DWR/DISE Aquatic Ecology Unit

**Standard Operating Procedures**

Last Revised: [8/20/21] (NK, JR)

Version: 1.3

Yolo Bypass Fish Monitoring Program: Listed Species Handling

The Yolo Bypass Fish Monitoring Program can “take” species listed under the California Endangered Species and U.S. Endangered Species Act. To respond to and mitigate for such, the YBFMP handles listed species differently than other fish caught in the program. Handling procedures differ depending on the species and can change annually. The following listed species can be caught as part of the YBMFP:

|  |  |  |
| --- | --- | --- |
| **Species** | **CESA Listing** | **ESA Listing** |
| Spring Run Chinook Salmon [Sac River Drainage] | Threatened | Threatened |
| Winter Run Chinook Salmon | Endangered | Endangered |
| Coho Salmon [south of Humboldt] | Endangered | Endangered\* |
| Steelhead [Central Valley DPS] | --- | Threatened |
| Delta Smelt | Endangered | Threatened |
| Longfin Smelt | Threatened | Candidacy |
| Green Sturgeon [southern DPS] | ---- | Threatened |

\*excludes Sacramento-San Joaquin River System

table information from: [<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109405&inline>]

# Equipment:

* Genetics kit + swabs
* Genetics Sampling and Take Cheat Sheet
  + See: YOLO BYPASS DATA:\Yolo Biological Data\Fish\Genetics Data\Species of Interest log Sheets\***Year***Species of Interest Log Sheets
* Scale
* Camera
* Aerators
* Cooler with ice
* YBFMP daily fish sampling gear
* Yolo Bypass Fish Datasheet
* Microscope
* Section laptop

# Methods:

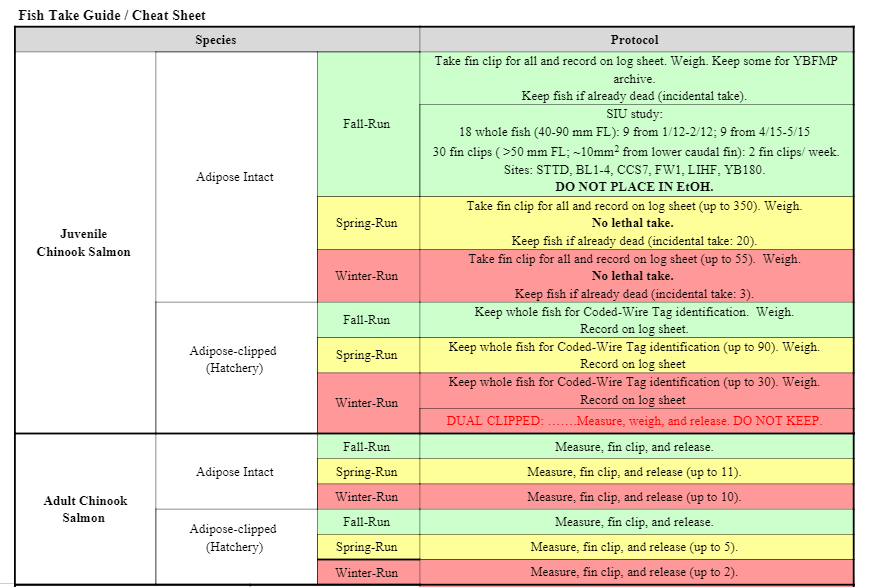
## Fish Safety

When listed species are caught, special handling techniques should be put in place.

1. Small fish (such as juvenile salmon and sturgeon, and all life stages of Delta and Longfin smelt), are usually caught in the rotary screw trap and beach seines. There are several steps that should be taken to reduce stress for these small fish:
   * Immediately place fish into a bucket of cool, aerated water and separate them from other non-listed species. Ice should be on hand to cool the water if necessary. Functioning aerators should always be available to provide oxygen.
     1. Water temperature in the bucket cannot exceed 21°C
   * Process listed species as soon as possible and be sure to handle them only with ungloved hands as gloves can be abrasive and disrupt their mucous coats.
   * Ensure your hands and the measuring board are wetted before making contact with the fish.
   * Remove fish from the water for the shortest amount of time possible and, if they are to be released, allow them to recover in an aerated bucket after handling.
   * Always use water-to-water transfers for smelt.
2. Large fish (such as adult salmon and sturgeon), are usually caught in the fyke trap. There are several steps that should be taken to reduce stress for these large fish:
   * Occasionally, due the water level, the fyke trap has to be lifted further out of the water than ideal, leaving little or no water for fish in the trap. To ensure this does not affect adult listed species or any salmonid or sturgeon, a field crew member should assess the contents of the trap as it is being winched to shore and look out for any large fish. If a salmonid or sturgeon is in the trap, they will usually splash around and be easy to spot. If these fish are found in to be in the fyke, every effort should be made to leave plenty of water in the trap. This may mean netting in deeper water than ideal to try and remove sensitive species, before winching the trap up further to more efficiently net the remaining fish.
   * A large tub of water should be prepared on shore for the fish to recover in before measuring and, if necessary, after measurement for recovery.
     + Add fresh water as necessary to improve dissolved oxygen content if the fish needs extra time to recover.
     + If the fish is not recovering and barely moving, try holding its caudal peduncle and gently moving the fish forward and backwards to force more water to pass over its gills.
   * Try to reduce the time the fish is out of the water as much as possible while you’re handing; this will help them recover faster.
   * Salmonids and sturgeon should be removed from the fyke using either the fish cradle or via net. If the net is used, the field crew member handling the fish should hold the fish so that its body weight is always supported. It is ideal not to wear gloves when handling these fish as to protect their mucous coats. However, it is acceptable to wear gloves when necessary for your safety – such as when handling sturgeon, which have sharp scutes along their body.
   * When transporting and measuring, be sure to keep a firm grip on the fish. It is better to apply more pressure than to allow the fish to fall or knock its head against the ground.
3. Spring-run and winter-run Chinook Salmon, Steelhead, and Green Sturgeon
   * When water temperatures exceed 21.1°C, special handling (length, weight, genetics, etc.) must be suspended and only identification and counts can be done.

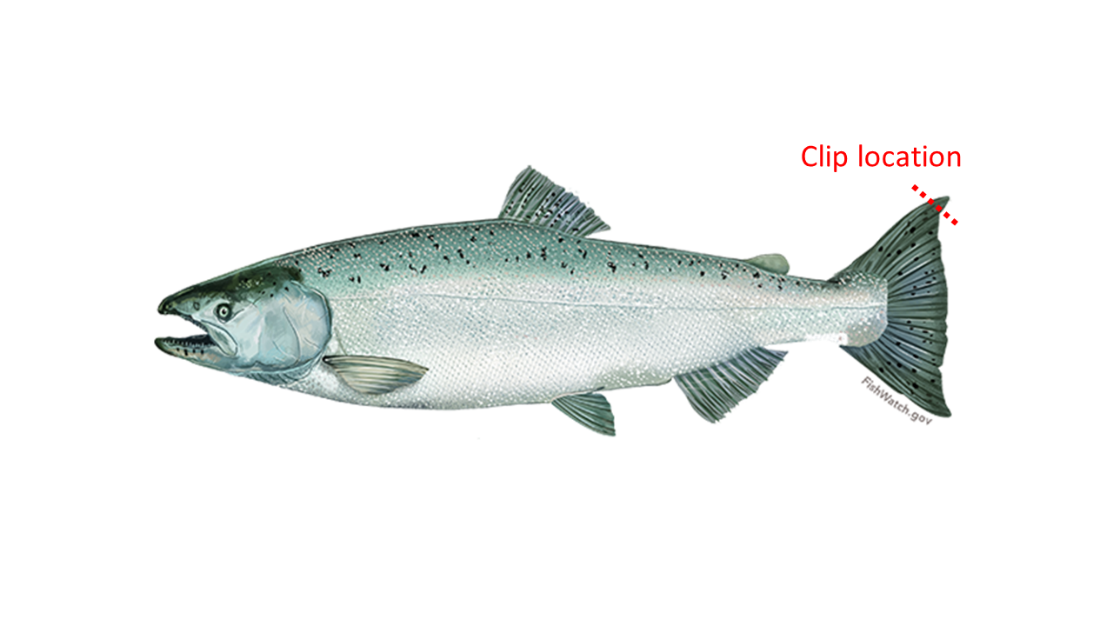
## Special Sampling Procedures

These describe procedures beyond typical sampling identification and fork length recording. Depending on the listed species, sampling procedures may differ. Please refer to the *Genetics Sampling and Take Cheat Sheet* (example below accessed 04/17/2020 from Yolo Biological Data\Fish\Genetics Data\Species of Interest log Sheets\2020 Species of Interest Log Sheets), which should be updated annually and always kept in the genetics tote for details regarding what samples to collect from which listed species.



Special sampling for most listed species includes:

1. Genetic fin clip
   * All ad-plus Chinook Salmon should have a genetic sample collected. Coordinate with the YBFMP PI if catch is high enough to make this infeasible.
   * Cut a small piece of fin tissue from the caudal (preferred) or anal fin using clean scissors.
   * Clip tissue from only ONE caudal lobe or one fin.
   * Hands of the collector should be fairly clean of mucus and scales between handling fish.
   * Scissors/knife should be sterilized between samples with alcohol swab.
   * Fin clip should be roughly 5 mm2 (2.5 mm x 2 mm).
   * Allow the fish to recover after collecting the clip.
   * See the Genetics SOP for further details.



1. Weight
   * Weights are only taken for small fish less than 1000g.
   * Prepare the scale in a stable location (such as the back of the truck) and protect it from wind.
   * Prepare a small container with enough water to cover the fish and place this on the scale and tare.
   * Place the fish in the container, record weight, and then transfer the fish to a recovery bucket.
2. Lethal sampling
   * If the fish is going to be brought back to the lab, euthanize the fish using blunt force to the head.
     + Blunt force consists of a precise, swift blow to the top of the head, just behind the eyes.
     + All staff should be trained first by an experienced crew member so as to reduce error and ensure a swift death.
   * Do this before collecting any other samples or measurements.

## Adult Salmon Additional Handling Procedures

1. Floy tag
   * Prepare the floy gun for tagging by ensuring the tags are pushed fully down so you can see the “T” of the first tag in the needle side opening. Record the numbers on the 2 floy tags which will be used for the fish.
   * Keeping the head fully submerged, firmly grip the caudal peduncle and use the angled edge of the needle to get beneath scales. Then, quickly insert the floy gun needle near the back base of dorsal fin. The goal is to inject the base of the tag behind the subdermal portion of the fin rays. Click the floy gun trigger, then twist the gun 90 degrees and remove the needle from the fish. Gently tug on the tag to ensure a good hold. Repeat this process on the other side of the fish. If it does not hold, try again but not within the same hole. After tagging, confirm the tags match those you recorded on your data sheet.
     + All staff should be trained first by an experienced crew member so as to reduce error.



(1) Clayton Waller, Idaho Fish and Game (2) marine.ie

## Juvenile Salmon Additional Handling Procedures

1. To minimize impacts to salmon, juvenile Chinook salmon are quickly sorted from other fish species and held in a separate bucket. Where possible, try and distinguish winter-run salmon from other salmon runs and process them first. Distinguishing is based visual identification using Fisher's daily length-at-date criteria (Delta model; [[Yolo Biological Data\Fish\Genetics Data\Salmon\Length-by-Date Documents\LengthCriteriaDelta\_field version.xls]](file:///\\cnrastore-des\DESSRV20\M%20&%20A%20Branch%20Data\Yolo%20Bypass\YOLO%20BYPASS%20DATA\Yolo%20Biological%20Data\Fish\Genetics%20Data\Salmon\Length-by-Date%20Documents\LengthCriteriaDelta_field%20version.xls).
   * Any adipose fin-clipped salmon are euthanized (see “take” above), bagged individually (whirl-pack bags) and marked with information on sampling location, date, gear type, fork length, and time. Fish are then kept on ice in a cooler until transferred to the West Sacramento office to be weighed and frozen at -20°C.
2. Captured salmonids are inspected for characters such as presence of yolk sac, parr marks, silvery appearance, and deciduous scales to determine life stage and/or degree of smolting. A simple life stage designation (F, P, or S) is determined for each fish measured.
   * **Fry**: Identify fry as any fish still retaining a yolk sac or not yet fully buttoned-up. An unbuttoned fry will no longer have a visible yolk sac but will have an open slit along its stomach in the same area where the yolk sac would normally protrude from.



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* + **Parr**: Identify parr as anything in between a fry and smolt. They should have prominent parr marks across their lateral line



beautifuloregon.com

* + **Smolt**: Identify smolts as fish who are starting to become/already are silver in color and shedding scales. Note that smolting fish may still have faded parr marks.



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1. Salmon take flowchart:

Diagram

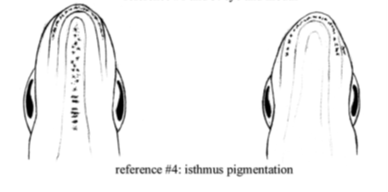
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* + To edit, visit <https://www.lucidchart.com/>
    - Email: [Nicole.Kwan@water.ca.gov](mailto:Nicole.Kwan@water.ca.gov)
    - Password: ybfmp2021!

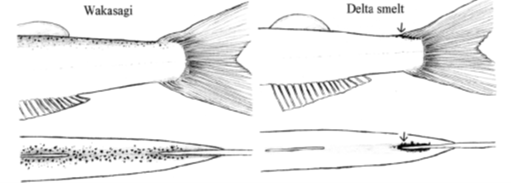
1. See the Genetics SOP, Dissections SOP, and CWT SOP for details regarding how to process salmon in the lab.

## SmeltAdditional Handling Procedures

1. Identifying smelt in the field**:**
   * Check for chromatophore numbers and v-shaped pigmentation in the field for adult Delta Smelt only.
   * No chromatophore numbers or v-shaped pigmentation is necessary for an ID of Longfin Smelt.
   * Look for the isthmus, check for pigmentation:
     + Chromatophore is the dot pigmentation on isthmus.
     + Wakasagi has two or more chromatophores on the isthmus.
     + Delta Smelt has one or no chromatophore on their isthmus.
     + Note that juvenile Wakasagi may be missing chromatophores (they develop chromatophores as they mature). Note how many chromatophores are present in each fish on the Genetic Log Sheet.



* + Look for pigmentation on top of the caudal peduncle:
    - Wakasagi will have scattered spots all around the top.
    - Delta Smelt will have fewer number of spots that are clustered around the caudal fin (creating a sort of v-shape).
    - Note whether or not fish has the v-shape spotting on the genetic log sheet prior to releasing Delta Smelt.



1. Smelt field handling flow chart:

**Diagram

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* + To edit, visit <https://www.lucidchart.com/>
    - Email: [Nicole.Kwan@water.ca.gov](mailto:Nicole.Kwan@water.ca.gov)
    - Password: ybfmp2021!

1. Genetic swab
   * Rinse off hand prior to handling fish and swab.
   * Open OmniSwab by peeling package open from the handle end of the swab. Remove carefully. Ensure that swab pad/head does not touch any fish or wet surface.
   * Hold OmniSwab using your dominant hand. Pick up fish with your non-dominant hand.
   * Gently rub the swab pad against fish belly or side. Rub swab pad back and forth 5-10 times.
   * After swabbing is done, eject swab pad into sample vial using release button at the other end.
   * Label vial accordingly and close it.
   * If raining, cover sampling area and the swab from rainwater as much as possible.
   * Avoid having vials be in direct sunlight for prolonged amount of time.
   * Upon return to the office, open the vial and air-dry the swab pads overnight under fume hood in the lab. Close the vials the following day and transfer to freezer.
2. Microscope Photography
   * Place fish under the scope to check for general morphology, chromatophore, and v-shaped pigmentation on caudal peduncle.
   * At least two staff members should look at each smelt and a consensus is needed to make a species call (see chromatophore and v-shaped pigmentation information in this document).
   * Once a species ID has been determined, write down information (# of chromatophores, v-shape, etc.) on the Genetic Log Sheet.
   * Take pictures of each smelt using dissecting scope camera and the section laptop. Pictures should include one of the isthmus, one of the caudal peduncle (top view), and full side body shot.
     + Save each picture file with the genetic ID (ex: “2017-WAG-006-0001”) seen in the log sheet. Be consistent in the use of “\_” or “-“.
     + Take a fin clip for genetic identification (see fin clip protocol above).
     + Preserve whole fish in 95% ethanol or process fish for dissection.
     + Create electronic copy of the genetic log sheet and enter data at least every other week.
     + Examples photos:



**** **** ****

1. See the Genetics SOP and Dissections SOP for more details regarding how to process smelt in the lab.

**NOTE**: Anytime a listed species (whole or specific parts) is transferred to an entity outside of DWR, a Chain of Custody (COC) form must accompany the exchange. The COC should be signed by both parties and a copy placed in the ESA Take Reporting Binder (currently in JT Robinson’s cube). The COC should also be scanned and added into a relevant project folder.

# QA/QC

At least two staff should be present to handle listed species, with each staff observing each other and providing feedback if the other is not following proper procedures for the safety and health of themselves and the fish.

## New Year Preparation

1. At the end of each calendar year, a new Species of Interest Log will be made (see Genetics SOP). Ensure this log meets all state and federal permitting requirements.
2. Be sure that all listed species have been reported through the proper take reporting channels. See the Take Reporting SOP [[Yolo Bypass:\YB\_Standard Operating Procedures\Programmatic\ DWR-6-SOP-009\_v1.2\_TakeReporting.docx](../Programmatic/DWR-6-SOP-009_v1.2_TakeReporting.docx)].

# Past SOP editors and collaborators:

* 4/10/2020 – Nicole Kwan: Created the document “Species of Interest SOP.”
* 4/13/2020 – Nicole Kwan: Added additional procedures and reformatted the SOP to meet YBFMP internal review standards.
* 4/20/2020 – Naoaki Ikemiyagi: Minor edits to text.
* 4/21/2020 – Brian Schreier: Minor edits to text.
* 4/22/2020 – Nicole Kwan: Incorporated NI and BS edits, added file paths.
* 4/29/2020 – Nicole Kwan: Added text about COC’s.
* 4/13/2021 – Nicole Kwan: Added QA/QC section.
* 8/12/2021 – Nicole Kwan: Added login information for Lucid Chart and updated to new ReOrg division and unit names.
* 8/20/2021- Nicole Kwan and JT Robinson: Updated some unclear language; updated salmon take flowchart to fix yes/no on CWT fish storage; added using water-to-water transfers for handling smelt; added information about water temperature thresholds listed in NMFS Sec 10 and SCP permits); changed language about sorting winter-run from other salmon runs to acknowledge that it is sometimes too challenging to tell them apart