1.2 Washington State Department of Ecology investigates the occurrence and concentrations of toxic contaminants in fish tissue. This SOP is intended to provide consistent techniques that ensure the quality of sample collection, tissue preparation (including whole finfish or other body parts) for the purpose of homogenizing samples for chemical analysis by an accredited analytical laboratory. This SOP was adapted from the Environmental Protection Agency's (EPA) *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1 Fish Sampling and Analysis Third Edition* (2000).

2.0 Applicability

- 2.1 This procedure is to be followed by Ecology person(s) conducting projects involving the collection of finfish tissue samples for contaminant analysis.
- 2.2 This SOP also addresses fish field processing to be conducted by other agencies (Washington Department of Fish and Wildlife, Tribes, etc.) when collecting fish for Ecology. See Attachment 1 for a one-page summary to present to non-Ecology groups for instructing when coordinating cooperative fish collection efforts.

3.0 Definitions

- 3.1 Composite – Composite samples are homogeneous mixtures of samples from two or more individual organisms of the same species collected at a particular site and analyzed as a single sample.
- 3.2 Ecology – Washington State Department of Ecology.
- 3.3 EAP – Environmental Assessment Program.
- 3.4 FFCMP – Freshwater Fish Contaminant Monitoring Program.
- 3.5 Field Log Book – A weather resistant logbook used to document all field activities, sample data, methods and observations for each and all collection sites.
- 3.6 Lab Analysis & Tracking Plan – A table, usually created in Excel®, used to plan and document lab analyses of samples for single or multiple projects (Attachment 2).
- 3.7 QAPP – Quality Assurance Project Plan.
- 3.8 Processing Bench Sheet – A table, usually created in Excel®, used to plan and document sample processing data for each fish collected (Attachment 3).
- 3.9 Resecting – Surgical removal of all or part of an organ, tissue or structure.
- 3.10 TSU – Washington State Department of Ecology's Toxics Study Unit.
- 3.11 WDFW – Washington Department of Fish and Wildlife.

4.0 Personnel Qualifications/Responsibilities

4.1 Staff leading or participating in fishing operations must meet qualifications described in Scientific Collection Permits. Required qualification might vary by permits, so staff need to consult each permit prior to field operations and fish collection. There are additional requirements for conducting fieldwork and operating Ecology boats. Please see “Safety” section 9.4 of this SOP for details.

5.0 Equipment, Reagents, and Supplies

5.1 Fish identification guides.

5.1.1 Wydoski, R. and R. Whitney. 2003. *Inland Fishes of Washington*, Second Edition. University of Washington Press. Seattle, WA.

5.1.2 Sport Fishing Rules for Washington – Current year’s edition located at <https://wdfw.wa.gov/>.

5.2 Field Log Book is a weather resistant notebook – Rite in the Rain™ (Figure 1).

5.3 Indelible ink and pens that function when wet.

5.4 Marking pens, pencils, pencil sharpener, permanent markers.

5.5 Field Identification (ID) tags (Figure 2).

5.6 Identifying tape – Blue painter’s masking tape.

5.7 Camera.

5.8 Bench scale (battery operable), include extra 9v batteries, standard weights, and standards log book for pre and post accuracy checks (Figure 3 and 4).

5.9 Fish measuring board (Figure 5).

5.10 Heavy-duty aluminum foil typically Reynolds Foodservice Foil 45.7cm x 152.4mm (624) and 38.1cm x 152.4mm (622).

5.11 Talc-free nitrile exam gloves.

5.12 Paper towels.

5.13 Garbage bags.

5.14 Polyethylene zip seal bags – Gallon sizes.

5.15 Large (11 in X 14 in or larger if needed) polyethylene bags for preserving large fish.

5.16 Plastic cable ties (zip ties).

5.17 Headlamp with extra batteries and an extra new bulb available.

5.18 Flashlights with extra batteries.

5.19 Gloves for handling fish.

5.20 Coolers with ice – Enough coolers and ice for ice to surround expected fish collected.

5.21 5-gallon bucket(s).

5.22 Deionized distilled (DI) water.

- 5.23 Copy of QAPP, which specifies the fish to be collected.
- 5.24 Scientific Collection Permits and associated equipment/references required by permits.
- 5.25 Electrofishing log forms (for boat and/or backpack electrofishers).
- 5.26 Fish collection gear such as boat, electrofishers, nets, fishing poles and tackle, and related equipment.
- 5.27 Related forms, fishing permits, checklists, and electrofishing log templates are located at F:\EAP\SHARED Files\TSU Fish.

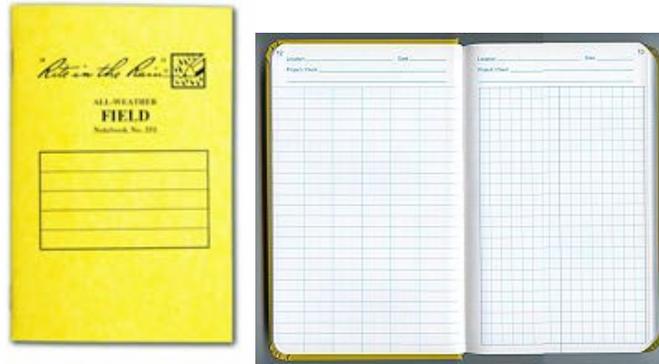


Figure 1 Field Log Book (Weather resistant notebook – Rite in the Rain™). Used to record fish field data, site information, methods, etc

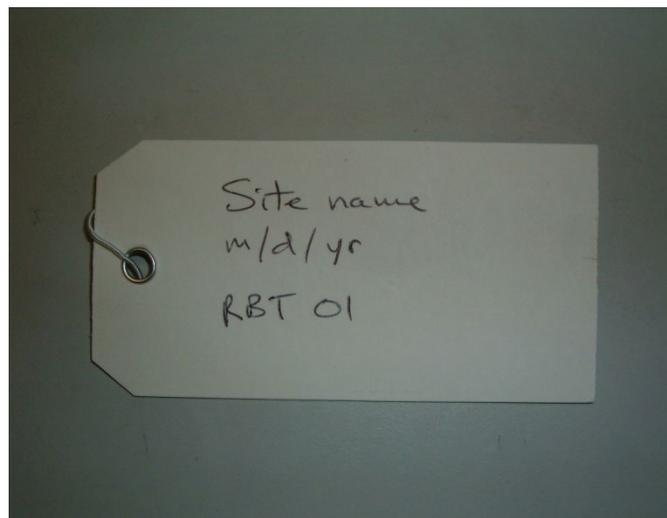


Figure 2 Fish field identification tag.



Figure 3 Bench scale.



Figure 4 Scale Log Book, Standard Weights, 9-volt battery (Items stored in scale case).

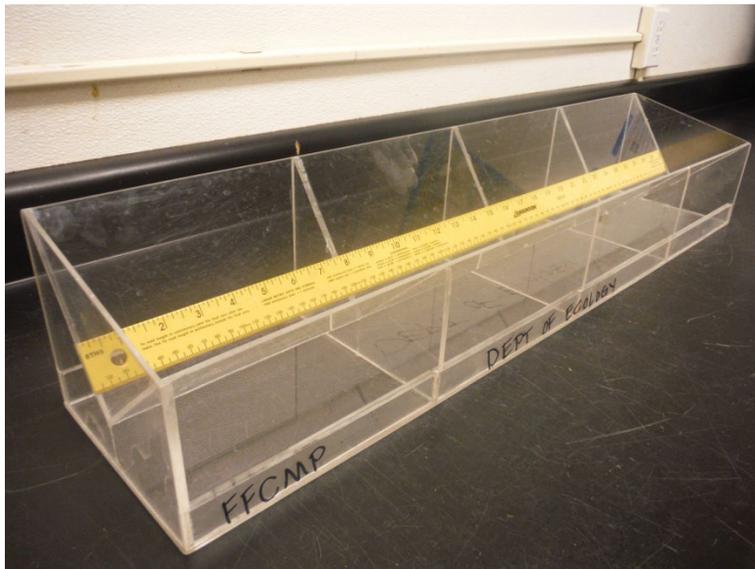


Figure 5 Fish Measuring Board.

6.0 Summary of Procedure

6.1 Fish collection planning.

- 6.1.1 Plan field sampling. Successful fish collection efforts require planning at various levels. The QAPP will describe project goals and help guide the selection of fish to collect from designated sites. Various Scientific Collection Permits are required at all sites and may dictate numerous conditions related to fish collection efforts. Reconnaissance of fish collection locations provides information needed to plan field efforts. Selection of fish collection methods and gear help determine resources needed in the field to collect target numbers and species of fish. Finally, document all field efforts in order to meet requirements of various permits and to record information about samples collected for the project.
- 6.1.2 Review QAPP. Identify the specifics needed to meet project objectives. Items of primary concern are timing and locations of fish collections, numbers and size ranges of target species at each site, collection methods, procedures for field processing, and any information relevant to the collection and preservation of samples.
- 6.1.3 Review collection permits. Determine the need for permits and/or permissions to collect fish at each site and contact the unit permit coordinator to obtain copies of relevant permits. Permits may need to be applied for, and is a process that can take from 2 to 6 months. One or more permits from various agencies and/or documented permission from other entities are needed to collect fish from, or gain access to, any site. Table 1 summarizes the various permits and agencies that may have jurisdiction at fish collection sites. Find the latest version of this Summary of Permit table on F:\EAP\SHARED Files\TSU Fish\Permits. Each permit has unique requirements about: species, locations, time of collection, collection methods and restrictions, personnel authorized for field work, record-keeping and reporting, notification of permitting authority, and more. Permits generally require that the permitting authority be contacted prior to collection within a time frame specified in permits (usually about 4 weeks to 3 days).

Table 1. Various permits and agencies that may have jurisdiction at fish collection sites.

Summary of Permits or Permissions Needed for Collecting Fish.					
Who Issues	Example	Permit Type	Geographic Coverage	Species	Application Information
WDFW	Washington State Department of Fish and Wildlife	Formal Permit	All waters within state	All species	http://wdfw.wa.gov/licensing/scp/
NOAA - NMFS	National Oceanic and Atmospheric Administration - National Marine Fisheries Service	Formal Permit	Most of state where about 14 ESA-listed anadromous salmonids species occur	Salmon & Steelhead	http://www.nmfs.noaa.gov/pr/permits/index.html
USFWS	U.S Fish and Wildlife Service	Formal Permit	Much of state where the ESA-listed Bull Trout has been found	Bull Trout	http://www.fws.gov/endangered/permits/index.html
National Parks	Olympic NP, Lake Roosevelt National Recreation Area	Formal Permit	Within National Park, Nat'l Recreation Area boundaries	All species	https://irma.nps.gov/rprs/Home
Other State Agencies	Washington Parks and Recreation	Formal Permit	In waters or access points managed by WA Parks and Recreation	All species	http://parks.state.wa.us/204/Passes-Permits
Tribes	Roughly 30 recognized Tribes in Washington	documented permission or notification	In waters or access points where Tribes have jurisdiction	All species?	https://goia.wa.gov/tribal-directory
Other Federal Agencies	USFS, BLM, BOR, USACE,	documented permission or notification	In waters or access points where such agencies have jurisdiction	All species?	Individual agencies
Local Government	Cities, towns, counties	documented permission or notification	In waters or access points managed by local gov't	All species?	Individual governments
Private Landowners	private citizens, utility companies operating dams	documented permission or notification	In waters or access points managed by local gov't	All species?	Individual private landowners

6.1.4 Site Reconnaissance. Obtain information about the site, access, species, local conditions, and any information that will improve chances of a successful fish collection effort. WDFW and other agency biologists have been very helpful with local knowledge. A site reconnaissance checklist (Attachment 4) can help guide inquiries into site characteristics. Most reconnaissance are conducted via phone, email, and office resources (e.g. Gazetteer, GIS, and other staff).

6.1.5 Select fish collection methods. Determine which collection gear and methods are appropriate for site characteristics and meeting project objectives. Boat electrofishing and gill netting are the most common methods used by Ecology's Toxics Study Unit (TSU). Other methods include backpack electrofishing, angling, and use of other nets such as beach seines, fyke nets, and otter trawls. Ensure needed equipment is available and in serviceable condition prior to field collection efforts. An inventory of nets and accessory gear is located at F:\EAP\SHARED Files\TSU Fish\Fishing Equipment Inventory\nets. Note that special training is required for boat operations and electrofishing.

6.2 Collect fish and document field efforts.

- 6.2.3.1 If boat electrofishing, fill out all fields. The NOAA permit requires this information. for Enter time of day and engine hours when getting underway and when returning to launch point. Measure and record the surface temperature and conductivity at a point representative of where electrofishing will occur. Fill out generator hours and electronics settings at start and end of electrofishing effort. Record any changes in electrofishing settings during fishing in the Electronics Log section.
- 6.2.3.2 The back of the form is used to record the approximate number of individuals for each fish species encountered (WDFW permit requirement). Additional pages can be used for notes required by permits or additional information such as sample collection activities, hydrologic conditions, weather conditions, boat or equipment operations, any other unusual activities observed (e.g. dredging), or problems encountered that would be useful to the manager in evaluating the quality of the fish contaminant monitoring data.
- 6.2.3.3 If backpack electrofishing, similar electrofishing logs (Figure 7) are required for permitting purposes. Use the most current Boat Electrofishing Log form found in F:\EAP\SHARED Files\TSU Fish\Field prep file location.

Backpack Electrofishing Log					Date(s): 10-15-08	
Site: PAHATA CRK						
Crew: CD, PS, ST						
Weather & site conditions (note substrate & gen flow): OVERCAST AND COLD 38°F, SLIGHT BRZ, ROCKY SUBSTRATE, OCC ORGANIC MATTER/DOWN LOGS, FLOW 1/2 CFS						
Date	Time UW	Time RTN	Anode #	Cathode #		
10-15-08	1100	1430	2	-		
Surface WQ						
Location		Time	Temp (C)	Cond (uS/cm)	Vis (ft)	
@ SECOND FISH WEIR ON F.S. Rd #040		1115	1.6	48	1+	
Electronics Log for Backpack Unit						
Time	Shock Seconds	Right Mode (refers to cycle time 2,4,6,8 or 10 sec)	Left Mode (F30Hz, 145Hz, L60Hz, etc)	Voltage (100-1000)		
1115	0	8	J 60Hz	500		
1345	893	"	"	"		
list species encountered and other comments on back of page						

Fish Encountered		Site: PAHATA CRK
Species	Estimated #'s	Date(s)
BKT	30+	10-15-08
RBT	10+	↓
SCULP	2	
Notes: CREEK IS VERY SHALLOW, RANGES 1"-8" DEEP. LARGER POOLS NEAR FISH WEIRS 6"-14" DEEP. MAJORITY OF FISH WERE COLLECTED BLW WEIRS IN POOLS. FISH RESPONDED WELL TO SHOCK SETTINGS. 2 ND WEIR LOCATION LAT: 46° 15' 33N / LONG 117° 31' 40W		

Figure 7 Front and back of Backpack Electrofishing Log form.

- 6.2.3.4 If setting gill nets, fyke nets, or beach seines; for each net identification (ID), record the location of each net set on a map, chart or GPS coordinates and the times of net set and retrieval. In addition, record the numbers and species of fish collected with each net set. Make these notes in the field logbook and/or on accompanying maps or charts of the site.
- 6.2.3.5 If trawling, record the net ID used, times and locations of trawl deployment and retrieval, and the numbers and species collected in the field logbook or accompanying maps or charts of the site.
- 6.2.3.6 If angling, record the location and time of effort along with numbers and species of fish encountered and collected in the field logbook or accompanying maps or charts of the site.
- 6.2.4 Collect fish and identify fish to species level as soon as collected. Ensure that adequate numbers and size ranges described in the QAPP are met. See Attachment 5 for target fish species. Return nontarget species or specimens that do not meet size requirements to their home environment. Consult experienced personnel knowledgeable in local fish identification and taxonomic keys, appropriate to the waters sampled for species identification. **Correct identification of species in the field is critical to project needs.**
- 6.2.5 Inspect fish to ensure that the specimen has no broken skin, damaged fins or other injuries that may compromise the quality of the sample. Discard damaged specimens. Rinse selected fish in ambient water to remove any foreign material from the external surface.
- 6.2.6 At the end of the fish collection effort, return to the launch point, complete field logs by correctly filling them out, and begin preparations to process the fish retained for the study.
- 6.3 Prepare to field-process fish.
 - 6.3.1 Prepare Field Logbook for the following:
 - 6.3.1.1 Project Name
 - 6.3.1.2 Sampling date and time
 - 6.3.1.3 Sampling site location
 - 6.3.1.4 Collection method
 - 6.3.1.5 Collector's names
 - 6.3.1.6 Species collected and number of individuals of each species
 - 6.3.1.7 Field ID number for each fish specimen retained
 - 6.3.1.8 Total length (measured to nearest millimeter)
 - 6.3.1.9 Weight (measured to nearest gram)
 - 6.3.1.10 Notes including visible morphological abnormalities such as fin erosion, skin ulcers, cataracts, skeletal and exoskeletal anomalies, neoplasms, or parasites.

- 6.3.2 Prepare field identification tags for each specimen on a waterproof tag using indelible ink and writing implements that can function when wet (Figure 2). Record the site name, date collected, species or species abbreviation, and a unique field ID. An example of a Unique Field ID designated for the individual fish at that site is RBT 01 through RBT 05 for five rainbow trout collected.
- 6.3.3 Prepare blue painter's tape to serve as specimen identification once the fish has been double-wrapped in foil. Write the abbreviated species and field ID on the tape with a sharpie-marking pen. Tear off enough of the labeled tape to wrap around the foil-wrapped fish.
- 6.3.4 Label polyethylene bag(s) with a permanent marker to hold the collected fish. Write the collection location, collection date, species of fish and unique field IDs of the fish placed in the bag.
- 6.3.5 Prepare the battery operated bench scale for weighing fish. Ensure scale is located on flat level surface. Windy conditions may cause scale measurements to drift up and down making it difficult to record accurate weights. If this happens, it might be necessary to situate scale out of the wind, or stack field totes and coolers around scale to block wind. Ensure scale accuracy by checking the weighing standard weights before each fish processing session. Record accuracy data in scale log book (Figure 4).
- 6.4 Sample Processing and Preservation.
- 6.4.1 Euthanize large fish by a sharp blow to the base of the skull with a wooden or heavy club to facilitate processing and packaging. Keep the club reasonably clean to prevent contamination of the samples. Small fish may be asphyxiated or euthanized by putting on ice immediately after capture (U.S. EPA, 2000).
- 6.4.2 Measure the total length to the nearest millimeter of each fish using the fish measuring board (Figure 5). Total length (also called maximum body length) is defined as the length from the anterior-most part of the fish to the tip of the longest caudal fin ray (when the lobes of the caudal fin are compressed dorsoventrally) (Figure 8) (U.S. EPA, 2000). Record total length in the Field Log Book (Figure 1).

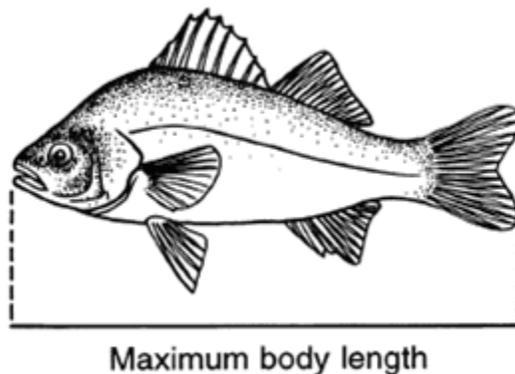


Figure 8 Recommended measurements of body length (total length) and size for fish. Maximum body length (total length) is defined as the length from the anterior-most part of the fish to

the tip of the longest caudal fin ray (when the lobes of the caudal fin are compressed dorsoventrally) (U.S. EPA, 2000)

- 6.4.3 Weigh each fish to the nearest gram using a portable, battery operated bench scale. Record weight in the Field Log Book.
- 6.4.4 Wrap individual fish in two layers of extra heavy-duty aluminum foil (dull side in). Wrap completely in the first layer of foil then repeat with the second layer. Place labeled field identification tag between the two layers of foil. Secure wrapped fish with the labeled identifying tape by wrapping the tape around the middle of wrapped fish (Figure 9).



Figure 9 Fish wrapped in two layers of foil (dull side to fish), taped with label and placed with same species into labeled watertight polyethylene bags.

- 6.4.5 Place fish of the same species and from the same location into labeled watertight polyethylene bag(s) and seal by zipping bag or by using zip ties. Place packaged fish in ice immediately.
- 6.4.6 Transport specimens to the processing lab as quickly as possible and place in a freezer at ≤ -20 °C for later processing

7.0 Records Management

- 7.1 Field Log Book – The Field Log Book is kept with a designated project team member for safekeeping and retrieval as needed. This logbook contains fish field data and site information. These logs are mandatory for permit reporting purposes.
- 7.2 Boat Electrofishing Log – These logs are also mandatory for permit reporting purposes. A template is found at F:\SHARED Files\TSU Fish\Field prep. Templates are formatted to print on 8 ½” x 11” Rite in the Rain™ paper containing two 4 5/8” x 7” perforated sheets.
- 7.3 The Lab Analysis & Tracking Plan and Processing Bench Sheet are tables, usually created in Excel®, used to document and coordinate all activities and data for single or multiple projects per collection and sampling time period and for documenting the tissue sample preparation for lab analysis. See Ecology’s SOP #007 *Resecting Finfish Whole Body, Body Parts or Tissue Samples* Section 7.0 for more information about these two forms.
- 7.4 Record management forms can be found at F:\SHARED Files\TSU Fish\SOP forms for Fish.

8.0 Quality Control and Quality Assurance

- 8.1 Assure sample integrity preservation by preventing the loss of contaminants already present in the tissues and by preventing extraneous tissue contamination (U.S. EPA, 2000). Loss of contaminants present in fish can be prevented by ensuring that the sampling gear or other mechanisms have not lacerated the skin on fish. Identify possible sources of extraneous tissue contamination such as sampling gear, grease from boat winches or cables, spilled engine fuel, engine exhaust, dust, ice chests and ice and take appropriate steps to minimize or eliminate them (U.S. EPA, 2000).
- 8.2 Verify that all information is filled out on the fish field identification tag for each fish sample. Ensure identification tag coincides with the correct fish ID written in the Field Log Book.
- 8.3 Verify that the Field Log Book contains all documentation of field activities, sample data, methods and observations for each and all collection sites.
- 8.4 Verify the completeness and accuracy of the information in all hard copy and electronic documentation. When hard copy data is transcribed to electronic files the person responsible for entering that data should perform verification checks and write “QA”, “their initials” and “date completed” at bottom of page to indicate data has been reviewed and entered into appropriate files.

8.5 Drain ice chest often to prevent possible cross contamination from melting ice during transport.

9.0 Safety

9.1 Conduct fish processing only by or under the supervision of someone with experience.

9.2 Gloves are required for fish processing to avoid exposure to pathogens and chemicals, and to avoid sample contamination. Hands should be cleaned using soap and clean water after completing work or any time hands become soiled during the process. Gloves should be replaced when torn, punctured, or anytime used gloves are removed from hands.

9.3 Follow general procedures for safety found in the *Environmental Assessment Program Safety Manual* Chapter 1 (2019). Take extra care for night collections and field processing. Ensure adequate lighting. Use of a night headlamp is recommended. Have extra batteries and a new bulb available.

9.4 Boat operations require that staff meet specific training requirements as described in the *Environmental Assessment Program Safety Manual*, such as an EA Boating Course and an approved Boating Safety Course. There are additional requirements to operate Ecology's 16' Electrofishing boat. See the *Environmental Assessment Program Safety Manual* section "Operating Electrofishing Boat's" for details. Most field operations also require training specified in EAP's Safety Manual such as First Aid, CPR, and Defensive Driving.

10.0 References

10.1 Ecology. 2019. Environmental Assessment Program Safety Manual. Olympia, WA.

10.2 U.S. EPA (Environmental Protection Agency). 2000. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1 Fish Sampling and Analysis. Third Edition. Office of Science and Technology. Office of Water, Washington D.C. <https://epa.gov/fish-tech/epa-guidance-developing-fish-advisories>. Accessed October 2021.

10.3 Zaroban, D.N., M.P. Mulvey, T.R. Maret, R.M. Hughes and G.D. Merritt. 1999. Classification of Species Attributes for Pacific Northwest Fishes. Northwest Science, Vol. 73, No. 2, pp. 81-93. May 1999.

Attachment 1. Summary of fish Field Processing

Summary of Fish Field Processing for Ecology Studies of Toxics in Fish (October 2021)	
1	Number of fish: 5 minimum; 6-10 OK if unsure about size distribution of all fish. Generally, 5-fish composites are used for most samples. If fish are <6", up to 10 fish may be needed in order to give enough fillet tissue for analyses.
2	Fish size: should be similar size - guideline is the total length of the smallest fish should be no less than about 75% of the total length of the largest fish. Larger fish are preferred over smaller fish. Generally want fish that may be sought by anglers (>8").
3	Inspect fish to ensure good specimen - no broken skin or injuries that may compromise quality of the sample. For trouts, check and note absence or erosion of any fins (e.g. adipose fin clipped off, pectoral and/or anal fin leading edges eroded) which may indicate hatchery-origin. Once selected, rinse fish in ambient water.
4	Assign ID number for each fish and record total length and weight of each fish in field notebook. Place a sample ID tag between foil layers for each fish containing the following information: date, site, species code, and fish ID number. (e.g. 11/11/19, Snake River or Central Ferry (CF), LMB-1).
5	Wrap each fish individually using new aluminum foil (dull side of foil to fish). Double-wrap fish: wrap once in foil, then wrap again in foil.
6	Put wrapped fish from the same waterbody and of the same species in large zip-lock or poly trash bags. Different species, different bag. Different locations, different bag.
7	ID bag contents: write following info on bag exterior near zip-loc seal or opening: FFCMP (or other proj), site, date, species and fish IDs in bag (e.g. Snake River or Central Ferry, 11/11/19, LMB 1-3). Use a Sharpie or other waterproof marker.
8	Place bagged samples on ice as soon as possible. Drain water from cooler occasionally so bagged fish do not get wet from meltwater. Transfer bagged fish to HQ freezer upon return.
9	Return field notes and other info to Patti or Keith. Note date of collection, how collected (electrofished, gillnetted, angled, etc), and general location/land marks if possible.

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Attachment 2. Lab Analysis and Tracking Plan, (example only)

Note: The Lab Analysis and Tracking Plan may look different, due to different fields and requirements of the project(s) involved, but fields will be available for documentation and cross reference of each sample's collection and processing information.

Lab Analysis & Tracking Plan for FFCMP: 2016																												
FFCMP Work Order # 1701015											DE THESE FIELDS WHEN PRINTING																	
SIC DST03											jar size ->																	
min amount needed per analysis ->											5 g	40 g	40 g	60 g								2 oz	4 oz	4 oz	4 oz	4 oz	4 oz	
cost/sample ->											\$ 50	\$ 379	\$ 242	\$ 675	\$ 531								5 g	80 g	60 g	60 g	80 g	80 g
updated: 1/17/17 NM											Use these fields for sample jar LABEL. Record amount of tissue in each sample jar.																	
FFCMP (0)	Lab Dup MEL	MS/MSD MEL	Lab Dup CL	Site 1	Site 2	Species	suffix for LAR Field ID	collect date	# fish in comp	Hg	CP, PCBa (PEST2P CB)	PBDE, lipid	PCB congn r	PCDD /F	FFCMP LAR Field ID	FFCMP MEL Lab # 1701015-nn	FFCMP fish IDs	process date	aliquot per fish (g)	skin: off or on	s p a c e	Hg	PEST2PCB, PBDE, lipid	MEL QC	PCB congener, PCDD/F	Archive 1	Archive 2	
f				Cowlitz R: Castle	CR	LSS	LSS-1	8/29/16	5		1	1			CR-LSS-1	01	6,8,15,24,30	12/28/16	300	ON					80	80	80	
f				Cowlitz R: Castle	CR	LSS	LSS-2	8/29/16	5		1	1			CR-LSS-2	02	9,11,13,19,23	12/28/16	300	ON					80	80	80	
f				Cowlitz R: Castle	CR	LSS	LSS-3	8/29/16	5		1	1			CR-LSS-3	03	2,18,22,27,33	12/28/16	300	ON					80	80	80	
f				Cowlitz R: Castle	CR	MWF	MWF-1	8/29/16	5	1	1	1	1	1	CR-MWF-1	04	6,9,10,13,17	1/6/17	79	ON		5	80		60	80	80	
f				Cowlitz R: Castle	CR	MWF	MWF-2	8/29/16	5	1	1	1	1	1	CR-MWF-2	05	8,15,18,22,23	1/6/17	89	ON		6	80		60	80	80	
f				Cowlitz R: Castle	CR	MWF	MWF-3	8/29/16	5	1	1	1	1	1	CR-MWF-3	06	5,14,26,27,28	1/6/17	64	ON		5	80		60	60	60	
f	a	a	a	Cowlitz R: Castle	CR	NPM	NPM-A	8/29/16	5	1	1	1	1	1	CR-NPM-A	07	1,2,3,4,5	1/4/17	90	ON		5	80	60	60	80	80	
f	p	p	p	Cowlitz R: Castle	OL	CTT	CTT-1	8/30/16	5	1	1	1	1	1	OL-CTT-1	08	7,13,14,17,18	1/11/17	83	ON		5	80	60	60	80	80	
f	a	a	a	Cowlitz R: Castle	OL	CTT	CTT-2	8/30/16	5	1	1	1	1	1	OL-CTT-2	09	5,6,9,10,16	1/11/17	94	ON		5	80	60	60	80	80	
f				Cowlitz R: Castle	OL	CTT	CTT-3	8/30/16	5	1	1	1	1	1	OL-CTT-3	10	3,8,11,12,15	1/10/17	51	ON		5	80		60	62	44	
f				Cowlitz R: Castle	OL	LSS	LSS-1	8/30/16	5		1	1			OL-LSS-1	11	16,18,21,29,35	12/29/16	300	ON			80			80	80	
f				Cowlitz R: Castle	OL	LSS	LSS-2	8/30/16	5		1	1			OL-LSS-2	12	6,7,14,27,40	12/29/16	300	ON			80			80	80	
f				Cowlitz R: Castle	OL	LSS	LSS-3	8/30/16	5		1	1			OL-LSS-3	13	8,10,17,32,37	12/29/16	300	ON			80			80	80	
f				Cowlitz R: Olequa	OL	MWF	MWF-1	8/30/16	5	1	1	1	1	1	OL-MWF-1	14	13,15,25,32,37	12/28/16	91	ON		5	80		80	80	80	
f	p	p	p	Cowlitz R: Olequa	OL	MWF	MWF-2	8/30/16	5	1	1	1	1	1	OL-MWF-2	15	23,28,29,33,34	12/28/16	80	ON		5	80	60	60	80	75	
f				Cowlitz R: Olequa	OL	MWF	MWF-3	8/30/16	5	1	1	1	1	1	OL-MWF-3	16	14,20,24,30,40	12/28/16	77	ON		5	80		60	80	80	
f				Cowlitz R: Olequa	OL	MWF	MWF-L1	8/30/16	3	1	1	1	1	1	OL-MWF-L1	17	3,4,17	1/5/17	103	ON		5	81		80	80	32	
f				Cowlitz R: Olequa	OL	MWF	MWF-L2	8/30/16	3	1	1	1	1	1	OL-MWF-L2	18	6,10,19	1/5/17	108	ON		5	80		80	80	44	
f				Cowlitz R: Olequa	OL	MWF	MWF-L3	8/30/16	3	1	1	1	1	1	OL-MWF-L3	19	7,9,16	1/5/17	115	ON		6	80		80	80	75	
f				Cowlitz R: Olequa	OL	NPM	NPM-1	8/30/16	3	1	1	1	1	1	OL-NPM-1	20	7,10,14	1/5/17	105	ON		5	80		60	80	80	
f	p	p	p	Cowlitz R: Olequa	OL	NPM	NPM-2	8/30/16	3	1	1	1	1	1	OL-NPM-2	21	8,9,11	1/5/17	102	ON		5	80	60	60	80	19	
f				Cowlitz R: Olequa	OL	NPM	NPM-3	8/30/16	3	1	1	1	1	1	OL-NPM-3	22	6,12,13	1/5/17	115	ON		5	80		60	80	80	
f				Mayfield L	ML	LSS	LSS-1	8/31/16	5		1	1			ML-LSS-1	23	1,11,27,30,32	12/27/16	300	ON			80			80	80	
f				Mayfield L	ML	LSS	LSS-2	8/31/16	5		1	1			ML-LSS-2	24	6,23,31,33,34	12/27/16	300	ON			80			80	80	
f				Mayfield L	ML	LSS	LSS-3	8/31/16	5		1	1			ML-LSS-3	25	3,12,16,37,40	12/27/16	300	ON			80			80	80	
f				Mayfield L	ML	NPM	NPM-1	8/31/16	5	1	1	1	1	1	ML-NPM-1	26	12,16,18,30,32	1/4/17	83	ON		5	80		60	80	80	
f				Mayfield L	ML	NPM	NPM-2	8/31/16	5	1	1	1	1	1	ML-NPM-2	27	4,11,15,20,31	1/4/17	84	ON		5	80		60	80	80	
f				Mayfield L	ML	NPM	NPM-3	8/31/16	5	1	1	1	1	1	ML-NPM-3	28	13,17,22,26,29	1/4/17	88	ON		5	80		60	80	80	

Attachment 3. Processing Bench Sheet, (example only)

Field Data for Fish Tissue Samples: FFCMP 2016																							
updated: 12/21/16 PS																							
Notes: 1. ND = Not Determined; U = checked but could not determine.																							
Site 1	Site 2	Species	ECY Field ID	Total Length (mm)	Field Weight (gm)	Collect Date	Collect Method	Process date	Processing crew	FFCMP fillet weight (gm)	FFCMP L, R, or B fillet	FFCMP skin status On/Off	sex M/F 1	fish age	Age Structures					Comment	FFCMP LAR Field ID	FFCMP MEL ID: 1701015-nn	
															scale card #	scale #	otolith tray #	otolith cell #	Pull Opercula Spines Y/N				
Castle Rock (CR)	CR	NPM	1	344	365	8/29/2016	E	1/4/17	PS	139	B	ON	F							Y		CR-NPM-A	07
Castle Rock (CR)	CR	NPM	2	367	454	8/29/2016	E	1/4/17	PS	166	B	ON	F							Y		CR-NPM-A	07
Castle Rock (CR)	CR	NPM	3	330	286	8/29/2016	E	1/4/17	PS	113	B	ON	F							Y		CR-NPM-A	07
Castle Rock (CR)	CR	NPM	4	311	258	8/29/2016	E	1/4/17	PS	105	B	ON	M							Y		CR-NPM-A	07
Castle Rock (CR)	CR	NPM	5	327	292	8/29/2016	E	1/4/17	PS	114	B	ON	F							Y		CR-NPM-A	07
Olequa (OL)	OL	CTT	7	350	498	8/30/2016	E	1/10/17	PS, NM, JM	103	L	ON	M			4				N	NO ADIPOSE FIN PRESENT	OL-CTT-1	08
Olequa (OL)	OL	CTT	13	316	355	8/30/2016	E	1/10/17	PS, NM, JM	105	B	ON	F			4				N	NO ADIPOSE FIN PRESENT	OL-CTT-1	08
Olequa (OL)	OL	CTT	14	318	362	8/30/2016	E	1/10/17	PS, NM, JM	103	B	ON	F			4				N	NO ADIPOSE FIN PRESENT	OL-CTT-1	08
Olequa (OL)	OL	CTT	17	300	262	8/30/2016	E	1/10/17	PS, NM, JM	100		ON	F			4				N	ADIPOSE FIN PRESENT	OL-CTT-1	08
Olequa (OL)	OL	CTT	18	308	302	8/30/2016	E	1/10/17	PS, NM, JM	100	B	ON	F			4				N	ADIPOSE FIN PRESENT	OL-CTT-1	08
Olequa (OL)	OL	CTT	5	340	487	8/30/2016	E	1/10/17	PS, JM	101	L	ON	M			5	5			N	NO ADIPOSE FIN PRESENT	OL-CTT-2	09
Olequa (OL)	OL	CTT	6	332	435	8/30/2016	E	1/10/17	PS, JM	126	B	ON	F			5	6			N	NO ADIPOSE FIN PRESENT	OL-CTT-2	09
Olequa (OL)	OL	CTT	9	337	410	8/30/2016	E	1/10/17	PS, JM	137	B	ON	F			5	9			N	NO ADIPOSE FIN PRESENT	OL-CTT-2	09
Olequa (OL)	OL	CTT	10	326	422	8/30/2016	E	1/10/17	PS, JM	100	L	ON	F			5	10			N	NO ADIPOSE FIN PRESENT	OL-CTT-2	09
Olequa (OL)	OL	CTT	16	333	452	8/30/2016	E	1/10/17	PS, JM	104	B	ON	M			5	16			N	NO ADIPOSE FIN PRESENT	OL-CTT-2	09
Olequa (OL)	OL	LSS	6	416	720	8/30/2016	E	12/29/16	KS, NM	whole	whole	ON								Y		OL-LSS-2	12
Olequa (OL)	OL	LSS	7	485	1122	8/30/2016	E	12/29/16	KS, NM	whole	whole	ON								Y		OL-LSS-2	12
Olequa (OL)	OL	LSS	14	463	1021	8/30/2016	E	12/29/16	KS, NM	whole	whole	ON								Y		OL-LSS-2	12
Olequa (OL)	OL	LSS	27	486	1171	8/30/2016	E	12/29/16	KS, NM	whole	whole	ON								Y		OL-LSS-2	12
Olequa (OL)	OL	LSS	40	485	1057	8/30/2016	E	12/29/16	KS, NM	whole	whole	ON								Y		OL-LSS-2	12

Attachment 4. Site Reconnaissance Checklist

Fish Sampling Site Recon Checklist (Updated 04/07/21)

This file can be found at: <F:\SHARED Files\TSU Fish\Field prep>

Please also see the "Resources for TSU Fish Collections" file in the same folder

Site Physical Info

_____ Gazetteer Page and Coordinates.

_____ Obtain bathymetric and aerial maps of site (e.g. EIM/GIS, WA Lakes book, web sites, USGS quad, NOAA chart. Also see <F:\SHARED Files\Lake Bathymetric Maps>).

_____ Info on temperature, water levels (high/low flow issues)?

Contacts (note names and phone/email info)

_____ WDFW, USFWS, USFS, NOAA and Tribal Bios. Others as required by Scientific Collection Permits (see <F:\SHARED Files\TSU Fish\Permits...> for requirements).

_____ Ecology regional staff (Watershed and TMDL Leads, see <F:\SHARED Files\TSU Fish\Field Prep\Resources for TSU Fish Collections.xlsx> for useful info/links).

_____ Others (e.g. City, County, local clubs, guide services, lake associations, volunteer monitors, etc).

_____ Enforcement agencies (Sheriff, WSP, DFW, Tribal, others).

_____ Private landowners as needed (e.g. timber companies, power companies, residential).

Fish Info

_____ Visit <F:\SHARED Files\TSU Fish\Field Prep\Resources for TSU Fish Collections.xlsx>

_____ Species present and size info (e.g. DFW bios, DFW WW Program tables, Gazetteer, web sites).

_____ Hatchery plant status: species, size, numbers, release dates (DFW database, DFW web site, local bios).

_____ Any DFW or other agency surveys being conducted or planned? How can we coordinate?

_____ When, where, how to fish/capture - local knowledge, websites (e.g. Bios, locals, Washingtonlakes.com).

_____ DFW web site for fishing reports, updates to regs, etc.

_____ Check DFW regulations. Review permit guidelines.

ESA-Listed species

_____ Review NOAA and USFWS permits regarding BLT & listed species

_____ Species present (BLT, salmonids, other)?

_____ Timing of runs for each listed species (start, peak, end)?

_____ Spawning habitat? Specific areas to avoid?

_____ Strategies to avoid harassing listed species? Specific permit guidelines, gear allowances?

_____ Water temperatures?

Site Environment Info

- _____ Boat launch access - public? private? Gated access? DFW boat launch key or other needs? See WDFW access info http://wdfw.wa.gov/lands/water_access/.
- _____ Primitive or maintained boat launch? Bathroom facilities, onsite campground manager/volunteer? Cost to use..?
- _____ Able to launch boat due to water level/flows (e.g. reservoirs/dams)?
- _____ Conditions - weather, wind, current, hazards.
- _____ Backpack shocking access - is terrain/stream hikable? Steep canyon walls? High flows? Safe operations?
- _____ Shoreside residents, night electrofishing bothersome?
- _____ Any local persons to contact about our ops?
- _____ Any concerns about fishery, land use, pollutant sources, etc?

Historical data (water, sed, tissue)

- _____ Study, date, publication info.
- _____ Brief summary of what's been done and findings.
- _____ Fish info.

Invasive or Nuisance species presence

- _____ Check EAP's Invasive Species webpage at <http://teams/sites/EAP/Pages/FieldTraining.aspx>. Also review "WDFW Invasive Species Management Protocols" per permit conditions **F:\SHARED Files\TSU Fish\Permits.**
- _____ Ever surveyed? When? Who?
- _____ Toxic algae present?
- _____ Plants:
- _____ Animals: (e.g. NZ mudsnail in Lwr Col Riv, Long Beach peninsula; zebra and quagga mussels, others).
- _____ List nuisance species present:
- _____ Develop/Review equipment decontamination SOP for areas of "Extreme Concern".

Attachment 5. Target Fish Species

Target fish species for Freshwater Fish Contaminant Monitoring Program: sorted by order of preference using feeding behavior, comparative value to historical data, likelihood of encounter, angler use (rev April 2021). Adapted from Northwest Science (Zaroban et al, 1999).

Common name	Scientific name	Habitat	Ecology Species Code	Feeding	Water temp	Tolerance	order of pref	Family name	Possible Hatchery or Transplant	feed sort	pref order of family	pref order within family
Largemouth bass	<i>Micropterus salmoides</i>	water col.	LMB	piscivore	warm	T	1	Centrarchidae	Y	1	2	1
Smallmouth bass	<i>Micropterus dolomieu</i>	water col.	SMB	piscivore	cool	I	2	Centrarchidae	Y	1	2	2
Walleye	<i>Sander vitreus</i>	water col.	WAL	piscivore	cool	I	3	Percidae	Y	1	3	1
Rainbow trout ³	<i>Oncorhynchus mykiss</i>	hider	RBT	invert/piscivore	cold	S	4	Salmonidae	Y	2	1	1
Brown trout	<i>Salmo trutta</i>	hider	BNT	invert/piscivore	cold	I	5	Salmonidae	Y	2	1	2
Cutthroat trout (Coastal) ¹	<i>Oncorhynchus clarki clarki</i>	water col.	CTTC	invert/piscivore	cold	S	6	Salmonidae	Y	2	1	3
Cutthroat Trout (Western) ¹	<i>Oncorhynchus clarki lewisi</i>	water col.	CTTW	invert/piscivore	cold	S	7	Salmonidae	Y	2	1	3
Cutthroat Trout (Lahontan) ¹	<i>Oncorhynchus clarki henshawi</i>	water col.	CTTL	invert/piscivore	cold	S	8	Salmonidae	Y	2	1	3
Kokanee salmon	<i>Oncorhynchus nerka</i>	water col.	KOK	invertivore	cold	S	9	Salmonidae	Y	3	1	4
Yellow perch	<i>Perca flavescens</i>	water col.	YP	invert/piscivore	cool	I	10	Percidae		2	3	2
Channel catfish	<i>Ictalurus punctatus</i>	benthic	CAT	invert/piscivore	warm	T	11	Ictaluridae	Y	2	5	1
Brook trout	<i>Salvelinus fontinalis</i>	hider	BKT	invert/piscivore	cold	I	12	Salmonidae	Y	2	1	6
Lake trout	<i>Salvelinus namaycush</i>	benthic	LKT	piscivore	cold	S	13	Salmonidae		1	1	5
Tiger Trout	<i>Salmo trutta X Salvelinus fontinalis</i>	hider?	TT	invert/piscivore	cold	I	14	Salmonidae	Y	2	1	3
White sturgeon	<i>Acipenser transmontanus</i>	benthic	WST	invert/piscivore	cold	I	15	Acipenseridae		2	6	1
Green sturgeon	<i>Acipenser medirostris</i>	benthic	GST	piscivore	cold	S	16	Acipenseridae		1	6	2
Burbot	<i>Lota lota</i>	benthic	BUR	piscivore	cold	I	17	Gadidae		1	8	1

Common name	Scientific name	Habitat	Ecology Species Code	Feeding	Water temp	Tolerance	order of pref	Family name	Possible Hatchery or Transplant	feed sort	pref order of family	pref order within family
Mountain whitefish	<i>Prosopium williamsoni</i>	benthic	MWF	invertivore	cold	I	18	Salmonidae		3	1	7
Lake whitefish	<i>Coregonus clupeaformis</i>	water col.	LWF	invertivore	cold	I	19	Salmonidae		3	1	8
Northern Pike	<i>Esox lucius</i>	water col.	NOP	piscivore	cold			Esocidae				
Northern pikeminnow	<i>Ptychocheilus oregonensis</i>	water col.	NPM	invert/piscivore	cool	T	20	Cyprinidae		2	4	2
Peamouth	<i>Mylocheilus caurinus</i>	water col.	PEA	invertivore	cool	I	21	Cyprinidae		3	4	3
Pumpkinseed	<i>Lepomis gibbosus</i>	water col.	PMP	invert/piscivore	cool	T	22	Centrarchidae		2	2	7
Black crappie	<i>Pomoxis nigromaculatus</i>	water col.	BC	invert/piscivore	warm	T	23	Centrarchidae	Y	2	2	3
White crappie	<i>Pomoxis annularis</i>	water col.	WC	invert/piscivore	warm	T	24	Centrarchidae	Y	2	2	4
Rock bass	<i>Ambloplites rupestris</i>	water col.	RKB	invert/piscivore	warm	I	25	Centrarchidae		2	2	5
Warmouth	<i>Lepomis gulosus</i>	water col.	WM	invert/piscivore	warm	T	26	Centrarchidae		2	2	6
Green sunfish	<i>Lepomis cyanellus</i>	water col.	GS	invert/piscivore	warm	T	27	Centrarchidae		2	2	8
Bluegill	<i>Lepomis macrochirus</i>	water col.	BG	invert/piscivore	warm	T	28	Centrarchidae	Y	2	2	9
Common carp	<i>Cyprinus carpio</i>	benthic	CCP	omnivore	warm	T	29	Cyprinidae		4	4	1
Brown bullhead	<i>Ameiurus nebulosus</i>	hider	BBH	invert/piscivore	warm	T	30	Ictaluridae		2	5	2
Yellow bullhead	<i>Ameiurus natalis</i>	hider	YBH	invert/piscivore	warm	T	31	Ictaluridae		2	5	3
Longnose sucker ²	<i>Catostomus catostomus</i>	benthic	LNS	invertivore	cold	I	32	Catostomidae		3	7	3
Salish Sucker ²	<i>Catostomus catostomus</i>	benthic	SS	omnivore	cool	S	33	Catostomidae		4	7	5
Largescale sucker	<i>Catostomus macrocheilus</i>	benthic	LSS	omnivore	cool	T	34	Catostomidae		4	7	1
Bridgelip sucker	<i>Catostomus columbianus</i>	benthic	BLS	herbivore	cool	T	35	Catostomidae		5	7	2
Mountain sucker	<i>Catostomus platyrhynchus</i>	benthic	MS	herbivore	cool	I	36	Catostomidae		5	7	4

Common name	Scientific name	Habitat	Ecology Species Code	Feeding	Water temp	Tolerance	order of pref	Family name	Possible Hatchery or Transplant	feed sort	pref order of family	pref order within family
Chiselmouth	<i>Arocheilus alutaceus</i>	benthic	CLM	herbivore	cool	I	37	Cyprinidae		5	4	4
Sculpins	<i>Cottus sp.</i>	benthic	COT	invertivore	cool	T	38	Cottidae		3	10	1
Tench	<i>Tinca tinca</i>	water col.	TCH	invertivore	warm	T	38.1	Cyprinidae		3?	4	?
Starry flounder	<i>Platichthys stellatus</i>	benthic	STF	invertivore	cold	S	39	Pleuronectidae		3	9	1
Grass carp	<i>Ctenopharyngodon idella</i>	benthic	GCP	herbivore	warm	T	don't take	Ictaluridae		-	-	-

1 - Cutthroat trout: if uncertain of subspecies, just call it CTT (*Oncorhynchus clarki*). Subspecies usually haven't been distinguished in past work. EIM doesn't distinguish fish subspecies yet. (2008)

2 - Same species, Salish Sucker appears to be dwarf form of Longnose. Salish is found west of Cascade crest. The Longnose is found east of the Cascade crest. EIM doesn't distinguish different forms.

3 - some RBT hybridize with CTT so that fish have some characteristics of both species. Please note in field book if hybrids suspected.

Tolerance field describes overall pollution tolerance: S = sensitive, I = intolerant, T = tolerant

Use order of preference as a guide. Higher trophic level species preferred over lower level. Consider availability of fish, size, historical data available, mix of families/trophic levels per site, angler use.