

Spawn Survey and Adult Trapping Protocol

Chum Reintroduction Project



Oregon Department of Fish and Wildlife

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This protocol is modified from the existing OASIS protocol to reflect additional sampling procedures for Chum salmon and emergency plans updated for our sampling locales.

GENERAL SURVEY INSTRUCTIONS

1. Check out every morning and in every evening after surveying.
2. Ensure that each survey description is clear and accurate. Survey descriptions should note if a key is needed.
3. Be sure to contact any landowners that require advance notice. On the first contact of the spawning season, check if they want weekly contact. Contact OASIS crew (Big Creek) to coordinate weekly landowner contacts.
4. Make sure survey start and end markers are intact. Determine GPS coordinates for start and end points whenever UTM readings are missing and reflag.
5. Keep the direction of the survey consistent throughout the season (i.e., if you walk upstream during the first survey do the same for each consecutive survey).
6. Use polarized sunglasses. Yellow or amber tinted lenses are best.
7. Walk ALL stream channels (side channels, backwater pools, etc.).
8. Wait until the end or termination of the survey to classify weather, flow and visibility for each survey area. Comments should reflect the conditions of a majority of the survey.
9. Take a photo from a specified "photo point" in each reach.
10. Surveys made under water visibility rating 3, or surveys with the comment "not surveyable" are not counted when calculating the interval between successive surveys.
11. Check in after your survey.

SURVEY PROCEDURES

All populations

- Survey each reach once per week (10-day rotations)
 - Multiple surveys may simultaneously threaten to go beyond the 10-day schedule. Carefully plan site rotations. Watch the weather diligently, and if a storm is looming anticipate your post-storm survey schedule. Prior to the storm (1-2 days prior) visit sites likely to stay blown-out (3-4 days). Maximize the chance of maintaining the rotation schedule. Surveys can/should be conducted as often as possible.
 - The 10-day rotation is based on experiments which suggest that the average lifespan of adult salmon on spawning grounds is about 10 days. Surveys performed more than 10 days apart would likely miss successfully spawning salmon. Surveys performed outside of the recommended rotation are not useful in providing estimates of abundance, though some valuable timing and distribution information can still be harvested from continuing the survey schedule.
- Be VERY careful – Do NOT step on redds - walk on banks when possible.
- Record survey conditions and the number of live and dead Chinook, Coho, and steelhead on the **SURVEY form**
 - Cut off the tail after counting a carcass
 - Note any tags or fin clips
 - Only count carcasses that have not been sampled previously (tail intact)
 - If a survey is completed and no fish are observed, record “NO FISH FOUND” in the notes section of the survey form
- Record number and location of live and dead Chum on **CHUM form**
 - **For live Chum**, record disposition, sex, visible tags and color (if present), mark GPS location, GPS accuracy, photo #, and any comments
 - **For new Chum carcasses**, record disposition (dead), sex, all tag colors and numbers (if present), MEPS length (prior to removing head), % spawned for females (cut into carcass, examine gonads), extract otoliths, take genetic samples, take scale samples, remove head and place in plastic bag with ID label remove the entire Chum head (encompassing the area with otoliths and CWT and bring back to Big Creek hatchery) , carcass condition, mark GPS location, GPS accuracy, photo #, and any comments
 - **For old Chum carcasses** (decomposition rates), record GPS location , GPS accuracy, Floy tag number/ colors, carcass condition, and note in comments that this carcass was already sampled. Do not record bio data on previously sampled Chum carcasses.

- Record location of Chum redds on the **REDD LOCATION form**
 - **For verified Chum redds (redd confidence = 1 or 2)** record redd number, redd confidence, mark GPS location, GPS accuracy, photo #, and any comments

SURVEY AND CHUM FORM DEFINITIONS

Population (Young's Bay, Big Creek, Clatskanie, Scappoose, Clackamas, Sandy, Lower Gorge)

Stream (write it out- no abbreviations)

Reach- Reach numbers are indicated at the start GPS point for each reach within a survey. Full reach descriptions are listed on the Spawn_Survey_Log Excel spreadsheet. Only record one reach per data sheet.

Date- Record all dates like this: 5 November 2015 and never like this: 11/5/15 (is this November 5 or May 11?)

Surveyors- Record the initials of all surveyors on the line and circle the one that recorded data on a particular datasheet.

Describe stream visibility as:

1. Can see bottom of riffles and pools.
2. Can see bottom of riffles ONLY.
3. Cannot see bottom of riffles or pools (check several areas before making this determination). If visibility is a 3, creek cannot be surveyed. Do a different survey on a creek that is less turbid, if possible.

Describe the weather as:

C – Clear	R – Rain	D- Downpour
O – Overcast	S – Snow	
F – Foggy	P - Partly Cloudy	

Describe the stream flow as:

LF – Low/Dry: stream covers < 50% of the active channel width
 MF – Moderate: stream covers 50-75% of the ACW.
 BF- Bankfull: Stream is at its banks
 FF – Flooding: stream is out of its banks.

#- This is a number beginning at 1 for each live or dead Chum for a survey date and reach (i.e., the first Chum is # 1 and the next seen is # 2).

Disposition:

D = Dead
S = Spawning- actively paired with another fish
RC = Redd Construction- digging a redd or test pit

P = Post Spawning (still alive) - spawned out, on or near a redd, dying
H = Holding- Holding in water but no obvious sign of redd construction or spawning activity
M = Migrating- Fish is moving at the time it is observed

M/F- Male/ Female- Males tend to have a darker stripe on their side, along with a pronounced hooked jaw. When in doubt, press on Chum to express eggs or milt if coloration and body shape are ambiguous.

Carcass Condition- Record the condition of the carcass as F = Fresh, MD = Moderately degraded (starting to degrade but easily identified as a Chum), or SD = severely degraded. Carcass condition is recorded for all Floy tagged Chum, even if they have been sampled previously.

MEPS- Length from **Mid-Eye** to **Posterior-Scale**, measured in millimeters (see figure 1)

Percent Spawned- Open the body cavity to see if gametes are still intact (did not spawn; **0%** spawned) or if the gonads are empty (spawned; **100%**). If there are **< 100 eggs** in the body cavity then the carcass is **100 %** spawned. Females may have **partial** eggs in sack even after spawning. For all females in a **REINTRODUCTION SITE**, collect eggs in a whirlpack if there are more than 100 eggs. Label the whirlpack with the genetic sample # using a piece of blank write in the rain and a pencil (no ink). For all other sites, estimate percent spawned as 0 (intact skeins full of eggs), partial, or 100 (< ~100 eggs remaining). Upon returning to office either enumerate and record the number of eggs for the given female, or store in freezer until we have time to count them later.

Snout ID #- Remove the head from all Chum carcasses as otoliths are being removed. Place this head and any other pieces of flesh (anterior to the gills) in a snout bag and place a piece of paper with the genetic ID in the bag. Do not record snout ID number on datasheet or scale card until the fish has been scanned. After scanning the fish, update the datasheet and scale card. **ONLY** fish with a CWT get snout ID tags and get sent to Clackamas.

Scale #- Record the scale number from the scale card on the datasheet and make sure that the envelope is filled out completely. The scale should be removed from above the lateral line, posterior to the dorsal fin (see [page 12](#)). Only remove scales from Chum that do not have a Floy or Peterson disk tag.

Genetics #- Remove a fin clip from the anal fin. The clip should be at least 4 X 4mm. Place clip in genetics vial. Ensure vial is pre-labeled, record that number on the datasheet. Make sure that the alcohol in the vial covers the fin clip. If it doesn't, then fill it with alcohol upon returning to the office and store it upright at room temperature in a vial holder.

CWT Y/N- See information on Snout ID above. Scan the snout from the carcass in the coded wire tag scanner at the Big Creek Hatchery. This can either be done the

same day as the survey or later in the season if time is limited. Record on data sheet **Yes** there was a CWT, or **No** there was not any CWT. After snout has been scanned, place it in the freezer at the Hatchery/research office. **All CWT + snouts will be send back to Clackamas snout lab at end of season.**

Floy Tag color Abbreviations-

G =Green, Y =Yellow, O =Orange, B =Blue, P =Purple, BR =Brown, or GR =Gray

1st Tag Color- Write the color of the Floy tag closest to the anterior end of the fish.

1st Tag # - Write the three digit number on the first Floy tag (Carcass only)

2nd Tag Color- Write the color of the Floy tag closest to the posterior end of the fish.

2nd Tag # - Write the three digit number on the second Floy tag. If the second tag is missing, place a check in the comments box and write the carcass number in the comments section at the bottom of the page with the comment “missing second Floy tag.”

GPS Waypoint- Record the waypoint where the Chum was found and record the waypoint accuracy (in meters) in the comment field.

Photo #- Take 3-5 photos with the Chum in several positions so that the marking on the body and the inside of the mouth can be clearly seen. **If there is ANY doubt that the carcass is a Chum, bring it back to the office in a garbage bag.**

Comments- Mark a check in this box and write the comment on the comment lines at the bottom of the datasheet. Reference the live fish/ carcass number for each comment.

REDD LOCATION FORM DEFINITIONS

We want to know the spatial distribution of redds, but not the abundance of fish spawning on that redd (because this varies constantly and we can't link redd data to spawner abundance).

Redd definition. A redd is an excavated depression dug by a female. A redd may be identified by a hollow area in the gravel and the adjacent downstream plume of excavated gravel. The gravel from a recently dug redd will usually appear lighter colored and less uniformly oriented than the undisturbed gravel. Care should be taken not to confuse redds with general stream scouring or scouring associated with wood, root wads, or larger rocks.

Data on Chum redds is to be recorded whenever you encounter a carcass or live Chum on or near a redd. **NEVER step on a redd or on the edge of a redd as you may crush eggs or cause fine sediment to percolate into the redd.**

Redd Confidence-

- 1 = Chum on redd (could be alive or dead),
- 2 = Chum near redd,
- 3 = clearly defined redd, no Chum,
- 4 = possible redd (describe in comments)

For possible redds, note the GPS location and description in the comments section but do not record other information. These depressions may be abandoned test pits, locations where surveyors or animals cross the stream, or locations where natural stream hydraulics produce scour or clean gravel. By noting the location, the depression is less likely to be mistaken for a redd in the future.

For redds that are verified Chum redds (confidence 1-2, Chum carcass observed, Chum observed constructing redds, or Chum near redds), record the following information:

Redd Number- This number begins at 1 in each reach, on each day.

GPS WPT- Record the GPS waypoint of the redd, if you do not already see one on your GPS device (stand as close as you can, without standing on the redd). If it is a new GPS waypoint, check the "New GPS Wpt." box. **For all GPS coordinates, indicate which GPS device you used.** Be sure to download waypoints every day in a file labeled with the date and GPS device number.

Photo #- Photograph every redd constructed by a Chum and record the photo # on the datasheet. Each day, download photos into a file that corresponds to the date and stream surveyed.

Comments- If Springs, tributaries or seeps are in the vicinity of the redd, and be sure to check for them under vegetation, record this in the comments.

ADULT TRAPPING

PROCESSING CHUM AT BIG CREEK

- Chum that are being outplanted will be held in a net pen within a raceway at Big Creek Hatchery. Some have CWT and some do not.
- On the day Chum are processed at the hatchery, implant two Floy tags (follow tag color schedule) and record Floy tag numbers, date, and all bio-data on the **ADULTTRAPPING datasheet**.
- Record if the Chum is a fall back under tag recovered, and make any associated comments using comment codes in the space below
- Chum are transferred to Stewart Creek using a liberation truck (see below)

OUTPLANTING CHUM AND CAPTURING UNMARKED CHUM AT STEWART CREEK

FOR PREVIOUSLY MARKED CHUM:

- Transfer Chum to Stewart Creek on spawn days or as needed once broodstock collection is complete. Unload Chum from liberation truck using a dip net, carefully walk the fish to the stream, and release in slow water. Always handle a Chum with one hand under the belly to support the weight.
- If Chum is a fall back, it will already have Floy tags. Record the Floy tag color and #s and release the fish above the trap again.
- If comment code is "SC" then write fish # and extended comment in space below
- If trap operation is impaired in some way, check the adjacent comment box and note trap condition in the comments field below or on the back of the datasheet

FOR UNMARKED CHUM:

- Record fish #, species, fork length, sex, body condition, check for presence of CWT, remove an anal fin clip and take scales from the key area, record the date, color and #s of Floy tag applied (each Chum gets two according to the tag schedule), and any comment codes.

FOR OTHER SPECIES:

- For **Chinook and Coho, steelhead, Cutthroat Trout, Sockeye Salmon, or Pink Salmon**, record species, sex (if apparent), and length. These fish will NOT be tagged.
- For **any other species**, record their presence (abundance) in the comments field.

Adult trapping procedures and definitions

Traps:

1. Clear debris off weirs and traps every day
 2. Adjust boards on sides of traps to maintain at least 1.5 feet of water depth in the trap
 3. Pound weir pickets into substrate before leaving trap site daily
 4. Under elevated flows where the trap can be operated, pickets or weir panels may need to be removed to allow water to pass the trap
 5. Under elevated flows where the trap cannot be operated, close the entrance to the trap, process and release all fish upstream of the trap, and remove either pickets or a weir panel to prevent water from backing up against the trap and flooding over the road.
 6. Fill out the **TRAP LOG** even if no fish were in the trap
 - a. Date, initials, time, flow, weather, trap running (Y/ N), comments on operation or changes to the trap (e.g., adding or removing weir panels)
 7. After trapping is done, make sure lid of trap is locked and all supplies are put away
 - a. All electronics will be stored in the office or vehicles
 - b. Datasheets and fish processing supplies for the Graham and Stewart traps will be stored in vehicles due to vandalism risk at trap sites
 - c. Datasheets and fish processing supplies for Big Creek will be stored in the Big Creek office
- If there are any trap mortalities, take all samples and data as above, record the code "TM" for trap mortality, cut the head and tail off, and throw the carcass downstream of the trap.
 - If mortality is at Big Creek Hatchery, consult with hatchery personnel on location to dispose of carcass.

Processing other species at Stewart Creek traps:

1. Use dip net to remove adult from trap
2. Place adult on right side on tagging board
3. Record fork length
4. Record if fish is an adult male, female, or a jack according to length criteria at bottom of datasheet
5. Implant two garment tags and record the color of the tag
6. If a fish is a fall back into the trap, record tag color, opercle punch the fish, and record the comment code "FB" for fall back
7. Release fish upstream of trap in slow water
8. If there are any trap mortalities, take all samples and data as above, record the code "TM" for trap mortality, cut the head and tail off, and throw the carcass downstream of the trap

Carcasses on weirs/ traps

1. Keep a Chum Spawn survey datasheet at each trap for carcasses that wash up on the weir panels and traps.
2. For previously sampled Chum carcasses (head removed), record tag numbers and carcass condition and pass below trap.
3. For tagged but unsampled Chum carcasses, record all information on Chum spawning form.
4. For all other unsampled carcasses (tail intact), record count on survey form and pass below trap.

NOTE: Handle all fish carefully. Do not throw live fish around.

SCALE SAMPLING

Scale samples taken from salmon carcasses encountered on spawning surveys are used to assess age composition and hatchery-wild ratios of salmon populations and growth rates of individual fish.

Example of a Scale Envelope with data fields completed

SGS-001
Species <u>CHUM</u> Date <u>20 Oct. 2012</u>
Basin <u>Clatskanie</u> Location <u>Conyers R1</u>
ML FL TL Length <u>642</u> Sex <u>M F</u>
Mark <u>None</u> Snout ID <u>12T 9999</u>
Source <u>Chum SGS</u> Collector <u>LM</u>
Comments: _____ Age _____

Filling Out the Scale Envelope

All scale card fields must be completed as follows:

Sampler

Enter the name of the individual who is sampling the scales.

Scale Number

Scale number. Each scale envelope is uniquely numbered (upper left corner). This number must be entered on the Bio-data datasheet under scale #.

Species

For each species, use the following species names:

- Chinook
- Coho
- Chum
- Steelhead

Date

Enter day, month (spelled out), and year.

Basin (= Population)

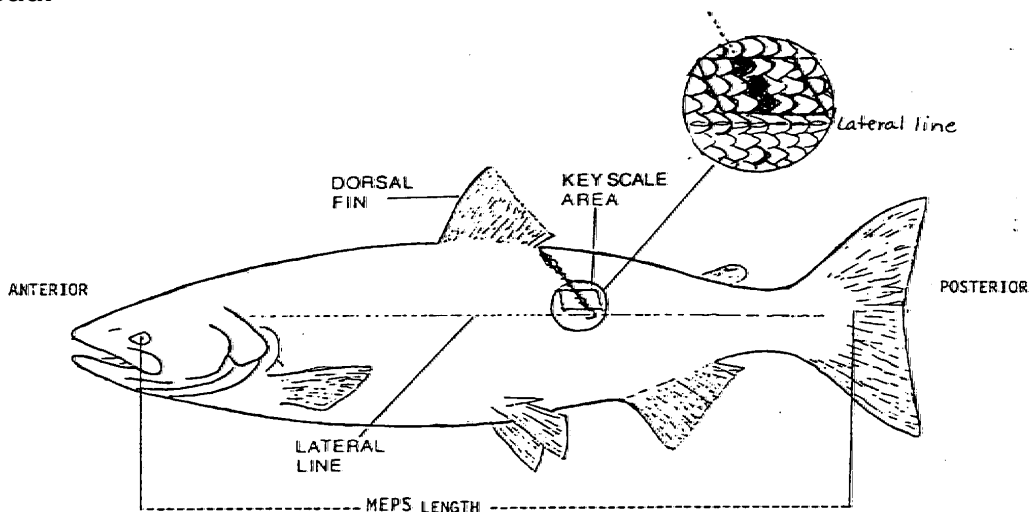
Populations are: Young's Bay, Big Creek, Clatskanie, Scappoose, Clackamas, Sandy, and Lower Gorge

Location (= Stream name)

Write both the Stream and reach number.

Scale Sampling Procedure

This procedure should be followed when sampling scales from any salmon or steelhead.



1. Locate the Key Area for collecting scale samples by following the diagonal row of scales down and back from the posterior insertion of the dorsal fin to the first 3 scales above, but not including the lateral line. One to two scales in front of (anterior) and behind (posterior) these three scales are within the key area.
2. Scrape the key area with the back of your knife blade to remove any slime. With forceps, pluck 4-5 scales from this area and place them neatly between the paper insert in the envelope. Be very careful that the scales come from the key area.
3. Turn fish over and repeat procedure on the other side of the fish, placing scales in the same envelope.
4. Write any pertinent information regarding that fish on the envelope.
5. If scales are absent from the key area on one side of the fish, sample from the key area on the other side of the fish. If scales are absent from key areas on both sides of fish, take scales, but note where they were taken from and why they couldn't be taken from key area (i.e. injury, missing, etc.).
6. Pull the paper sleeve 2/3 of the way out of the scale envelope, then fold the upper half backward over the top of the envelope when placing scales inside the sleeve. Do not stack the scales. Taking the sleeve completely out of the envelope not only takes more time, but also causes wrinkling of the scales and can render them (and you) useless.
7. Keep all the scale samples organized and in the same place – **scales should be stored in a dry location with adequate ventilation**. Plastic trays are provided for daily deposition of samples, and a larger box located in a safe location is excellent for longer-term storage. Placing scales in Ziploc bags or other sealed environments causes scales to decompose.

FISH IDENTIFICATION

You will be expected to identify the species of live fish and the species and gender of fish carcasses encountered in the field. To accomplish this, you will use a number of characteristics including size, run timing, geographic location, coloration, body morphology, markings, and behavior. It is prudent to use as many characteristics as possible when determining species and gender. If you are uncertain of the species, take a scale sample and turn it in to your crew leader. Species of salmon can be determined from the scales.

Coho appear in streams later in the season than Chinook, generally beginning in late October to early November. They tend to spawn in smaller streams and are generally a smaller fish. They are dull to bright red with greenish backs, and can often be distinguished by the white spot on the operculum behind their eyes. Occasionally you may see a coho that still has its bright silver ocean coloration. They tend to be deeper in the body, making them look football-shaped. They have small round spots on their backs and the upper lobe of their tails. The gums at the base of their teeth are white, but the rest of the jaw is dark. They tend to be more reclusive than Chinook and are easily startled.

Chinook appear in early fall, and are generally much larger than coho. They tend to spawn in bigger water, are typically darker than coho, and are often bronze to black in coloration. Some Chinook (especially large males) are quite red, but not forward of the dorsal fin. You can distinguish reddish Chinook from coho by their size. They have large irregular spots on their backs and both lobes of their tails and their tail rays are smooth. Chinook can often be distinguished by the white 'skunk-line' of fin rot on their backs. The gums at the base of their teeth are black.

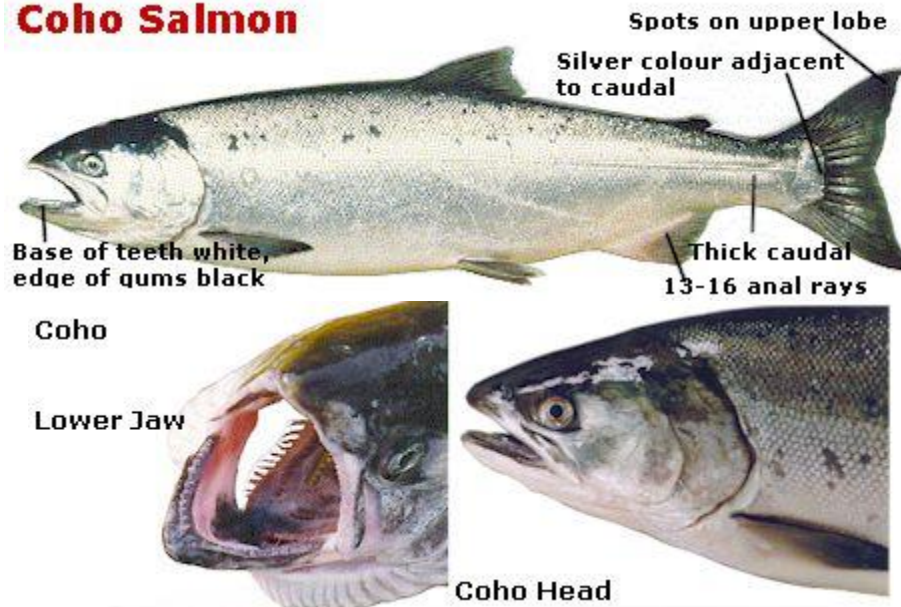
Chum appear almost exclusively in the northern part of the coast. They don't travel far in-river and tend to spawn in low gradient streams within a few miles of the ocean. They can be distinguished by the distinctive striated bars on their sides. They have very small speckles on their backs. Other key characteristics include their large eyes, lack of spotting on the tail and narrow caudal peduncle.

Steelhead appear in the winter and early spring. They are more elongated (torpedo-shaped) than salmon, and have a broader caudal peduncle and a square tail (salmon tails are more lobed or forked). They are gray-blue on their backs and silvery-white on their lower halves. They have completely white mouths, small spots on their tails, and are very shy. In order to observe them you must move quietly and stealthily.

Female salmon and steelhead tend to have a more extensively eroded tail fin. This is the result of digging the redd, and both lobes are eroded evenly. Males have a more pronounced kype (hooked nose) and are generally larger overall. The lower lobe of a male's tail is usually more eroded than the upper lobe. If you are unsure of the gender of a carcass, you can cut open its belly to examine its gonads.

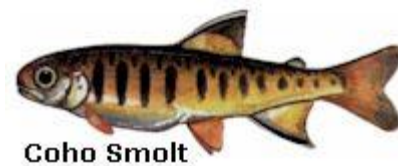
COHO (*Oncorhynchus kisutch*)

Coho Salmon



Coho salmon (*Oncorhynchus kisutch*), often called silver salmon, are found in most Oregon coastal streams and in many streams from California to Alaska. Oregon and California coho populations exist at the margins of the overall species range. Their major territory lies between Cook Inlet halfway up the Alaska coast, to the Columbia River. While most coho tend to remain close to the coast, they have been found as far as 100 miles inland. When mature in the late fall they average 750 mm (29.5 in) in total length (jacks are less than 430 mm (17 in) MEPS length) and weigh up to 25 pounds, although their average weight is between 8 and 14 pounds.

Coho life history patterns revolve around three largely independent age classes, each with a three year generation time. Some breeding interaction between year classes is maintained by the spawning contribution of early returning jacks and the occasional four year old adults. Juvenile coho are highly adaptable and can have varied life histories. Most stay from one to two years in coastal streams before emigrating seaward as smolts. But other fry are equally at home in lakes or in coastal estuaries.



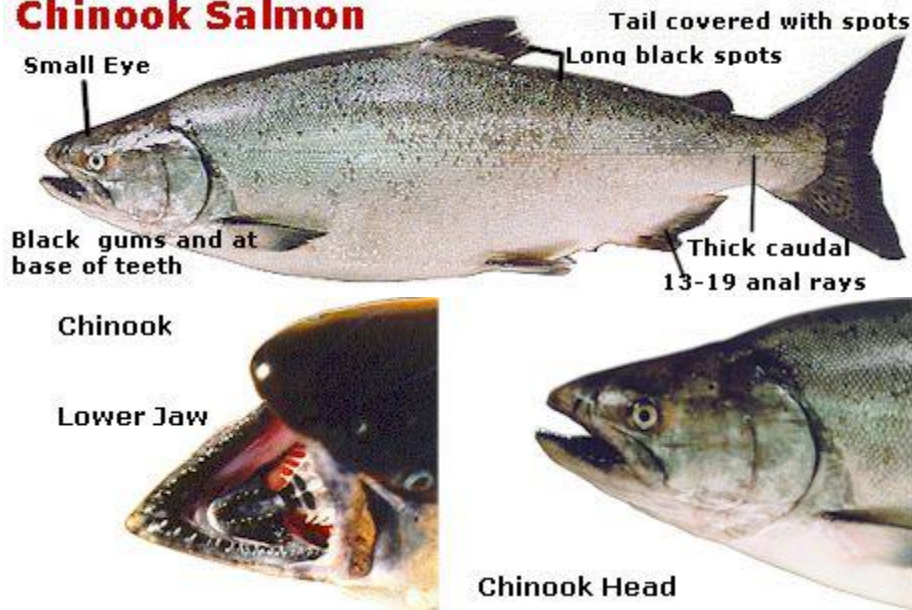
During early stages of growth, they have distinct parr markings (dark, vertical bars along each side), greenish brown backs, and a white leading edge on the anal fin and an orange tint on all but the dorsal fin. As they develop into smolts, their parr marks gradually fade and their backs become green with dark spots.

In the ocean, coho adults have silvery sides and a metallic blue back with irregular black spots. Spawning males in fresh water may exhibit bright red on their sides and bright green on their back and head, with darker coloration on their belly. They also develop a marked hooked jaw with sharp teeth. Females also change color and develop hooked snouts, but the alteration is less spectacular.



CHINOOK (*Oncorhynchus tshawytscha*)

Chinook Salmon



Chinook salmon (*Oncorhynchus tshawytscha*) are the largest of Oregon's five salmon species and are often referred to as King Salmon because of their size and strength. Fall Chinook in our coastal rivers and streams range in size from about 530 to 1200 mm (21 to 47 in) (jacks are less than 510 mm (20 in) MEPS length) and 20 to 60 pounds at the time of spawning.

Although the majority of Chinook salmon head to sea a few months after they emerge from the gravel, some remain in their home stream for one or two years. Chinook returning to spawn vary greatly in age. In Oregon, three, four and five-year-old Chinook are most common. Further north, five, six and seven-year-olds are more abundant. Chinook jacks are two- to three-year-old male fish that may also return to spawn. While still feeding in salt water, the Chinook has a dark back, with a greenish blue sheen.



Spawning Male Chinook

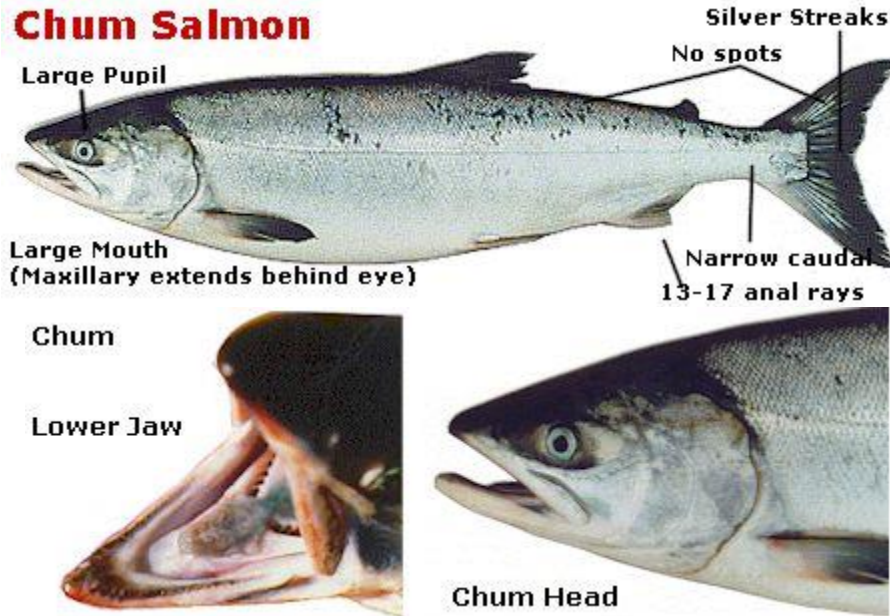
As it approaches fresh water to spawn, its color darkens and it develops a reddish hue around the fins and belly. By the time Chinook are typically observed in freshwater, the head is significantly larger than pictured above. Also, spawning males have enlarged teeth and the snout develops a hooked appearance (called a kype). Some coastal river systems have more than one stock of Chinook, sometimes with the stocks migrating in spring or fall.



Chinook Smolt

In the sea, Chinook feed on large zooplankton, herring, sand lance and many other fish, ranging widely in the ocean and growing rapidly during their last year in salt water.

CHUM (*Oncorhynchus keta*)



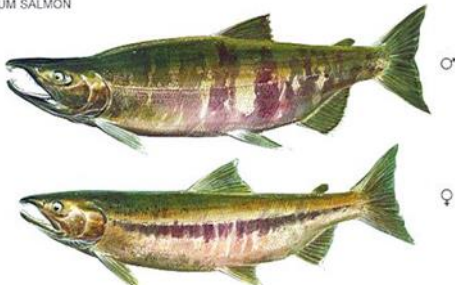
Chum salmon (*Oncorhynchus keta*) are widely dispersed along the Pacific coast from northern California to the Aleutian Islands in the Bering Sea. The distribution of chum salmon in Oregon is generally limited to the lower reaches of large streams and rivers on the north coast. In periods of high abundance they may be found further upstream and occasionally can be observed during coho surveys. While some have been known to weigh up to 35 pounds, chum salmon average between 8 to 14 pounds and measure between 610 and 760 mm (24 and 30 in) in total length.

In shorter coastal streams, young fry move directly to the sea upon emergence from the gravel, sometimes requiring only a day or two for their journey downstream. In the larger river systems, however, the fry may stay in fresh water for several months while making their way to the ocean. They remain in coastal waters until mid- to late- summer before going farther offshore. Their growth during this part of their migration is rapid. The young are green-backed, silvery fish with faint parr markings.



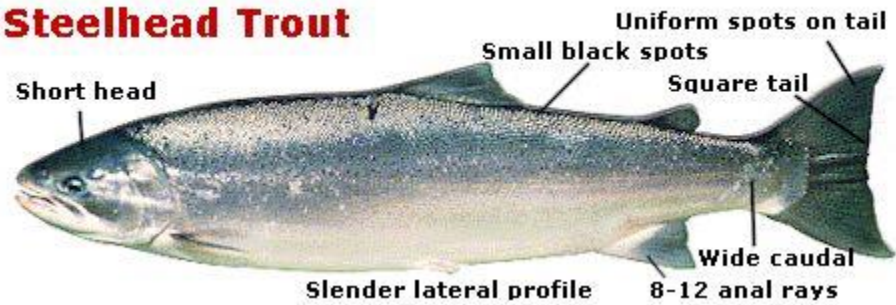
In salt water, chum salmon are metallic blue and silver, with occasional black speckling on the back. As they near fresh water on the return to their home streams, their flesh quality and visual appeal deteriorate rapidly. Mature fish show reddish or dark bars across the sides and some have blotches of gray or black as well. Sometimes spawning chum will display a greenish tint. The males also develop a sharply hooked nose and large, dog-like teeth (hence the common name "dog salmon") which are used for displaying behaviors and to protect their territory during spawning.

CHUM SALMON



STEELHEAD (*Oncorhynchus mykiss*)

Steelhead Trout

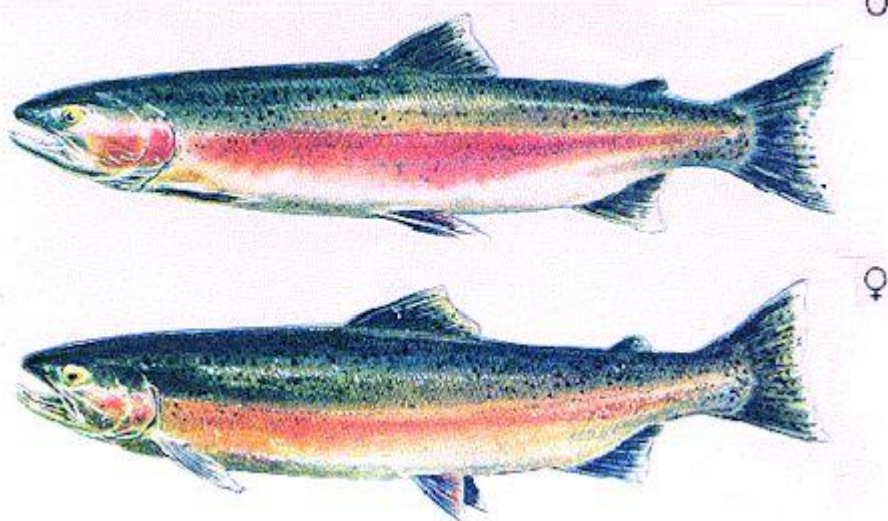


Steelhead trout (*Oncorhynchus mykiss*) utilize habitat in freshwater, tidal waters of estuaries and the near-shore environment. Adults prey on squid, euphausiids, amphipods and fishes; the young eat insects, copepods, amphipods and other crustaceans and young fishes (e.g. sand lance, eulachon, herring). Steelhead predators include of a variety of fish, birds and marine mammals.

Steelhead spawn in larger streams and rivers. Mature adults enter rivers and larger streams year round, but runs are generally concentrated in winter (November to May) and summer (May to October). Steelhead may spawn more than once (~30-40 % of the population do). Eggs are laid in gravel redds prepared by the female in tributary streams or inlets/outlets of nursery lakes from January to June. Eggs hatch in four to seven weeks and fry emerge from the gravel from mid-June to mid-August. Juveniles rear in freshwater for two to four years prior to migrating to the sea as smolts from April to June, and only remain in an estuary for a short period of time before moving offshore. Adults usually complete extensive feeding migrations in the Pacific Ocean before returning to spawn after two to three summers (range one to four) in the ocean. Adults live six to eight years and may reach up to 1140 mm (45 in) and 42 pounds. More typical length and weight range of fish you may see will be, 635 to 890 mm (25 to 35 in) and 5 to 20 pounds.

Spawning Comparison:

STEELHEAD TROUT





Fall Chinook: note irregular spots on back



Male, Female and Jack Chinook carcasses



Female, Male and Jack Coho



Female and Male Chum carcasses

SUPPLY LIST

Forms:

2. Landowner names for taxlots surrounding survey (laminated)
3. Photos of adult salmon in spawning colors (laminated)
4. Map and reach description along with GPS start and stop points
5. Survey form
6. Chum form
7. Redd Location Form
8. Protocol (waterproof)

Equipment:

1. Waders and Boots
2. Polarized sunglasses
3. Raincoat
4. ODFW Hat
5. Orange field vest
6. CWT reader- KEEP @ office
7. Plastic tray - to cut heads when extracting otoliths
8. Pencils and Sharpies
9. Measuring tape (mm)
10. Vials with labels in them for otoliths & genetic samples (ethanol for genetics, otoliths are stored dry)
11. Tweezers for pulling out otoliths
12. Scale envelopes
13. Forceps for pulling out scales (these can be same as what is used for otoliths)
14. Knife with sheath (sharp)
15. Dry bags and extra clothes
16. Wading staff with gaff
17. C. B. Radio (as needed)
18. GPS Unit w/ waterproof container and spare batteries
19. Thermometer
20. Cell Phone w/car charger
21. Machete and file to sharpen (one per person)
22. First Aid Kit
23. Cut resistant gloves
24. Flagging (used to mark ends of reaches and any landowner denials)
25. Handheld radios and spare batteries
26. Aqua Seal (one per crew)
27. Garbage bags for bringing back carcasses- uncertain species ID

28. Blank Rite-in-the-Rain paper - labeling heads before they are scanned for CWT and labeling eggs collected from females
29. Life Jacket – as needed
30. Whirlpaks - @ reintroduction sites to collect eggs

LANDOWNER CONTACTS

You must contact landowners for permission before conducting surveys that are located on private land. The data on these forms is our best knowledge about the landowners on the survey, but it is not infallible. People buy, sell and subdivide land, and there may be new landowners that are not on your sheet, or old landowners that no longer live on the survey. These landowners will need to be added or removed, respectively, from the sheet. It is your responsibility to make sure you DO NOT TRESPASS.

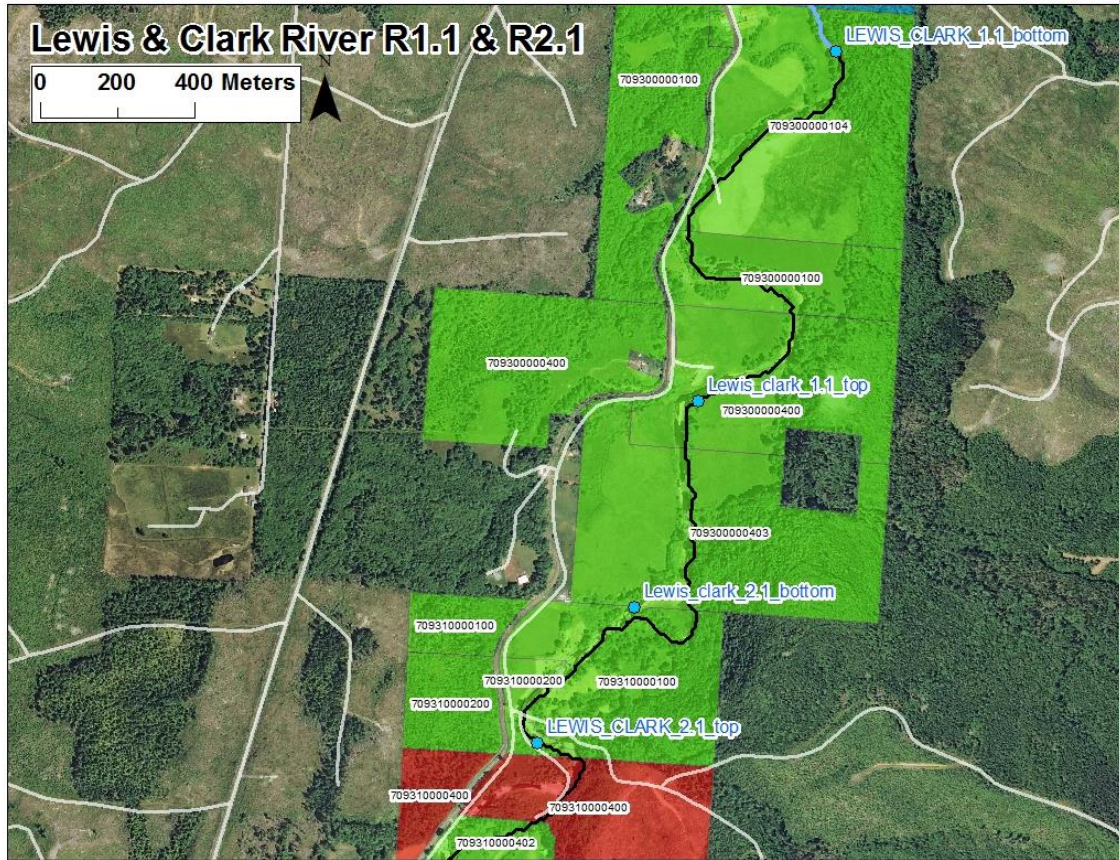


Figure 2. Example of aerial photo with survey location and landowner boundaries mark.

DEALING WITH SPECIAL CIRCUMSTANCES

MISSING SURVEY PARTNER:

What should you do if your partner does not return from a survey? Partners will survey separately unless specifically noted in the directions or in special circumstances. There may be times when you will find yourself waiting long periods of time for your partner to return. Keep in mind that surveys can take two to three times as long during periods of heavy carcass processing and scale recovery. High flows also make surveys more time consuming. If, after taking these and any other relevant factors into account, you determine that your partner has been gone too long, it may be time to go looking for them. Before leaving the predetermined pick-up spot, leave a very visible note (use flagging or survey sheets). The note should state when you left and your exact search plan. Start your search by going in the exit route, and then downstream from the end to the start. The next step, if necessary, would be to contact your crew leader and the state police. Do not attempt this search by yourself if it is late in the day. If cell coverage allows, stay on site near the survey. Leave the site only if you have to do so to contact help. It is a good idea to keep a flashlight in the rig. Do not start surveys late in day if they cannot be completed before dark.

CREEKS ARE UNSURVEYABLE:

Any creek with a visibility of 3 cannot be surveyed. **Before making this determination, check several areas within the route.** It is worthwhile to check several different spots, sometimes a creek may clear up a little way into the survey. If you cannot see more than a couple of inches into riffles or the tail outs of pools, you should not survey the creek.

There are a few guidelines that may help you during periods of high flows. Creeks have varying degrees of susceptibility to blowing out. If you know a big weather system is moving into the area, try to get the creeks that are more susceptible to blowing out done first. Once a storm has hit, focus on getting the smaller, less prone creeks done. Once the water level goes back down you can survey those creeks which you were not able to before. Planning and careful scheduling will help in keeping the surveys within the 10-day survey limit. It may be helpful to create a spreadsheet to help you plan. Consult regularly with your crew leader during periods of heavy rainfall when there are multiple creeks blown out. In general, when in doubt about the status of a creek go ahead and take the time to check it out.

FISHING AND HUNTING REGULATIONS:

Two current copies of the ODFW fishing rules and regulations brochure can be found in the vehicle glove box. Review the local regulations. Bear in mind that you are not an enforcement officer. If you encounter someone fishing illegally, use your best judgment on how to proceed. Often times it is just a matter of the fisherman not understanding or

knowing the regulations. Suggesting a check of the regulations is often all it takes to get them to move on. Be careful about confrontations. If you do not feel comfortable approaching certain individuals, try to obtain relevant information such as a license plate number. Report illegal activity to the state police or your supervisor (Oregon State Police tip line: 1-800-452-7888). Do not put yourself in a dangerous or an uncomfortable position.

CELL PHONES

All crews will be issued a cell phone. They are for work and emergency use only (not for routine personal calls) and should be taken with you in the vehicle every day. Check and respond to your messages daily.

PUBLIC RELATIONS AND SAFETY

When driving a state vehicle, accessing sites, or conducting surveys, you are personally representing ODFW to landowners, anglers, and the general public. In order to ensure continuing cooperation with our efforts, it is essential that we maintain a positive image and constructive relationships with members of the public.

If a landowner challenges your right to conduct surveys on their land, explain it was your understanding that permission was obtained, apologize for the misunderstanding, and request permission to continue the survey. **Under no circumstances** conduct a survey if the landowner denies you permission. If someone other than a landowner challenges your right to conduct a survey, tell him or her that you will seek confirmation of permission through the owner and your supervisor. Do not conduct a survey if you feel that it is unsafe to do so.

Always treat members of the public with respect. In recent years, ODFW has generally improved its public image, having demonstrated respect for landowners, a high level of scientific credibility, and budgetary responsibility. However, it is not uncommon to encounter a person who has complaints about ODFW or other fish and wildlife management issues. If you encounter an angry person and you feel unsafe, end the encounter. Otherwise, repeating or paraphrasing back what the person says will help you gain that person's trust by letting them know that you hear and understand what they are saying. Find a point of agreement and end the conversation. Avoid prolonged discussions, you can always refer the individual to your supervisor if they want to follow up with more questions.

Respect your physical and mental limits when conducting a survey. Don't take unnecessary chances when walking across rapidly flowing streams, on slick rocks or bedrock, and on slick, unstable, or rotten logs. Stay aware of your surroundings at all times (i.e., that bear needs that salmon more than we need the data). Pay particular attention to fatigue or the potential for hypothermia as each will affect your judgment.

You can probably make that jump to the log 9 times out of 10, but it will be that one time you miss that you'll probably regret for the rest of the day, if not the rest of the season.

Every work station needs to have a surveyor check-in system and search plan to locate missing surveyors. Your assistant project leader will set up a check-in system daily to make sure each crew safely returns from the field.

CB RADIO

Crews will be assigned CB radios whenever crews will be driving on logging roads. Never go on to a logging road without a functioning CB radio as well as a key for the gate. Radios should be set to the channel indicated at the entrance of the logging road. If there is no channel number posted, please ask your crew leader for the appropriate channel. To properly use your radio make a call when entering, exiting, and at every mile post along a logging road. Indicate what type of vehicle you are using, what logging road you are on, what direction you are heading, and how many vehicles are in your party. For example; One pickup, entering Big Creek mainline at milepost 1. Always know what mile marker you are near and be prepared to pull over when there is another truck heading your direction. When on logging roads, you must yield to all logging trucks. Note, logging trucks often don't call out on their CB radios so always drive slow and be prepared for a logging truck even when your radio is quiet.

PERSONNEL POLICIES AND PROCEDURES

Accidents and Injuries

All employees are required to have an emergency medical notification form on file. Any on-the-job injuries must be reported to your supervisor within 24 hours. Your supervisor will help you complete an Accident and Incident Analysis form within 24 hours of being informed of the accident. If medical attention is required, a SAIF Workers' Compensation Claim Form 801 also needs to be completed and sent to SAIF within five days of the incident. If you are seen by a physician, you need to take a Physical Assessment Form to the physician's office.

Crew leaders have copies of the necessary documents and will help guide you through the process if you become injured. If you become injured and are unable to continue work in the field, we will attempt to find other types of work for you. Often this means data entry or other office assignment.

Vehicle accidents need to be reported to the Department of Administrative Services (DAS; State Motorpool) as soon as possible (1-800-378-0077). An accident form also needs to be filled out. Vehicle Accident Forms are located in the vehicle information packet assigned to each vehicle.

Uniform Clothing

Employees are required to wear uniforms while working in the field. Surveyors also should wear uniforms when reporting to ODFW offices or contacting landowners for permission. Uniforms may be worn only when on-duty. Newly hired seasonal employees shall be allowed a uniform allowance equal to the purchase of two uniform shirts with logo and one pair of pants. Seasonal employees working continuously for 10 months per fiscal year (June through July) will accrue an allowance of \$25 per month of employment for use after an initial 6-month employment period. Returning seasonal employees will carry forward any unused uniform allowance earned in the twelve months immediately preceding the rehire date. Uniform hats will be supplied to all employees and should be worn.

APPENDIX A. IMPORTANT PHONE NUMBERS

Contact List for Lower Columbia Adult Spawn Surveys Fall/Winter 2016

Name	Position	Field Office	Work Cell	Personal Cell	Email
Chum Reintroduction Project					
Kris Homel	Coordinator	Clackamas/Big Creek	(503) 910-3091		kris.homel@oregonstate.edu
Natalie Scheibel	Asst. Project Leader	Big Creek	(541) 223-3824	(315) 412-3512	natalie.c.scheibel@state.or.us
Tony Grubb	EBA	Big Creek		(717) 602-6158	anthonygrubb1@gmail.com
Jordan Wheeler	EBA	Big Creek		(262) 327-4221	Jordan.r.wheeler@state.or.us
Big Creek Hatchery		Big Creek	(503) 458-6512		
ODFW District Biologists					
Tom Murtagh		Clackamas	(971) 673-6044		tom.murtagh@state.or.us
Chris Knutsen		Tillamook	(503) 842-2741		chris.j.knutsen@state.or.us
Oregon State Police					
OSP Astoria			(503) 325-4411		
Columbia County Sheriff			(503) 366-4611		
Clatsop County Sheriff			(503) 325-8635		
2016 OASIS Spawning Surveys in the Lower Columbia					
Frank Drake	Crew Leader	Big Creek	(541) 360-1646		frank.drake@oregonstate.edu
Kara Jauneke	EBA	Big Creek		(585)406-6278	
Jessie Vargas	EBA	Big Creek		(951)231-0371	

APPENDIX B. EMERGENCY PLAN

Spawning Ground Survey Emergency Plan:

Youngs Bay Locations: Lewis & Clark River

Big Creek Locations: Big, Bear, Little Bear, and Ferris creeks

Hospital: Columbia Memorial Hospital 2111 Exchange Street, Astoria OR
503-325-4321

Fire Station: Knappa-Svensen Burnside Fire 43114 Hillcrest Loop, Astoria, OR
503-458-6610

Clatskanie Locations: Stewart and Graham creeks

Hospital: Peace Health Saint John Medical Center located 1615 Delaware Street,
Longview, WA
360- 414-2000

Fire Station: Rural Fire Protection District 280 SE Third Street, Clatskanie
503-728-2025

Response: Most survey locations should have cell phone service. If an emergency occurs, first make sure the scene is safe. If the scene is safe then assist the victim so they are no longer in danger. If the incident is serious, then call 911 and monitor victim until help arrives. If you are out of cell phone service then mark the location of the victim with a GPS unit and go to an area where you get service, call 911, and relay the coordinates with the emergency responders.

ODFW, Chum Reintroduction emergency contacts:

Natalie Scheibel, Assistant Project Leader: 541-223-1767

Kris Homel, Project Coordinator: 971-673-0578

Erik Suring, Project Leader: 541-760-7518

APPENDIX C. SANITIZING SAMPLING GEAR

Crews should sanitize field gear between every survey and when they return to their duty station. Each Crew will be provided with a water container for fresh water (not from a stream!), and a stiff bristled brush. **After a survey please use this brush to thoroughly clean any material from boots and waders and then rinse with fresh water prior to driving to the next site.** Whenever possible, OASIS crews can minimize accidental mud snail transport across river basins by not sampling in more than one major basin per day. For purposes here we'll define major basins at the 4th Field HUC level (examples include the Sandy, Wilson, Asea, Siuslaw, Smith, Coos basins). See figure below for known current distribution of NZMS.

In addition to the above methods, use of a chemical protocol can aid in gear sanitizing on a weekly basis, or when surveying in a different basin the following work day. The protocol is based on research that showed that 100% of snails, etc. were killed in 5 minutes with a 1000 ppm concentration of Copper Sulfate (Hosea and Finlayson 2005). The chemical procedure and materials can be adapted by other crews that have nets and other collection gear. This method is to be used when drying of equipment prior to the next survey day is possible: over the weekend is ideal. Not all of our work stations have appropriate facilities for these methods.

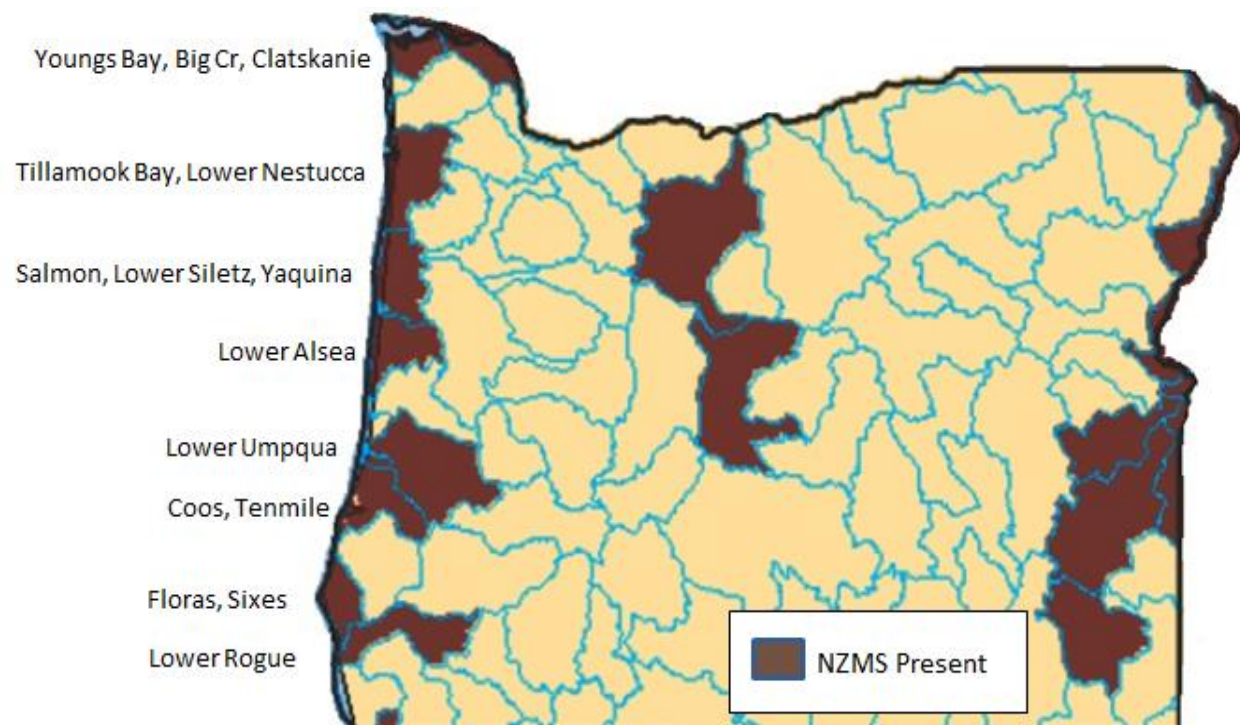


Figure shows known distribution of New Zealand Mud Snail within the Western Oregon in 2011

