State of California
California Natural Resources Agency
Department of Water Resources

John E. Skinner Delta Fish Protective Facility

Standard Operating Procedures

2020 Update

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Contents

Introduction

Project History and Purpose

The Department of Water Resources (DWR) completed construction of the John E. Skinner Delta Fish Protective Facility (Skinner Fish Facility) in 1969. DWR is responsible for its operation and maintenance. The Skinner Fish Facility is an integral part of the State Water Project (SWP). Water is diverted from the southern Delta into Clifton Court Forebay, a large storage reservoir. Water is later exported south via the California Aqueduct after it is lifted by the Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant).

The function of the Skinner Fish Facility is to reduce the number of fish entrained into the Banks Pumping Plant. Fish are collected using a system of louver screen arrays, bypass passages, and fish collection tanks. Periodically, fish are lifted from the collection tanks, placed into fish hauling trucks, transported to locations away from influence of the State and Federal pumping plants, and released.

The need for accurate estimates of the number and species of fish salvage at the Skinner Fish Facility has grown in importance since its construction. Fish sampling was first started to record the numbers, sizes, species of fish salvaged and to optimize fish hauling loads. This information was later used to estimate fish losses and determine mitigation obligations for Chinook salmon, steelhead trout, and striped bass.

Since the authorization of the Federal and State Endangered Species Acts, salvage data are closely studied for evaluating the potential impacts of pumping and export operations, improvement in fish facilities, and for monitoring fish population trends. Since the export agencies must minimize their impacts through adaptive water management. The numbers of listed species salvaged or lost at this facility can greatly affect the quantity and timing of water deliveries through the SWP.

Department of Fish and Wildlife's Involvement

The Skinner Fish Facility was operated solely by DWR personnel for the first 23 years of operation. The DWR operators performed fish counts and hauls while performing all facility operations. Following the Federal or State listing of several fish species in the late 1980's, there was an increased demand for accurate reporting of fish salvage data. The Department of Fish and Wildlife (CDFW) and DWR mutually decided that the most effective method for improving accuracy was to provide additional staff. During the early 1990's, DWR contracted with the CDFW to perform fish salvage operations at the Skinner Fish Facility. The CDFW's primary responsibilities were to conduct the fish sampling counts and haul the salvaged fish. At the same time, regulatory and monitoring requirements concerning listed species had increased the scope of duties and responsibilities of the fish facility staff.

In August 2000, CDFW identified the positions at the Skinner Fish Facility for redirection. CDFW modified its current contract with DWR to return salvage operations at Skinner back to DWR in early 2001. DWR and CDFW management implemented a transition plan to return the salvage operations to DWR. Stockton CDFW staff involved with the salvage data processing, data reporting and analyses were not redirected in this management action.

Purpose of these Procedures

In early 1999, the CDFW Skinner Fish Facility staff began preparing Standard Operating Procedures to assist the training of employees. After the announcement of the redirection of CDFW staff, CDFW and DWR agreed that detailed Operating Procedures were needed to enhance and speed the training of DWR staff. Written documentation would help transfer CDFW salvage operations experience to their DWR counterparts and provide an authoritative reference resource. The Operational Procedures act as a foundation document for standard operating procedures (SOPs) adopted under a quality assurance program plan (QAPP) developed by DWR management with CDFW's assistance.

Regulatory Requirements and Agreements

Operation of the Skinner Fish Facility involves the salvage of a diverse assemblage of fish species including delta smelt, Chinook salmon, steelhead, and other resident and migratory species. Delta and longfin smelt, winter-run and spring-run Chinook salmon, Central-Valley steelhead, and Southern Distinct Population Segment (DPS) green sturgeon have been listed for protection under the California and/or Federal Endangered Species Acts (ESA). Operation of the Skinner Fish Facility is therefore performed in compliance with terms and conditions of a variety of regulatory permits and agreements. These permits and agreements regulate the numbers of protected fish that can lawfully be taken during routine operations of the facility and how the facility is operated. A summary of each of these permits and agreements is included here for reference.

Procedures for Fish Species Counts

1. Record operations readings from the computer monitor in the facility control room.

   Tip: Time is required for water velocities to stabilize after a flow change. Premature flow readings will be unstable and result in inaccurate salvage and loss estimates. Usually, **15** to **20** minutes are required to ensure stable readings. Consult the facility supervisor on duty if there are any questions.

2. **If both holding tank buildings (HTB) are collecting fish, you must perform counts in both buildings simultaneously.**

   When collecting fish in both **HTBs**, start the count in one building at a time, but run both buildings simultaneously. For example, start the count in the HTB2 building and then immediately begin a count in the HTB1 building. When the count period ends in the HTB2 building, immediately halt the count in the HTB1 building.

   Do **not** collect a full count in one building and then, at a later time, begin a count in the other building.

3. Close the collect valve(s) to the holding tank(s) currently receiving water from the secondary bypass(s). Typically, fish are collected in Tanks 2 through 4 in the HTB1 building and in Tank 6 in the HTB2 building.

4. Open the collect valve for the Count Tank (Tank 1 in the HTB1 building or Tank 5 in the HTB2 building).

5. Wait for the allotted time for the fish count.

6. Close the collect valve in the Count Tank.

7. Open the collect valve(s) to the holding tanks(s) being used currently to salvage fish.

8. Position the 90-gallon count bucket over the drain of the Count Tank.

9. Close the fill valve in the count tank and open the drain. Once the tank is drained, lower the counting bucket until it seats with the bottom of the holding tank. **Do not leave significant amount of slack in wire rope.**

10. Lift the Count Tank screen (Jack).

11. **Hose down the screen and the bottom of the count tank** until all of the fish are flushed into the counting bucket.

    Important: This is *especially* critical when larval and small juvenile fish are being recovered in the counts. It is impossible to see 20 to 30 mm fish at the bottom of the collection tanks from the floor of the collection buildings.

12. Lift the counting bucket out of the Count Tank and maneuver the bucket over the counting station.

13. Lower the bucket onto the tire and release the bucket drain valve slowly. Hose off any fish and debris that are hanging up on the count bucket screen. Allow the bucket's contents to drain into the counting pan.

14. Remove the counting bucket, tire, and the counting pan screen. Inspect the inside of the tire to ensure that fish are not trapped there. Remove any incidental debris from the counting pan.

15. Process the fish sample by:

    a. Identifying and counting all fish and listed species.
    b. Measuring all the Chinook salmon, steelhead, and listed species and recording data on a length sheet.
    c. Recording the count information on the data sheet.
    d. If no fish are collected in a count, record "0" in the "Total Fish Count – code 98" row.

    NOTE: Use a piece of scratch paper while in the building to record fish count species and numbers to be transferred to the ops sheet in the control room. Place your scratch paper in the draw in control room when you finish transferring data.

16. Close the Count Tank drain, open the fill valve, and lower the tank screen.

17. Review the count data sheet for completeness and legibility.

Recording Operations Information

1. Sample Time indicates the time at the end of the sampling period. If the sample period is from 0700 to 0900, enter **0900**.

2. Total minutes' pumping is the duration of the sampling period. For example, if the sampling is:
   a. From 0700 to 0800, enter **060**;
   b. From 0700 to 0900, enter **120**;
   c. From 0700 to 1000, enter **180**.

3. Length of count is the duration of the count in minutes followed by two decimal places. For example, for a **30**-minute count, enter **30**.

4. Temperature is the water temperature reading rounded to the nearest whole number and followed by one decimal place. For example, if the readings were:

   a. 67.4 F, enter **67**;
   b. 67.8 F, enter **68**

   If the reading ends with 0.5 F, round up to the next nearest whole number. For example, the readings were:
   67.5 F, enter **68**;
   68.5 F, enter **69**

5. Channels/bays open are found on the computer screen under the "Velocity" heading. A bay is open if velocity is shown for the bay.

6. Primary bypasses open HTB1/HTB2 is determined by the building being used. There are always two primary bypasses open unless instructed otherwise by the operator.

7. Primary depth is found at "Upstream Primary Depth." *Example* **19.1**

8. Primary flow is found at "Primary Channel Flow." Banks flow **2260 cfs**

9. Secondary depth – HTB1 is found at "Downstream Sec 2." *Example* **10.3** **channel 2**

10. Secondary flow – HTB1 is found at "Sec Channel 2." Round this reading to the nearest whole number. For example, a flow of 80.6; *Enter* **81**

11. Secondary depth – HTB2 is found at "Downstream Sec 1." *Example* **10.3** **channel 1**

12. Secondary flow – HTB2 is found at "Sec Channel 1." Round this reading to the nearest whole number. For example, for a flow of 80.6; *Enter* **81**

13. HTB1 tank flow – HTB1 is the calculated average flow into each tank and is not displayed by the operations monitor. This flow is calculated by the operations monitor. This flow is calculated by dividing the total flow entering the HTB1 building "Sec Pipe 2" by the number of collection tanks in operation. For example, if the total flow entering the HTB1 building was 24.3 cfs and three HTB1 tanks were collecting fish, the estimated flow entering each tank would be **8.1**

14. HTB1 tank flow – HTB2 is typically entered as it appears at "Sec Pipe 1" since only one tank is normally used in the HTB2 building. However, if two HTB1 tanks are in use in the HTB2 building, follow the same instructions as for the HTB1 building when collecting fish in multiple tanks. *Note; Two HTB1 tanks would only be used if too many fish or too much weed debris for one tank or Banks is pumping over 9,000 cfs.*

15. Comments typically include flow change information. A flow change at 1:00 PM would be recorded as **1300 = 3390 to 6400 cfs**. This section is also used to record any operational problems such as missed counts due to sudden or unannounced flow changes, excessive debris, inoperable valves, Delta Smelt Larval, etc.

Additional Data Sheet Tips

Operations/Counts Data Sheets

1. If no fish were salvaged: Write a zero value for species code 98.

2. If no fish were salvaged, but there were mitten crabs present: There should be a value for the number of mitten crabs and a zero written in species code 98.

3. If the facility is undergoing a shutdown period, then nothing is entered in the count section. *The shutdown should be noted in the comments section.* If the facility is shut down for the entire day, include a date sheet with the date and explain the reason for the shut down and write across sheet "No Pumping".

4. The daily acre feet value must be written on all Ops and Count data sheet.

5. Write out the full species name.

6. Date is correct.

7. Page number in right corner, *Example*; **1 of 5**.

Length Data Sheet

1. For mitten crab sex: write M or F next to the length value.

2. Write out the full species name, except mitten crab is acceptable for Chinese mitten crab and steelhead is acceptable for steelhead trout or steelhead rainbow trout.

3. When measuring Chinook salmon or steelhead, you only need to write a C if it is clipped or NC if it is non-clipped.

4. Write a C under each length for each clipped Chinook salmon or steelhead. **Do Not** write C under species code if all fish are clipped, the C must be written under each clipped fish length. ***Number on top line and C,or N/C on the bottom line***.

Corrections Made After Data Sheets Are Sent to F&W

1. The change is made and an asterisk is placed beside the correction.

2. An asterisk in the comment box at the bottom of the ops sheet with date and operator's initials'.

3. Include the pump time correction was made on.

Procedures for Processing Adipose-fin Clipped Salmon

CWT Wand

1. Measure and record the fork length. Write a "C" next to the value to indicate the fish is adipose clipped.

2. Use the blue wand to verify a CWT is present. If it is verified a CWT is present follow steps 3 through 8. If no cwt present go to Pit Tag procedures.

3. Put the fish into a small freezer bag. Place only one fish per bag.

4. Record the following information on a waterproof tag:

    a. Facility (e.g., SWP for the Skinner Fish Facility)
    b. Building (old or new)
    c. Time of collection
    d. Date
    e. Fork length + "C", circle CHNT
    f. Species
    g. Number of set (e.g., sample 1 of 5)

5. Place the tag into the freezer bag with the fish. Ensure that the tag can be read from the outside of the whirl pack.

6. By each count **and** each building, place all the individual sample packs into one 1 – gallon freezer bag.

7. Record the following information on the outside of the freezer bag:

    a. Facility (e.g., SWP for the Skinner Fish Facility)
    b. Building (old or new building)
    c. Species
    d. Time of collection
    e. Date
    f. Total number samples in this set (e.g., 5 of 5)

8. Place the samples into the sample freezer.

PIT TAG Wand

1. Measure and record the fork length. Write a “C” next to the value to indicate the fish is adipose clipped.
2. Use the yellow wand to verify the presents of a Pit Tag.
3. If a pit tag is verified.
4. Record on Pit Tag record form. (1, 2, 3 etc.) (note any visible sutures or scars)
5. Release the fish back into the holding tank.

NO Tag Detected

1. Measure and record the fork length. Write a “C” next to the value to indicate the fish is adipose clipped.
2. Release the fish back into the holding tank.

Procedures for Tissue Collections from Chinook Salmon

1. Samples to be used for DNA studies should be taken only from live, freshly frozen, or anesthetized specimens. DNA cannot be obtained from specimens or tissues that have been exposed to or fixed in formalin.

2. Tissue for DNA studies can come from any part of the organism but we take a piece (approximately 1mm square) of caudal (tail) fin clipped from the specimen.

3. DNA cross-contamination (contamination of one sample of DNA with DNA from another sample) is always a potentially serious issue that can compromise results from molecular studies. To avoid cross-contaminating DNA specimens you should use sterile laboratory techniques. After every fin clip is taken from a specimen, the scalpel, knife, razor blade, or scissors and forceps must be cleaned thoroughly of any possible DNA. This cleaning is best done by plunging the instruments exposed to the previous sample of DNA (or tissue) into an **Iodine solution**. THIS IS TO BE DONE IN BETWEEN EVERY SINGLE INDIVIDUAL SAMPLE.

4. Sample tubes will be provided by CDFW Central Valley Tissue Archive Laboratory (CVTA) and prefilled with denatured 95% Ethanol (EtOH). Each tube will contain only the tissue of one specimen of a species. Each EtOH filled tube must have a unique label or number that was predetermined by the CVTA. Record this vial number on the DNA collection sheet as samples are taken.

Wild Winter Run Chinook Salmon

SET-UP

1. The DNA sampling station should be set up away from the regular sampling station to reduce the DNA sample contamination.

2. Ensure the DNA sampling station is set up with the necessary sampling equipment at the start of each shift before processing any fish. The necessary equipment consists of:

    a. Plastic Bucket of fresh AQUI-S or other CDFW approved anesthetic.
    b. Sample Vials with 95% ethanol*
    c. Sample Log
    d. Small beaker of Iodophor
    e. Stainless Steel Scissors
    f. Clean rag

***Tip**: Do not spill on bare skin.

TISSUE SAMPLING:

3. Place all **fish to be DNA sampled** into a bucket of fresh water (reference the "Annual Procedures for Sampling Salmon and Steelhead" document for guidance on which fish to sample). If necessary, use more than one bucket to reduce overcrowding; no more than 10 fish per bucket.

4. Any fish collected for DNA sampling will be measured by fork length during the tissue collection process. Length measurements obtained during the DNA collection step must match those on the Salvage data sheets.

5. After processing the fish count, secondary removal, or special study, proceed with the tissue sampling by fin clip.

Tip: Normally, DNA samples from both buildings could be done together. If the samples from the next building are estimated to require a long processing time, collect the DNA samples first to reduce the fish's bucket holding time before proceeding to the next collection building.

6. Anesthetize the fish by placing them into the anesthetic solution. If there is a large number of fish to be sampled (greater than 10), adjust the rate that the fish is placed into the solution so that anesthetized fish are not excessively exposed to the drug. Once fish are "unconscious", tissue and fin clips can be taken.

7. Prepare the sample vial(s) to receive the tissue sample.

8. Dip the scissors into the iodophor solution and wipe with a clean rag before each fin clip to avoid tissue contamination.

9. With sharp (sterile) scissors, clip a small section, **about 1 mm x 1 mm square mm (the size of a hole punch)** from the tip of the caudal (tail) fin and place it in the sample vial. If unable to take sufficient tissue from the caudal fin, a clip may be taken from the anal fin. Approximate sample size: 

10. Once the fin is successfully removed place it into the properly labeled tube with ETOH using the scissors (i.e. avoid touching the sample with your hands).
    a. **It is <u>crucial</u> that tissue samples be completely immersed and not exposed to air.**
    b. **ONLY A SINGLE CLIP SHOULD BE PLACED INTO THE SAMPLE VIAL.**
    c. **IF MULTIPLE CLIPS WERE TAKEN ONLY THE LARGEST SHOULD BE KEPT.**
    d. **VIALS WITH MULTIPLE SAMPLES MAY BE DISCARDED.**

Place the anesthetized clipped fish into a bucket of clean water and revive the fish **before returning them to the holding tank**.

12. The hands of the collector should be cleaned of slime and/or scales between handling fish, and scissors should be rinsed between samples.

13. Sterilize the scissors and move on to the next fish specimen. Again, sterilize by plunging the instruments exposed to the previous sample of DNA (or tissue) into **Iodine solution**. THIS IS TO BE DONE IN BETWEEN EVERY SINGLE INDIVIDUAL SAMPLE!!!

14. Close each tube, and remove the tubes from the immediate work area, so as not to add the tissue sample to the wrong tube.

15. Record the following information on the data sheet:

    a. Collection Date
    b. Time
    c. Fork Length
    d. Sample ID

17. Place all samples into the bottom drawer in office in a special marked vial box labeled (Winter Run Chinook Only) to await pickup. Ensure that the vials remain in numeric order.

18. Record all Wild CHN Salmon, length, time of count on operator desk Wild CHN Salmon sheet.

19. **Call and inform ACC** number of Wild CHN Salmon, length, time of count, then record ACC operator's name you talked to on Wild CHN Salmon sheet.

20. ***Immediately notify your supervisor or Superintendent*** of any Wild Winter Run Chinook Salmon tissue sampling.

CVTA Contact:
Lea Koerber
Lea.Koerber@wildlife.ca.gov
CA Department of Fish and Wildlife
8175 Alpine Avenue, Suite F
Sacramento, CA 95826
916-227-6398

DWR Regulatory Compliance-Genetics
Kevin Reece
Kevin.reece@water.ca.gov
CA Department of Water Resources
3500 Industrial Blvd., Floor 2
West Sacramento, CA 95691

Procedures for Tissue Collections from Steelhead

Central Valley Steelhead Genetics Tissue Collection Project
State Water Project Byron Fish Salvage Facility
Sampling Procedures
Sample ALL Steelhead

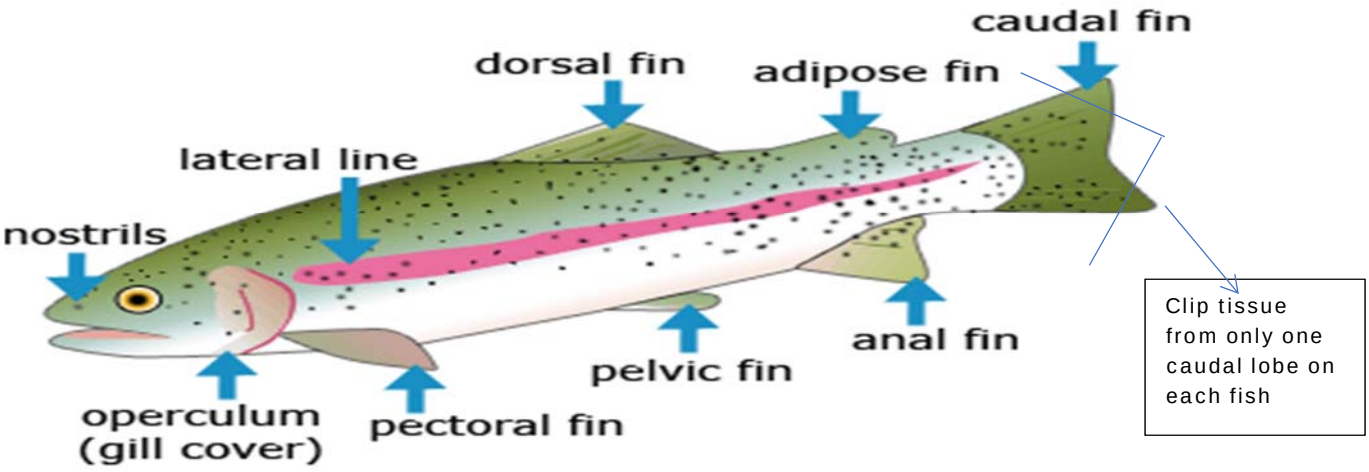
DO NOT store samples in the freezer, store in office cabinet

1. Clean (sanitize) scissors between each fish sampled. Agitate the scissors in argentine and rinse in bottled water before each new fish sampled. (This will prevent infection in the fish as a result of the clip.)

2. Using bottled water, wet the hand that will be holding the steelhead. (This protects the fish's slime layer.)

3. Pick up the fish and hold its tail between the thumb and forefinger. (Anesthetize fish as needed for better handling.)

4. Using scissors, clip a small piece of caudal fin tissue, about 1 square millimeter, from the steelhead. Only one clip per fish should be taken from either the top or bottom caudal lobe. With live fish, tissue taken from either caudal lobe is adequate and will regenerate. Only use one vial for each fish. Replace scissors if cutting surface rusts.



5. Place the tissue for each sampled into its own pre-labeled vial with 95% Ethanol. The tissue sample must be completely submerged in the ethanol. Please use vials in numerical order.

6. Pace each sample into the plastic box for pick-up. Store in a cool, dry place (i.e. Office cabinet drawer) until they can be picked up by the Central Valley Tissue Archive staff.

   The samples collected in ethanol do not need to be frozen.

7. Cleaning scissors between clips.
   a) Agitate the scissors in argentine in between samples to disinfect the scissors. (This will prevent infection in the fish as a result of the clip.)
   b) Then dip the scissors in bottled water to wash off the argentine so it does not get into the vial. (This will prevent cross contamination, which could lead to lost data.)

8. Completely fill out the following sections of the data sheet for each sample taken:
   a) Building (HTB1/HTB2)
   b) Sampler's initials
   c) Collection date
   d) Collection time
   e) Fork Length (mm)
   f) Sample ID (on vial)
   g) Ad-clipped
   h) Comments

Please make sure all items are filled in properly and correspond with salvage data recorded.

9. Allow fish to recover completely in a holding tank.

9. If you have any questions, speak with the on-site supervisor.
   a. The supervisor will call the Central Valley Tissue Archive at 916-227-6844 or 916-227-6398.

Fish Count Sampling Procedures

1. Standard fish count periods are 30 minutes and the standard count period is two hours. These time intervals are required to yield statistically accurate salvage estimates.

2. Current DWR agreements and biological opinions specify the minimum total count period will be 30 minutes every two hours. The fish count periods can be shortened with onsite supervisor approval, but the number of counts should be increased per two hour period.

3. Counts longer than 30 minutes are permissible only when flow in the count tank is less than 10 cfs for the entire duration of the count. *During very low fish salvage periods, fish counts may be increased from 30 to 60 minutes to increase fish estimate accuracy.*

4. If a fish count **cannot** be taken every two hours, the justification must be documented in both the daily and supervisor's logs. Documentation must include date, time, count lengths, **reason**, and **relevant factors**.

5. The target rating for total number of fish per count is from 100 to 150 fish regardless of how many buildings are in operation. If only one building is operating, the target range is 100 to 150 total fish. If both buildings are operating, the target range is still 100 to 150 total fish for both buildings.

6. This target range of 100 to 150 total fish must be maintained unless the entire count period has been sampled (Total Counts). If Total Counts are being carried out, then count periods longer than two hours are ok.

7. The target range of 100 to 150 fish per count must be maintained unless debris loads, special studies, or length measurements impact the next count or a fish haul cannot be done. Counts with less than the target range of fish and less than 30 minutes in length require documentation including date, time, count length, cfs and reason. Number of holding tanks and buildings in operation does not affect the target range for fish.

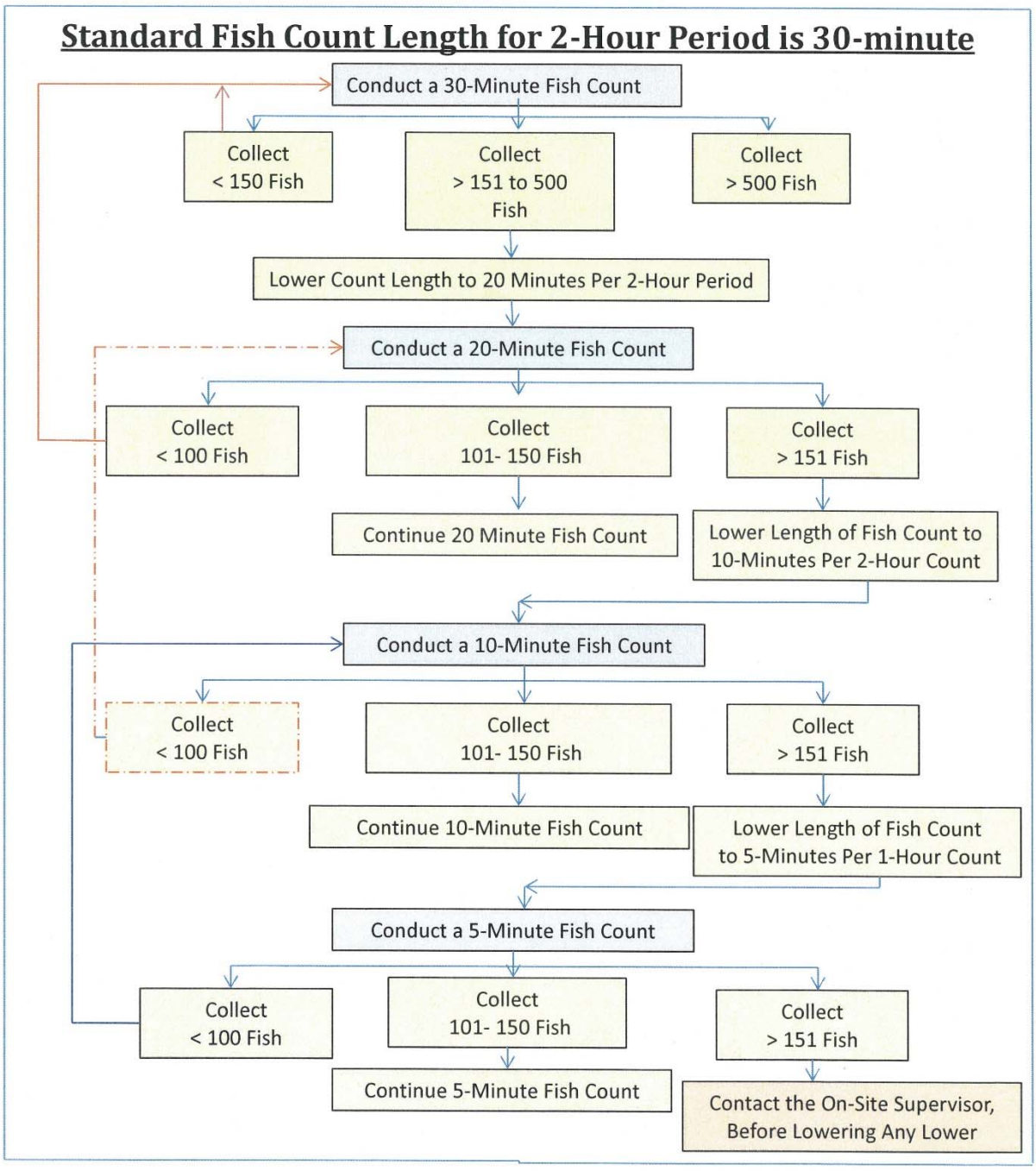
8. When a 30 minute fish count yields more than 150 fish, the count can be reduced to 20 minutes. If a 20 minute count yields more than 150 fish, the count can be reduced to 10 minutes per two hour period if the on-site supervisor has given his authority to do so. If the next 10 minute count yields less than 100 fish, go back to a 20 minute count (see attached figure).

9. If a 10 minute count yields more than 150 fish, then:

    a. Contact the on-site supervisor, and the on-site supervisor will contact the CDFW Associate Fishery Biologist, or the CDFW Senior Biologist Supervisor. Only these persons can authorize a count less than five minutes or a count interval beyond two hours.

10. **Tips**:
    a. If the collection period associated with an individual count is longer than two hours because of fish loading or hauling, the next count should be taken as soon as possible.
    b. Do not extend the length of the fish count taken immediately after dusk relative to the pervious fish count. A large pulse of fish is typically seen at the first count taken after dusk. This count is usually a good indicator of fish to be expected throughout the night and early morning hours.
    c. If a flow change is scheduled before two hours has elapsed after the preceding count, then an additional count must be taken before the flow change.

Any other variances or exceptions must be justified in writing, and shall be provided to the on-site supervisor, which in-turn will notify the CDFW fishery biologist headquartered at Stockton. The purpose of this documentation is to provide a record of the problems encountered by these procedures so that modifications can be discussed and implemented.


Standard Fish Count Length for 2-Hour Period is 30-minute
Conduct a 30-Minute Fish Count
Collect < 150 Fish
Collect > 151 to 500 Fish
Collect > 500 Fish
Lower Count Length to 20 Minutes Per 2-Hour Period
Conduct a 20-Minute Fish Count
Collect < 100 Fish
Collect 101- 150 Fish
Collect > 151 Fish
Continue 20 Minute Fish Count
Lower Length of Fish Count to 10-Minutes Per 2-Hour Count
Conduct a 10-Minute Fish Count
Collect < 100 Fish
Collect 101- 150 Fish
Collect > 151 Fish
Continue 10-Minute Fish Count
Lower Length of Fish Count to 5-Minutes Per 1-Hour Count
Conduct a 5-Minute Fish Count
Collect < 100 Fish
Collect 101- 150 Fish
Collect > 151 Fish
Continue 5-Minute Fish Count
Contact the On-Site Supervisor, Before Lowering Any Lower

Procedures for Exceptionally High Fish Counts

Step 1

If the following conditions have been met:

a) If the overall trend of fish in the counts is increasing and,
b) If reducing fish count length to five minutes yields more than 150 fish per count in a **one** hour period and,
c) Supervisory approval has been obtained,
d) Then, reduce the next count to 2.5 minutes **per 1 hour period** (see attached figure).

Step 2

A. If this count yields less than 100 fish, return to a five minute count per one hour.
B. If this count yields more than 150 fish, got to Step 3.

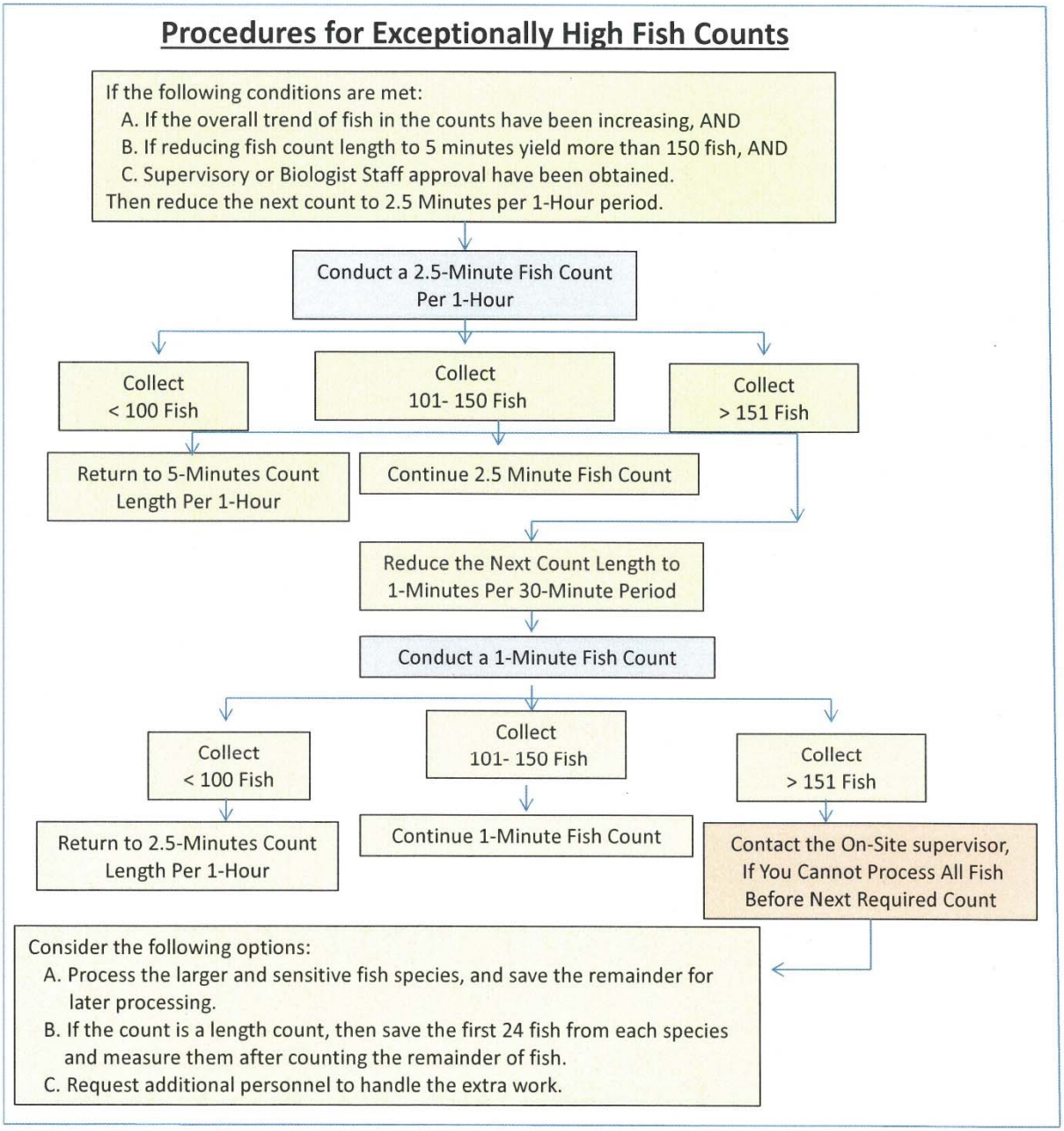
Step 3

Reduce the duration of the next count to 1 minute **per 30 minute period**:

a) If this count yields less than 100 fish, go back to Step 1 (2.5 minute count per 1 hour period).
b) If the count yields more than 150 fish, and you cannot process all the fish before the next required count, advise your supervisor and consider the following options:

Possible Solutions:

a) Process the larger fish and listed fish species, then save the remainder for later processing.
b) If this count is a length count, then save the first 24 fish from each species and measure them after counting the remainder of the fish.
c) Request additional personnel to handle the extra work.
d) When starting up look back on the ops sheets for the last 3–4 days to determine the number of fish that maybe expected to come in for that count time frame. This will give you a picture of what you can expect.


Procedures for Exceptionally High Fish Counts
If the following conditions are met:
A. If the overall trend of fish in the counts have been increasing, AND
B. If reducing fish count length to 5 minutes yield more than 150 fish, AND
C. Supervisory or Biologist Staff approval have been obtained.
Then reduce the next count to 2.5 Minutes per 1-Hour period.
Conduct a 2.5-Minute Fish Count Per 1-Hour
Collect < 100 Fish
Collect 101- 150 Fish
Collect > 151 Fish
Return to 5-Minutes Count Length Per 1-Hour
Continue 2.5 Minute Fish Count
Reduce the Next Count Length to 1-Minutes Per 30-Minute Period
Conduct a 1-Minute Fish Count
Collect < 100 Fish
Collect 101- 150 Fish
Collect > 151 Fish
Return to 2.5-Minutes Count Length Per 1-Hour
Continue 1-Minute Fish Count
Contact the On-Site supervisor, If You Cannot Process All Fish Before Next Required Count
Consider the following options:
A. Process the larger and sensitive fish species, and save the remainder for later processing.
B. If the count is a length count, then save the first 24 fish from each species and measure them after counting the remainder of fish.
C. Request additional personnel to handle the extra work.

Protocols for Saving Juvenile Delta Smelt, Longfin Smelt, and Wakasagi

1. Save all juvenile delta smelt, longfin smelt, and wakasagi (≥ 20 mm FL) from the routine fish counts and secondary flushes for verification.

Record the following information on the waterproof label provided for juveniles (see example of a completed label below)

2. Record the date and time of collection.

3. Circle the building ("HTB1" or "HTB2").

4. Place all smelt from the fish count in a sample vial with 95% ethanol (ETOH). These are the vials with the white caps. Make sure the completed label is inserted in the vial.

Date: 11/5/15 **Time: 1100** **Building: HTB1 or HTB2**

Front of label

SWP Smelt Verification 95% ETOH

Back of label

Example of a completed label

5. There is no need to indicate how many of each smelt are in the vial. I will be using the information from the fish salvage data sheets. Please limit the number of juvenile smelt in a vial to 10. If you collect more than 10 juvenile smelt in a count/flush, please split the smelt into multiple vials with a label in each vial.

6. The saved smelt will be taken to the Stockton CDFW office along with larval fish samples and verified by Walter Griffiths (CDFW). The on-site supervisor will contact Walter Griffiths at (209) 234-3671 or via email Walter.Griffiths@wildlife.ca.gov for any questions regarding the protocols.

Procedures for larval Sampling

Sample Processing Count Station

Use the procedures listed below to remove the larval fish from the Sample Bucket into a fine mesh dip net.

1) A 0.50 mm Nitex screen will be used to line the inside of this screen only during the 0300, 0900, 1500 and 2100 samples and a rubber seal will be placed on the top and bottom of the screen to minimize leaking in those areas (Figure 1.). (Larval Fish Count Screen)

2) Use a low pressure water hose, equipped with a spray nozzle, to rinse the inside of the count stations 0.50 mm Larval Fish Count Screen. ensure no larval fish are stuck to the 0.05mm Nitex screen.

3) Remove the Larval Fish Count Screen from the Sample Bucket.

4) Use your hands (with nitrile or latex gloves) to remove large debris (logs, sticks, trash, *Egeria densa* strands, etc.) from the Sample Bucket and place into a 6 mm net inside an empty 20 liter bucket ("Rinse Net"). Check debris quickly to ensure that no larval fish are stuck on the debris before placing it in the Rinse Net.

5) Process all >20 mm fish first. Use your hands and/or a 6 mm mesh net to remove fish from the Sample Bucket and record fish ≥ 20 mm FL as normal salvage. Fish < 20 mm FL that are accidentally salvaged should be placed back into the Sample Bucket.

6) Remove all small debris with a 6 mm mesh net and place in the Rinse Net.

7) Pour water (~ 10 liters) over the Rinse Net to wash larvae off the debris and into the bucket. This sample is the Rinse Net Sample.

8) Using a 0.39 mm fine mesh net, collect the entire remaining sample from the Sample Bucket and combined with the Rinse Net Sample.

9) Place the Rose Bengal bath on the count station.

10) Dip the net containing the sample into a 100 ppm *Rose Bengal bath (~1 liter) for 1 minute and then rinse the sample with the spray hose. ***Place the lid back onto the Rose Bengal* bath.***

11) Place net into the Pyrex dish ***(½ full of water)*** sitting on the light table were the picking will be done. Invert the net into the Pyrex dish and rinse out the net with bottled water. Use only enough water to get approximately a 5-15 mm layer of water in the dish.

12) Retrieve a new 20 ml sample jar stored at the light table. Fill out (with pencil) and attach a lid label and internal label, and place jar inside the jar holder on the light table. The jar holder will be stored in the divided box placed in the refrigerated cabinet. The lid label is a round sticker and the internal label is made out of waterproof paper. Both labels must contain the facility name, date, time, and operator's initials.

13) Fill out a data sheet for your sample making sure to note the date, time, and operator.

14) During periods of irregular pumping, after start up, take a larval sample on the first count.

15) Larval sampling guidelines
    1. Collect a larval sample for each 6 hours of pumping. If the pumping period is between 1 and 6 hours, collect 1 larval fish sample some time during that period. The larval fish sample doesn't necessarily have to be conducted at 0300, 0900, 1500, or 2100 when pumping only occurs during part of the day.
    2. Use the following table as a guideline.

Pumping Period	Number of larval fish counts conducted
1-6 hours	1
7-12 hours	2
13-18 hours	3
19-24 hours	4

*Ensure you *Place the lid back onto the Rose Bengal bath* when finished with the 100 ppm Rose Bengal bath. It is not toxic, but it can leave a nasty permanent stain on skin and clothing. It is best to keep this chemical next to the sink where cleanup is easiest and always wear gloves when working around this chemical. Use water hose to wash all areas you may have spill Rose Bengal on immediately.

Fish Loading Tables

Attached are the current fish loading tables for various fish size classes, tank volumes, and water temperatures. A CDFW memo (CDFW 1986) has been included to provide a detailed method of manual calculation of fish loads. Please refer to the on-site supervisor for the preferred method.

Instructions for Calculating the Percentage of a Load in the 3,500 Gallon Fish Truck

1. Data from the routine fish length counts (0300, 0900, 1500, and 2100), operational data (water temperature), and the Bates tables are used to calculate the percentage of a load in the 3,500 gallon fish truck.
2. These instructions will enable you to calculate the percentage of a load for the 6 hour period preceding a fish length count without having to refer to the Bates tables.
   Example: Calculating the percentage of a load at the 0900 hour length count will cover the fish collected from 0300 hours to 0900 hours (total of 6 hours).
   Note: If fish are being held for longer than 6 hours, you will need to calculate the percentage of a load for the other periods of collection and sum the individual percentages to come up with the total percentage of a load. If you need to calculate the percentage of a load between length counts, you will need to use the fish data from the previous length count.
3. Open the Excel spreadsheet titled “Percentage of Load_2013”.
4. Enter the total number of fish (expanded) for the collection period into the yellow box to the right of “Total number of fish collected during time period”.
5. Enter the water temperature at the length count in the yellow box to the right of “Water Temperature (°F)”.
6. **DO NOT ENTER ANYTHING IN THE BLUE BOX FOLLOWING “PERCENTAGE OF A LOAD IN THE FISH TRUCK”.** The calculated percentage of a load value will appear in this box.
7. The length table is set up to look the same as the fish length sheet. It is not necessary to enter the building code and species name, but it is necessary that you enter the species codes and lengths and/or count data.
8. If the facility is only collecting fish in one building, enter the information collected from the length count (fish species codes and fork lengths) for all species collected. If more than 24 of any fish species are collected, enter the plus count in the blue box on the right.
   Note: If you can clearly see that a particular fish species fits within one of the size classes (For example: all fork lengths are < 38 mm), you can enter the letter of the size class in the white box and enter the total number of that fish species collected during the count in the blue box. If this is the case, you would not have to enter the lengths for that particular fish species. See attached example 1.

9. If the facility is collecting fish in both buildings, complete the table with data from all fish species collected between the 2 buildings.

   Special instructions when a fish species is collected in both buildings
   a) Enter the information (species code and lengths) for the building that collected the majority of that fish species in the length table.
   b) Enter the total number of fish not recorded in the lengths table (for a specific species) in the blue box to the right. See example 2.
   c) If you can clearly see that a particular fish species fits within one of the size classes, you can enter the letter of the size class in the white box and enter the total number (from both buildings) of that fish species collected during the count in the blue box.
10. Once all of the fish data is entered into the spreadsheet, the percentage of a load will be automatically calculated and will appear in the blue box following “Percentage of a load in the fish truck”.
11. When you are finished or need to do another calculation, simply close the file without saving it. The spreadsheet will be blank the next time it is opened.

Example 1: Entering data when you clearly know the size class of the fish species

Calculating the Percentage of a Load in the 3,500 Gallon Fish Truck

Total number of fish collected during time period 23.576

Water Temperature (°F) 70

Percentage of a load in the fish truck 8

Do not enter anything into this cell. It automatically calculates the percent of a load in the 3,500 gallon fish truck.

If a particular fish species clearly fits within one of the size ranges, you can enter the letter of the size range in the white box and enter the total number of that species collected in the length count in the blue box. In this example, the 24 Threadfin Shad (species code 8) measured had an average fork length less than 38 mm. Therefore, an "A" was entered in the white box and the total number of Threadfin Shad was entered in the blue box. In this case you do not need to enter all 24 Threadfin Shad fork lengths

Plus Count or Total Count (blue

Building Code	Species Name	Code	Lengths (mm)												Total Count (blue box)
		3	29	35	48	50	36	51	25						
		8													A
															298
		21	40	32	38	27	54	24	22						
		31	35	54	70	31	65								

Example 2: When fish species are collected in both buildings during a length count

0900 Length Count

145 Threadfin Shad are collected in the HTB2 Building

56 Threadfin Shad are collected in the HTB1 Building

Since the majority of the Threadfin Shad were collected in the HTB2, you would enter the length information from the HTB2 in the length table (see below).

The plus count from the HTB1 (+121) is combined with the total number of Threadfin Shad from the HTB1 Building (56) and entered into the blue box to the right.

Calculating the Percentage of a Load in the 3,500 Gallon Fish Truck

Total number of fish collected during time period

Water Temperature (°F)

Percentage of a load in the fish truck **# N/A**

Fish Size Classes

Class	Size Range
A	- 37 mm FL
B	38 - 63 mm FL
C	64 - 114 mm FL
D	Over 114 mm FL
E	C. Salmon 38 - 76 mm FL
F	C. Salmon over 76 mm FL

Building Code	Species Name	Code	Length (mm)												Plus Count or Total Count (blue box)
		8	32	50	28	27	30	34	45	41	36	35	29	30	
			40	39	28	25	38	44	43	39	33	27	50	51	177

Explanation of Spreadsheet Cell

Calculating the Percentage of a Load in the 3,500 Gallon Fish Truck

Total number of fish collected during time period [ ] 1

Water Temperature (°F) [ ] 2

Percentage of a load in the fish truck [# N/A] 3

Fish Size Classes

Class	Size Range
A	- 37 mm FL
B	38 - 63 mm FL
C	64 - 114 mm FL
D	Over 114 mm FL
E	C. Salmon 38 - 76 mm FL
F	C. Salmon over 76 mm FL

6

Building Code	Species Name	Code	Length (mm)	Plus Count or Total Count (blue box)
		4	5	7
				8

1 Total expanded number of fish collected during the time period (usually within the 6-hour period preceding a length count.

2 The facility water temperature at the time of the length count.

3 The calculated percentage of a load in the 3,500-gallon fish truck for the specific time period.

4 Fish Species code.

5 Fish fork length (mm).

6 Fish size class categories.

7 White box; The fish species size class is entered into this box if it can be clearly seen from the fork length measurements that species falls into a specific size class.

8 Blue box; The plus count for the fish species is entered into this box if fork length measurements are entered for the species. size class for the species has been determined (Letter in white box), then the total number of fish for that species is e entered in the box. If 2 buildings are being used, enter the total fish collected in both buildings.

** Note: Original Tables
*Note: The highlighted values in some of the tables may contain errors but should not be a problem.

Size Class A - Fish Under 38 mm in length

Water Temp. (°F)	Truck Size 2500 g / 3500 g	Thousands of Fish																						
		25 / 35	37.5 / 52.5	50 / 70	62.5 / 87.5	75 / 105	87.5 / 122.5	100 / 140	112.5 / 157.5	125 / 175	137.5 / 192.5	150 / 210	162.5 / 227.5	175 / 245	187.5 / 262.5	200 / 280	212.5 / 297.5	225 / 315	237.5 / 332.5	250 / 350	262.5 / 367.5	275 / 385	287.5 / 402.5	300 / 420	312.5 / 437.5
		Percent of Load																						
80		25	37	50	62	75	87	100																
79		22	33	44	55	66	77	88	100															
78		20	30	40	50	60	70	80	90	100														
77		18	27	36	45	54	63	72	81	90	100													
76		17	25	33	42	50	58	67	75	83	92	100												
75		15	23	31	38	46	54	62	69	77	85	92	100											
74		14	22	29	36	43	51	58	65	72	80	87	94	100										
73		14	21	27	34	41	48	55	62	68	75	82	89	96	100									
72		13	19	26	32	39	45	52	58	65	71	78	84	91	97	100								
71		12	19	25	31	37	43	49	56	62	68	74	80	86	93	99	100							
70		12	18	24	29	35	41	47	53	59	65	71	76	82	88	94	100							
69		11	17	22	28	34	39	45	51	56	62	67	73	79	84	90	96	100						
68		11	16	22	27	32	38	43	48	54	59	65	70	75	81	86	91	97	100					
67		10	15	21	26	32	36	41	46	52	57	62	67	72	77	82	88	93	98	100				
66		10	15	20	25	30	35	40	45	50	54	59	64	69	74	79	84	89	94	99				
65		10	14	19	24	29	33	38	43	48	52	57	62	67	71	76	81	86	90	95	100			
64		9	14	19	23	28	32	37	42	46	51	56	60	65	69	74	79	83	88	93	97	100		
63		9	14	18	23	27	32	36	41	45	50	54	59	63	68	72	77	81	86	90	95	100		
62		8	13	17	22	26	30	35	39	43	48	53	57	61	65	70	75	78	83	87	92	98		
61		8	12	17	21	26	29	34	38	42	47	51	55	59	64	68	73	77	81	85	89	94	100	
60		8	12	16	20	25	29	33	37	41	45	50	54	58	62	66	71	75	79	83	87	91	95	100
59												49	53	57	62	66	70	74	78	82	86	91	95	99
58												46	50	54	58	62	66	70	74	77	81	85	89	93	97
57												43	47	51	54	58	62	65	69	73	76	80	84	87	91
56												41	44	48	51	55	58	61	65	68	72	75	79	82	86
55												38	41	45	48	51	54	58	61	64	67	71	74	77	80
54												36	39	42	45	48	51	54	57	60	63	66	69	72	75
53												33	36	39	42	45	48	50	53	56	59	62	65	67	70
52												31	34	37	39	42	44	47	50	52	55	58	60	63	66
51												29	32	34	37	39	41	44	46	49	51	54	56	59	61
50												27	29	32	34	36	39	41	43	46	48	50	52	55	57
49												25	27	29	32	34	36	38	40	42	44	47	49	51	53
48												23	25	27	29	31	33	35	37	39	41	43	45	47	49
47												22	24	25	27	29	31	33	35	36	38	40	42	44	46
46												20	22	23	25	27	29	30	32	34	35	37	39	41	42
45												19	20	22	23	25	26	28	30	31	33	34	36	38	39

Size Class B - Fish Between 38 and 63 mm (inclusive) in length

Water Temp. (°F)	Truck Size 2500 g / 3500 g	Thousands of Fish																					
		25 / 35	37.5 / 52.5	50 / 70	62.5 / 87.5	75 / 105	87.5 / 123	100 / 140	113 / 158	125 / 175	138 / 193	150 / 210	163 / 228	175 / 245	188 / 263	200 / 280	213 / 298	225 / 315	238 / 333	250 / 350	263 / 368	275 / 385	288 / 403
		Percent of Load																					
80		29	43	57	71	86	100																
79		26	39	53	65	79	92	100															
78		24	36	49	60	73	85	97	100														
77		23	35	47	58	69	81	93	100														
76		21	33	43	54	65	76	86	97	100													
75		20	31	40	51	61	71	82	91	100													
74		19	29	38	48	58	67	77	86	96													
73		18	27	36	45	54	63	72	81	90	100												
72		17	25	34	43	51	60	68	77	86	94												
71		16	24	32	40	48	56	64	72	80	88	96											
70		15	23	30	38	46	53	61	69	76	84	92	100										
69		14	22	29	36	44	51	58	66	73	80	88	95										
68		14	21	28	35	42	49	56	63	70	77	84	91	98									
67		13	20	27	34	41	47	54	61	68	75	82	89	95									
66		13	19	26	32	39	46	52	59	65	72	78	85	92	98								
65		12	18	25	31	37	44	50	56	63	69	75	82	88	94	100							
64		12	18	24	30	37	43	49	55	61	67	74	80	86	92	98							
63		12	18	24	30	36	42	48	54	60	66	72	78	84	90	96							
62		11	17	23	29	34	40	46	52	58	63	69	75	81	87	93	99						
61		11	17	22	28	34	39	45	51	56	62	68	73	79	85	91	97						
60		11	16	22	27	33	38	44	50	55	61	66	72	77	83	88	93	100					
59									52	57	63	69	74	80	86	92	97	103					
58									49	54	59	65	70	76	81	87	92	98					
57									46	51	56	61	67	72	77	82	87	92	98				
56									44	48	53	58	63	68	73	78	83	88	92	97			
55									41	46	50	55	60	64	69	73	78	83	87	92	97		
54									39	43	48	52	56	61	65	70	74	78	82	87	91	96	
53									37	41	45	49	53	57	61	65	70	74	78	82	86	90	94
52									34	38	42	46	50	54	58	62	66	69	73	77	81	85	89
51									32	36	40	43	47	51	54	58	62	65	69	73	76	80	84
50									30	34	37	41	44	48	51	55	58	61	65	68	72	75	79
49									29	32	35	38	41	45	48	51	54	58	61	64	67	71	74
48									27	30	33	36	39	42	45	48	51	54	57	60	63	66	69
47									25	28	31	34	36	39	42	45	48	51	53	56	59	62	65
46									23	26	29	31	34	37	39	42	45	47	50	53	55	58	61
45									22	24	27	29	32	34	37	39	42	44	47	49	52	54	56

Size Class C - Fish Between 64 and 114 mm (inclusive) in length

Water Temp. (°F)	Truck Size 2500 g / 3500 g	Thousands of Fish 2.5 / 3.5	5 / 7	7.5 / 10.5	10 / 14	12.5 / 17.5	15 / 21	17.5 / 24.5	20 / 28	22.5 / 31.5	25 / 35	27.5 / 38.5	30 / 42
		Percent of Load											
80		25	50	75	100								
79		22	45	68	90								
78		20	41	62	83								
77		19	38	57	76	96							
76		17	35	53	71	89							
75		16	33	50	66	83	100						
74		15	31	46	62	78	93						
73		14	29	44	58	73	88	100					
72		13	27	41	55	69	83	97					
71		13	26	39	52	65	78	92					
70		12	25	37	50	62	75	87	100				
69		11	23	35	47	59	71	83	95				
68		11	22	34	45	56	68	79	90				
67		10	21	32	43	54	65	76	86	97			
66		10	20	31	42	52	62	72	83	93			
65		10	20	30	40	50	60	70	80	90	100		
64		9	19	28	38	48	57	67	76	86	96		
63		9	18	27	37	46	55	64	74	83	92		
62		8	17	26	35	44	53	62	71	80	89	98	
61		8	17	25	34	43	51	60	68	77	86	94	
60		8	16	25	33	41	50	58	66	75	83	91	100
59							51	59	68	76	85	94	102
58							48	56	64	72	80	88	96
57							45	52	60	67	75	82	90
56							42	49	56	63	70	77	84
55							39	46	52	59	66	72	79
54							37	43	49	55	61	67	74
53								40	46	51	57	63	69
52									42	48	53	59	64
51									40	45	50	55	60
50									37	41	46	51	55
49									34	38	43	47	51
48									32	36	40	44	48
47									29	33	37	40	44
46									27	30	34	37	41
45									25	28	31	34	37

Size Class D - Fish over 114 mm in length

Water Temp. (°F)	Truck Size 2500 g / 3500 g	Thousands of Fish																
		1.25 / 1.75	2.5 / 3.5	3.75 / 5.25	5 / 7	6.25 / 8.75	7.5 / 10.5	8.75 / 12.25	10 / 14	11.25 / 15.75	12.5 / 17.5	13.75 / 19.25	15 / 21	16.25 / 22.75	17.5 / 24.5	18.75 / 26.25	20 / 28	21.25 / 29.75
		Percent of Load																
80		25	50	75	100													
79		21	43	65	86													
78		20	40	60	80	100												
77		17	35	53	71	89												
76		16	32	48	64	80	96											
75		15	30	45	60	75	90											
74		14	28	42	57	71	85	100										
73		13	26	39	52	65	78	92										
72		12	25	37	50	62	75	87	100									
71		11	23	34	46	58	69	81	93									
70		11	22	33	44	55	66	77	88	100								
69		10	20	31	41	52	62	72	83	93								
68		10	20	30	40	50	60	70	80	90	100							
67		9	18	28	37	47	56	66	75	84	94							
66		9	18	27	36	46	54	63	72	81	90	100						
65		8	17	26	34	43	51	60	68	77	86	94						
64		8	16	25	33	41	50	58	66	75	83	91	100					
63		7	15	23	31	39	47	55	63	71	79	87	95					
62		7	15	23	30	38	46	53	61	69	76	84	92	100				
61		7	14	22	29	36	44	52	58	66	73	80	88	95				
60		7	14	21	28	35	42	50	57	64	71	78	85	92	100			
59								49	56	63	70	78	85	92	99			
58								46	52	59	66	72	79	85	92	99		
57								43	49	55	61	67	73	80	86	92	98	
56									45	51	57	63	68	74	80	85	91	
55									42	47	53	58	63	69	74	79	85	90
54									39	44	49	54	59	64	69	74	78	83
53										41	45	50	54	59	63	68	73	77
52										38	42	46	50	54	59	63	67	71
51										35	39	42	46	50	54	58	62	66
50											35	39	43	46	50	53	57	61
49											33	36	39	43	46	49	52	56
48											30	33	36	39	42	45	48	51
47												30	33	36	39	41	44	47
46												28	30	33	35	38	40	43
45												25	28	30	32	35	37	39

Size Class E - Chinook Salmon Between 38 and 76 mm (inclusive) in length

Water Temp. (°F)	Truck Size 2500 g / 3500 g	Thousands of Fish											
		12.5 / 17.5	25 / 35	37.5 / 52.5	50 / 70	62.5 / 87.5	75 / 105	87.5 / 122.5	100 / 140	112.5 / 157.5	125 / 175	137.5 / 192.5	150 / 210
		Percent of Load											
70		13	27	41	55	69	83	97					
69		13	27	40	54	67	81	94					
68		12	25	38	51	64	76	89					
67		12	25	37	50	62	75	87	100				
66		11	23	35	47	59	71	83	95				
65		11	23	34	46	58	69	81	93				
64		11	22	34	45	56	68	79	90				
63		10	21	32	43	54	65	76	86	97			
62		10	21	31	42	53	63	74	85	95			
61		10	20	30	40	51	61	71	81	91			
60		10	20	30	40	50	60	70	80	90	100		
59		9	19	29	39	49	58	68	78	88	98		
58		9	19	28	38	48	57	67	76	86	96		
57		9	18	28	37	47	56	66	75	84	94		
56		9	18	27	37	46	55	64	74	83	92		
55		9	18	27	36	45	54	63	72	81	90	100	
54		8	17	26	35	44	53	62	71	80	89	98	
53		8	17	26	35	43	52	61	70	78	87	96	
52		8	17	25	34	43	51	60	68	77	86	94	
51		8	16	25	33	42	50	59	67	76	84	93	
50		8	16	25	33	41	50	58	66	75	83	91	100
49		8	16	25	33	42	50	59	67	76	84	93	101
48		8	16	24	32	41	49	57	65	73	82	90	98
47		7	15	23	31	39	47	55	63	71	79	87	95
46		7	15	23	30	38	46	53	61	69	77	84	92
45		7	14	22	29	37	44	52	59	67	74	82	89

Size Class F - Chinook Salmon Over 76 mm in Length

Water Temp. (°F)	Truck Size 2500 g / 3500 g	Thousands of Fish														
		2.5 / 3.5	5 / 7	7.5 / 10.5	10 / 14	12.5 / 17.5	15 / 21	17.5 / 24.5	20 / 28	22.5 / 31.5	25 / 35	27.5 / 38.5	30 / 42	32.5 / 45.5	35 / 49	37.5 / 52.5
		Percent of Load														
70		11	22	33	44	55	66	77	88	100						
69		10	21	32	43	53	64	75	86	96						
68		10	20	31	41	52	62	72	83	93						
67		10	20	30	40	50	60	70	80	90						
66		9	19	29	39	49	58	68	78	88	98					
65		9	19	28	38	47	57	66	76	85	95					
64		9	18	27	37	46	55	64	74	83	92					
63		9	18	27	36	45	54	63	72	81	90	99				
62		8	17	26	35	43	52	61	70	78	87	96				
61		8	17	25	34	42	51	59	68	76	85	94				
60		8	16	25	33	41	50	58	66	75	83	91	100			
59		8	16	24	32	40	48	56	65	73	81	89	97			
58		7	15	23	31	39	47	55	63	71	79	87	95			
57		7	15	23	31	38	46	54	62	69	77	85	93			
56		7	15	22	30	37	45	53	60	68	75	83	90	98		
55		7	14	22	29	37	44	51	59	66	74	81	88	96		
54		7	14	21	28	36	43	50	57	65	72	79	86	94		
53		7	14	21	28	35	42	49	56	63	70	78	85	92	99	
52		6	13	20	27	34	41	48	55	62	69	76	83	90	97	
51		6	13	20	27	34	40	47	54	61	68	74	81	88	95	
50		6	13	20	26	33	40	46	53	60	66	73	80	86	93	100
49								48	55	62	69	76	83	89	96	103
48								46	53	60	67	73	80	87	93	100
47								45	52	58	65	71	78	84	91	97
46								44	50	56	62	69	75	81	88	94
45								42	48	54	60	67	73	79	85	91

Fish Loading Procedures

A. Perform pre-operation inspection of the fish hauling truck. Items include:
   a) DMV Pre-Operations Checklist
   b) Fuel Level
   c) Oxygen Supply
   d) Keys/remote controls for entry locks and pumps at the release site
   e) FastTrack pass for toll

B. Park the fish truck in the loading bay of the Holding Tank Building #1.

C. Verify that the release gate on the truck tank is closed.

D. Open the access doors on the top of the truck tank.

E. Add the required salt and water into the truck tank.

Important: There must be a significant amount of water (1/2 tank of water at minimum) in the truck before you load any fish. This cushions their fall into the truck and helps bring the salinity of the hauling water to the proper level. Never dump any fish into an empty truck.

F. Removing salvage fish from the collection tanks is similar to the removal procedures described in the Count Section. One exception is the 500-gallon loading bucket is used to transfer the fish to the fish truck. Please refer to your on-site supervisor for additional information on this process.

   a) The contents of each holding tank should be transferred to the fish truck separate from the other holding tanks. **"**Double dipping**" or** collecting fish from more than one holding tank in the same loading bucket **is** Not Allowed and is extremely stressful to the fish.

   b) Sometimes it is necessary to remove debris from the loading buckets before emptying its contents into the truck tank. Debris can be removed after the bucket is temporarily placed into its storage pit or set on floor space near load out truck on a rubber tire, with the use of benches weed is pitch-forked out shacking to dislodge fish back into bucket. Then proceed to load into truck.

   c) If loading is required from Holding Tank Building #2, move the truck and resume loading.

Fish Release Site Procedures

ALLWAYS alternate release sites when releasing fish.
Document release site used on daily release sheet.

1. Position the fish truck so that the release pipe extension hose can be attached to the release gate on the truck.

2. Unlock the release pipe and pull out the release extension hose.

3. Fit the release extension hose to the truck release gate and secure with the cam-locks.

4. Inspect the condition of the site wash hose and its connection to the water pump on the release pipe. Place the discharge end of the wash hose in one of the truck tank compartments.

5. The water pump is equipped with a valve to direct the flow of water to either the wash hose or the release pipe. Turn on the water pump and direct the water to the water hose.

6. Partially open the release gate on the truck to start water down the release pipe, then gradually open the release gate wide open. (On occasion, a back surge can occur if the release gate is opened too quickly, resulting in water and fish discharging from release pipe onto ground.)

7. Wash out all fish, crabs, and debris from the tank.

8. Shut all of the tank compartment lids.

9. Replace the hose back onto stand pipe from the top of the truck.

10. Remove the release extension hose and retract back into the release pipe.

11. Check that the release gate knife valve is clear to close without any obstructions.

12. Shut the release gate on truck

13. Ensure the wash water is still flowing into the release pipe.

14. Secure all pump cabinets.

15. Re-lock the release pipe cover.

16. Neatly store the wash hose and item used at site. (Pitch fork etc.)

17. Turn off the oxygen.

18. After returning to the Skinner Fish Facility, open one or more of the tank compartment lids to air out the tank.

DWR, DFD, AND CDFW Data Transfer

1. Insert data sheets into scanner automatic feed tray.
2. Select email option on printer / scanner control screen.
3. Select address book and chose skinner as mail recipient, Press start.
4. On the Skinner computer open email with outlook, navigate to the correct email and open the PDF attachment (data sheets) by double clicking.
5. In the file tab click save as and select desktop, Year (2020) Shortcut folder, then navigate to the correct month and day folder.
6. Save the PDF email attachment in that folder, naming the email correctly. SWP for 0800, Preliminary Salvage Information for 1000 and Salvage for 2400.
7. Using outlook create a new email message.
8. In the address bar type "Fish" and select "Fish & Wildlife" from the drop down menu. (This is for the SWP at 0800)
9. In the subject line type the date M/D/Y SWP Example = 1/1/2020 SWP
10. On the toolbar click "attach file" select the correct file from the recent items list or by navigating to the saved file location, select the correct file and attach to the email by double clicking file. Send email.
11. Repeat steps 1-7 for Preliminary Salvage Information.
12. In the address bar type "NMFS" and select "Preliminary Salvage Information" from the drop down menu. (This is for the Preliminary Salvage Information at 1000)
13. In the subject line type the date M/D/Y Preliminary Salvage Information Example = 1/1/2020 Preliminary Salvage Information.
14. On the toolbar click "attach file" select the correct file from the recent items list or by navigating to the saved file location, select the correct file and attach to the email by double clicking file. Send email.
15. Repeat steps 1-7 for Midnight Salvage.
16. In the address bar type "Salvage" and select "Salvage Information Midnight" (This is for the Midnight Salvage Information)
17. In the subject line type the date M/D/Y Salvage Information Example = 1/1/2020 Salvage Information.

18. On the toolbar click "attach file" select the correct file from the recent items list or by navigating to the saved file location, select the correct file and attach to the email by double clicking file. Send email.

NOTE: The SWP will be sent no later than 0800.
The NMFS Preliminary Salvage will be sent by 1000
The SALVAGE (Midnight) will be sent no later than 0200.

Geir Aasen
Phone: (209) 234-3672
Email: Geir.Aasen@wildlife.ca.gov

NOTE: Do Not Add any name to the distribution list, requests must be made to the on-site supervisor, which must get permission from the Superintendent and Field Chief.

For Assistance:
Techs, Delta Field Division LAN Administrator, (209) 833-2065

Instructions for QAQC of Data Collection and Data Entry

Data Checking of Data Sheets

A. OPS Section of OPS/CNTS Sheets

1. Check for correct Date.
2. Check for correct facility number (state=1, federal=2)
3. Make sure a number is entered for the daily acre-feet at the top of both sides of the data sheet.
4. Check that the total minutes pumping are equal to the time for the previous count to the present count (ex. If the previous count started at 0100 and it's now 0300, the total minutes pumping should be 120). If the total minutes pumping are not correct, look for an explanation in the comments section at the bottom of the sheet.
5. Check that the length count is in decimal form (xx.xx).
6. Look for channels/bays open 1-5.
7. Primary depth should be in decimal form (xx.x) and read entries across on the data sheet to see if numbers are similar.
8. Primary flow should be entered as (xxxx), if not, look in comments section for explanation.
9. Secondary depth should be in decimal form (xx.x).
10. Secondary flow (xxx) read across to see if numbers are similar; if not, see if it's due to a drop in primary flow.

11. Holding tank flow should read (xx.x).

12. Make sure all spaces are filled in.

B. CNTS Section of OPS/CNTS Sheet

1. In the counts section of the OPS/CNTS sheet check to make sure that the species name corresponds with the proper species code.
2. For the state OPS/CNTS sheet, check that the count for each species in the old building and the new building adds up to the proper totals in the columns on the right of each count.

3. Check that there is a zero-value written for species code 98 if no fish are present in old building and/or new building.

4. If mitten crabs are present and no other fish were caught, there should be a value for a mitten crab and a zero written in species code 98 under old building and/or new building.

5. If the facility is shut down temporarily (and no counts performed) then the period must be noted on the comments section. If a time entry is written during this period, “shut down” should be written in the entry column but species code must be left blank indicating that no counts were taken.

6. Check to make sure the operator’s initials are entered at the bottom of the OPS/CNTS sheets.

7. Make sure that any changes from normal procedures are noted in the comments section.

C. LGTS Sheets

1. Check for the correct date.

2. Check for correct time.

3. Check to make sure the species names match the species codes.

4. Count the number of length values and make sure it corresponds with the total count for the same time period for each species on the POS/CNTS sheet.

5. If there are any plus counts, make sure that 24 + the plus count equal the total number of fish for each species on the OPS/CNTS sheet for that time period.

6. Make sure that there is a length sheet and value for every Chinook salmon and Steelhead trout that appears on the OPS/CNTS sheet.

7. Make sure there is a length sheet with a value and sex for every mitten crab that appears on the OPS/CNTS sheet.

D. Data Sheet Errors

1. If there is an error on the data sheet before daily data sheets are scanned and sent out erase and fix using the correct data from the scratch paper. If there is an error on the data sheet after it has been sent out, fix it in red pencil by crossing out the wrong value and then writing the correct value next to it. Write it down on the problems slip as a Facility Operator and Facility Operator QC error.

The data entry process has been eliminated by the scanning process. This is an improvement in the overall process and accuracy in the salvage data transfer.

Determination of Dissolved Oxygen Concentration in Water by Membrane Electrode Method

General

The concentration of dissolved oxygen is determined by using a membrane covered polarography sensor in conjecture with a built-in thermistor for temperature measurement and compensation. The membrane protects the sensor from electrode poisoning and other interferences. Voltage is passed between two metal electrodes and the resulting current is directly proportional to the dissolved oxygen (DO) concentration. This is an excellent method for DO analysis, especially for in situ monitoring of polluted or highly colored water. Operators should refer to the manufacturer's instruction manual for further information on this instrument (Appendix E-9).

Instrument Set-Up

1. Fit the probe into the calibration flask containing a layer of DI water at the bottom. A good calibration flask is a BOD bottle. The DO probe with a rubber O-ring can act as water vapor seal and stopper.

2. Set the function switch to zero mode and zero the instrument (YSI Model 58).

3. Set the function switch to % mode and wait at least 15 minutes for the probe to stabilize.

4. Check the following web-based weather pages for the local barometric pressure (try entering "Stockton, CA" for the nearest location):

    a. www.weather.com for the Weather Channel
    b. www.msnbc.com for MSNBC Weather

c. www.yahoo.com for Yahoo Weather

5. Adjust display to the proper calibration value using the factory manual Table A.

Dissolved Oxygen Measurement

6. Adjust the salinity control to the salinity of the water sample.

7. Turn the function switch to zero mode and readjust if necessary.

8. Turn the function switch to the desired readout mode. Place the probe into the water and move the probe by hand at a rate of 1 foot per second or more. Record the measurement when the reading has stabilized.

9. Rinse the probe with deionized water or distilled water between samples.

10. Store the probe between measurements in the calibration flask

Important Tips

1. If you turn off after performing Steps 1 through 5, you will need to recalibrate the DO meter (Steps 1 through 5). If you need to make several readings throughout the day, it is best to leave the meter on until the last reading of the day and hold the probe in the calibration flask.

2. If the meter is consistently used, it is recommended that the electrode membrane and electrolyte solution be changed at least once per month. Please refer to the manufacturer's manual for the procedure for routine servicing of the probe and meter.

3. The DO electrode sensor has a finite service life and is costly to replace. Under normal use, a properly maintained electrode can have a two to three-year life span. Irregular or poorly maintained electrodes will significantly shorten its life.

4. If the meter is used very infrequently, it is recommended that the battery be removed, and the probe's membrane and electrolyte solution be removed, sensor area rinsed with Distilled water, and store the dried probe disassembled.

Standard Procedures for Hoist and Sampling Bucket Operations

1. Personnel are required to wear hard hats when operating the overhead hoists.

2. Prior to lifting buckets from their storage areas, ensure that:

   a) The hoist trolley is directly over the bucket, and

b) All slack is removed from the cable. A sudden lift on the bucket with a load will damage the cable.

3. Smooth operation of the hoist trolley will help keep the bucket from swinging.

4. Check the condition of the cable and block when operating the hoists, and report any defects to your on-site supervisor.

5. When attaching or removing the hoist hook from a bucket, a catwalk will be placed across the bucket to prevent slipping on wet surfaces.

6. When using a count bucket during a fish count, do not lower it into the tank until the water has been drained to a level that will not lift the ball valve, misalign and wedge the bucket against the screen.

7. Rest bucket on rubber tire center of tire with no slack in wire rope.

Operating Instructions for Wand Style Coded Wire Tag (CWT) Detector.

The wand type tag detector (blue) is a hand-held unit which may be moved in the earth's magnetic field without causing a false detection. Its detection range is approximately 2 CM for standard length tags and 1 CM for half-length.

Batteries and Battery test

Whenever you turn on the unit, it performs a battery test sequence as follows. If the battery has enough life left for at least eight hours of operation, both indicators turn on immediately for at least ½ second, then off at least briefly. If the battery is in doubtful condition, the initial ½ second after switching on will be largely quiet, though there may be a brief flash and chirp just at the start. We recommend checking the battery at the start of each day and replacing it if it does not pass the test.

The battery is inside the handle and can be reached by unscrewing the knob at the end. A high quality 9 volt alkaline battery will provide about 100 total hours of normal operation. The unit will also operate from any other standard 9 volt battery, though shorter battery life can be expected. Most rechargeable batteries made for 9 volt appliances actually provide only 7.2 volts and should not be used.

Operation

The Wand detector is like other detectors in responding to relative motion between tag and detector. It is the first one in which the detector may move and the tag stay still, and one ordinarily waves it or rubs it over the suspected location of a tag.

Arrows marked on the nose of the wand show the various surfaces and motions which are effective in detecting tags. As the wand is held with the switch upright, a side to side motion past its bottom or end if effective, as is any motion past its vertical sides. If you are using the wand for the first time, experiment with a tag of the type to be detected to get a feel for the range to be expected and to familiarize yourself with the motions which are effective.

To avoid false indications, pick a place to work which is several feet from large iron objects. Use the wand to explore the intended working area for smaller but closer magnetic objects which could also cause false indications. Iron nails or screws in wooden furniture and reinforcing iron in concrete can interfere if they are close enough.

Care

The detector is made to resist corrosion and other damage from either fresh or salt water. It will float. You need take only reasonable care to keep all water out of the battery holder when it is open, to keep the unit clean, and to avoid letting salt water dry on any of its surfaces, especially under the skirt of the control knob or in the beeper cavity. When storing the unit for the season, remove the battery.

In case of trouble or questions

Contact Northwest Marine Technology, Inc. Shaw Island, WA 98286, USA. Telephone (206) 468-3375, FAX (206) 468-3844.

Heavy Debris Period Procedures

Supervisor Will;

1. Preform visual check of Clifton Court starting mid-May through June to determine the growth of pond weed, heavy growth requires;

2. The supervisor communicating with Assist. and Superintendent status of weed growth occurring.

3. Call the harvesters in early to mid-August or first of September in to start harvesting.

4. Treat Clifton Court with a herbicide that will kill the pond weed (pre-emergent) in early July.

Louvers

1. Ensure the louvers are thoroughly cleaned by end of July:

    a) Free of summer sponge and weed.

        1) Scrape the louvers to ensure all sponge is removed.

    b) May need extra resources of the yard to accomplish this.

    c) Bolts are on hand to replace any broken ones that maybe missing.
        1) Ensure the louvers are in good repair to hold together. (Not losing panel sections that have to be repaired by divers.)

    d) Louver Washer has had a thorough preventive maintenance performed by August.

Bosker

1. Ensure Bosker is in good repair;

    a) Bosker trolley and gripper has had a thorough preventive maintenance performed by August.

    b) Properly trained techs are available for on call maintenance at fish facility.

Weed Removal from Conveyor

1. Run conveyor in slow speed assisting weed mats to attach to conveyor to be removed to pit for removal to cans.

2. When debris loads are to excessive for conveyor assist by using an excavator.

    a) Stack debris on asphalt.

    b) Load into bins with a loader.

Weed Disposal

1. Call Disposal Co. for extra wet bins to change out.

2. Stage them near conveyor.

HTB Weed Removal

1. Remove excess weed from count bucket before dumping bucket into count station.

    a) Set count bucket on tire on floor to remove excess weed.

    b) If high weed count and high fish count use the tub to dump count bucket into, remove the weed then count fish.

    c) Acquire extra personnel to assist in counts.

    d) Removed weed must be put into carts and drained outside of buildings then put into dumpsters often (daily or multi-times daily).

2. Wash all weed from screen after every count or load out.

3. Load out bucket must be set on tire on ground and remove weed shaking each time to dislodge the fish, before loading fish into truck.

4. At release site ensure all weed is flushed from tank.
    a) This may require more rise time and the use of a pitch-fork.

Secondary Weed Removal

1. Lock out-Tag-out secondary valves 103/104 or 21/22.

    a) With the use of confined space procedures.

    b) Drain secondary.

    c) With the use of pitch-fork remove fish by shaking each fork load.

    d) Pitch fork weed into bucket.

    e) Dump into dump truck.

2. If debris is too heavy install secondary weed screens for debris removal.

NOTE: Most important don't get behind the weed. Staff up during day light hours, preferably at break of day until dusk.

If you get behind call ACC and POC and request a couple of hours to catch up so facility can stay in pumping criteria.