APPENDIX C – SOP BOOK 2014 - FINAL

STANDARD OPERATING PROCEDURES FOR WATER QUALITY SAMPLE COLLECTION AND PROCESSING AT PLATTE RIVER STATE FISH HATCHERY

Edited and Revised
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12/05/2014

SCOPE

The Platte River State Fish Hatchery collects water quality data from Big Platte Lake and its tributaries in an effort to quantify phosphorus concentrations in the watershed. This data will also be used to detect changes in water quality over time. The ultimate goal of this effort is to restore and preserve water quality in the Platte River watershed.

PURPOSE

The purpose of this document is to provide a detailed outline of the procedures used in sample collection and processing. Adherence to consistent sampling and processing protocol is vital to ensure data is of a known quality and integrity.

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STANDARD OPERATING PROCEDURES
COLLECTING SAMPLES FOR CHLOROPHYLL *a* ANALYSIS

1. SCOPE/ PURPOSE

1.1 This Standard Operating Procedure (SOP) describes the procedure for collecting and processing samples for Chlorophyll *a* analysis. This sample allows composite water samples to be collected from the entire column of the photic zone. It is assumed that the photic zone of the lake being studied is two times the Secchi depth.

2. REFERENCES

2.1 Handbook of Common Methods in Limnology, Lind, Owen T., 1995.

3. DEFINITIONS

3.1 Chlorophyll *a* is a photosynthetic pigment found in plants, including phytoplankton. It constitutes about 1 to 2% of the dry weight of planktonic algae; therefore the total phytoplankton biomass may be estimated based on the chlorophyll *a* concentration.

3.2 Photic zone is the column of water reaching from the surface to the photic depth. The Photic depth is the depth that receives 1% of surface illumination.

4. MATERIALS

4.1 Tube sampler.

4.2 Kemmerer.

4.3 Brown bottles.

5. SAMPLE COLLECTION

5.1 The tube sampler is lowered 30 feet into the water column and then emptied into a 5 liter (L) Nalgene brown bottle labeled “TUBE”. This procedure is repeated three times to provide enough water for complete sample collection.

5.2 The Kemmerer is used to collect a composite of water samples from depths 45, 60, 75, and 90 feet. This is done by using the Kemmerer to collect a sample from each of those depths and emptying all of them into a single 5 L Nalgene brown bottle labeled “45+”.

5.3 Once the sample water is collected and transported back to the lab, the 5 L Nalgene brown bottles are shaken vigorously before pouring. This procedure is repeated following each chlorophyll *a* sample filter apparatus filling.

5.4 Carefully grab the edge of a 45 µ filter with tweezers and rinse filter with distilled water.

5.5 Place a 45µ filter (grid down) on the filtering apparatus on the vacuum pump.

5.6 Pour 200mL of the appropriate 5 L Nalgene brown bottle sample into the filtering apparatus and turn on vacuum pump.

5.7 Once all water has passed through the filter, turn off the vacuum pump.

5.8 Place the filter into a mini Petri dish and label with the date, bottle number, and the amount filtered.

5.9 Wrap Petri dish in aluminum foil, label the same as the Petri dish, and place in freezer until measurement date.

Author:
Aaron Switzer 2003
Revised:

STANDARD OPERATING PROCEDURES
CLEANING SAMPLE AND LABORATORY CONTAINERS

1. SCOPE

1.1 These Standard Operating Procedures (SOPs) describe the methods to be used for cleaning sample and laboratory containers.

2. PURPOSE

2.1 It is critical that these procedures are followed to ensure that all sample and laboratory containers are contaminant free and that they are prepared in a way that is suitable for the activities for which they are designed.

3. PROCEDURES

3.1 5 and 10 L Nalgene plastic bottles and caps

3.1.1 After samples are collected the bottles and tops should be rinsed with tap water and scrubbed with a brush to remove any dirt. The bottles are turned upside down in the sink and allowed to drain. The bottles should never be washed with detergents.

3.1.2 Rinse with a 3% mixture of hydrochloric acid after each use. (980 mL Type III de-ionized water and 30 mL Hydrochloric acid)

3.1.3 If cleaning more than one bottle, pour HCl solution into next bottle to be rinsed.

3.1.3.1 If rinsing more than one bottle, order should be as follows. Lake bottles, Wastewater Pumps Reservoir, Site 11, Site 12, Site 14, Site 15, Site 28, and Site 39.

3.1.4 Once HCl solution has been transferred, rinse bottle with Type III de-ionized water and allow to drain and dry.

3.1.5 Steps 3.1.2-3.1.4 should be done monthly or as needed to prevent buildup of possible TP on the walls of the vessels.

3.2 Erlenmeyer flask

3.2.1 Rinse with tap water and scrub with a brush to remove any dirt.

3.2.2 Rinse with a 3% mixture of hydrochloric acid.

3.2.3 Rinse with Type III de-ionized water and allow it to drain and dry.

3.3 250 mL Sample bottles and caps

3.3.3 Same procedure as Erlenmeyer flask.

3.3 Laboratory Glassware and caps

3.3.1 Same procedure as Erlenmeyer flask.

4 QUALITY CONTROL

4.1 It is critical that these procedures are followed to ensure that all equipment is contaminant free.

4.2 If any container or equipment is thought to be compromised, it must be cleaned in order to keep the utmost control on sampling results.

Author:
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Revised:
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STANDARD OPERATING PROCEDURES
ISCO SAMPLERS

1. SCOPE/PURPOSE

1.1. This standard operating procedure (SOP) describes the procedure for using the ISCO portable samplers. There are two of these samplers located on the hatchery grounds. The design of the sampler allows it to sample a calibrated volume of water at programmed time intervals over a 72 hour period.

2. REFERENCES

2.1. 3700 Portable Samplers – Installation and Operation Guide, Teledyne Isco, Inc., 2011

3. DEFINITIONS

3.1. Platte River State Fish Hatchery uses ISCO automated water samplers to monitor the amount total phosphorus entering and exiting the hatchery.

4. PROCEDURE

4.1 The ISCO sampler is opened by removing the cover that contains the keypad.

4.2 The properly labeled, acid washed, 10 L wide mouth poly carboy is placed inside the unit.

4.4 Replace cover and make sure that the sampler outlet hose is fed into the mouth of the carboy.

4.5 Press the START SAMPLING button of the keypad.

4.6 The display will read “SAMPLING 1 OF 144” or it will ask “START SAMPLING?”

4.7 If the display reads “START SAMPLING” and the sampler has not started sampling, then press the “ENTER/PROGRAM” button on the lower right of the keypad.

4.8 The sampler will start to take a sample and read “SAMPLING 1 OF 144.” Return in approximately 72 hours.

4.9 Press the red “STOP” button on the keypad. The display will read “PROGRAM HALTED”. Collect the sample and replace cover.

5. SAMPLER MANTENANCE

5.1 The sampler tubing should be replaced at least once every six months or as needed.

5.2 The sampler should be calibrated at the time of tube replacement or as needed. Refer to the manual at S:\FIS\PLIA Stuff\ISCO3700Manual.pdf.pdf.

5.3 Any maintenance and/or modifications to the program is recorded and entered into the ISCO Log on the PM file.

Author:
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Revised:

STANDARD OPERATING PROCEDURES FOR RUNNING THE JENWAY MODEL 6320D VISIBLE RANGE SPECTROPHOTOMETER

1. SCOPE/PURPOSE

1.1 This Standard Operating Procedure (SOP) describes the procedures for obtaining an absorbency reading for Phosphorous analysis.

2. REFERENCES

2.1 Jenway Model 6300 & 6320D Visible Range Spectrophotometers Operating Manual

3. DEFINITIONS

3.1 A Spectrophotometer is an instrument used for to determine the intensity of various wavelengths in a spectrum of light.

4. MATERIALS

4.1 Jenway Spectrophotometer

4.2 100 mm Glass Cuvette

4.3 Processed sample

4.4 Jenway 63-0 software installed on computer

5. PROCEDURES

5.1 Take cover off of Jenway and turn machine on, the switch is located in the back center, and let it warm for 30 minutes.

5.2 Open 63-Zero Software on computer desktop.

5.3 Once the software has opened click on the Photometrics tab.

5.4 Make sure in the menu options it is on ABS if running absorbencies and the wavelength factor is set at 880 nm.

5.5 Once the samples have had their proper amount of reaction time, pour the processed sample into the cuvette, insert into slot in the spectrophotometer, and close the lid.

5.6 Once reading has stabilized, click on the read button in the 63-zero program, make sure the read out is displayed in the logging area.

5.7 Once a reading has been obtained rinse the cuvette with the next sample to be read.

5.8 Repeat steps 5.5-5.7 until all your samples are run.

5.9 When all the samples have been run, save results to Jenway Files folder using the format of yymmdd for tracking purposes.

5.10 Shut off Jenway, close software, and cover.

Author:
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Revised:

STANDARD OPERATING PROCEDURES
USING A KEMMERER TYPE SAMPLER

1. SCOPE/PURPOSE

1.1 This standard operating procedure (SOP) describes the procedure for using the Kemmerer type sampler at discrete depths. The design of the sampler allows transfer of water into storage bottles without agitation. Water samples are collected for a variety of analysis; including total dissolved solids, phytoplankton, zooplankton, phosphorous, calcium, and alkalinity.

2. REFERENCES

2.1 Handbook of Common Limnology Methods, Lind, Owen T., 1985

3. DEFINITIONS

3.1 The messenger is a lead device that is dropped down the line to which the sampler is attached. When it reaches the sampler it trips the device causing the plungers to close.

4. PROCEDURE

4.1 The Kemmerer is opened and lowered to the depth of interest. This is determined by measured markings on the rope to which the sampler is attached.

4.2 When the desired depth is reached the messenger is dropped to close the sampler and it is raised to the surface and lifted into the boat.

4.3 The sample is then deposited into the appropriate bottle(s) for each analysis required.

5. SAMPLER STORAGE

5.1 The sampler is stored in the open position to keep moisture from being trapped inside and to avoid plunger wear.

Author:
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Revised:
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STANDARD OPERATING PROCEDURES
USING LI-COR RADIATION SENSORS

1. SCOPE/PURPOSE

1.1 This standard operating procedure (SOP) describes the procedure for using the Li-Cor Radiation Sensor in the atmosphere and at three foot depth intervals in Platte Lake.

2. REFERENCES

2.1 Li-Cor Radiation Sensors Instruction Manual, Li-Cor Inc., 1990

3. DEFINITIONS

3.1 The spherical quantum sensor is the light bulb like device on a lowering frame to which coaxial cable is attached. The Li-Cor model LI-250 Light Meter is attached at the other end of the coaxial cable.

3.2 The Li-Cor model LI-250 Light Meter measures photosynthetic active radiation.

4. PROCEDURE

4.1 The spherical quantum sensor and the lower frame are held in the atmosphere on the sunny side of the boat.

4.2 Attach the other end of the coaxial cable to the light meter.

4.3 Turn on the light meter by holding the ON/CAL button for at least two seconds. Pressing the ON/CAL button once more places the meter in calibration constant mode. The calibration constant for the atmosphere is -133.7. The constant can be changed by pressing the HOLD/MULTISELECT button.

4.4 Once the proper calibration constant is selected press the ON/CAL button again to put the meter in the read mode. The proper units for the read mode are umol.

4.5 A reading is taken by pressing the AVG button, which takes a 15 second average of the current readings. Take the reading for the atmosphere at this point and recorded on the data sheet. Pressing the HOLD/MULTISELECT button puts the meter back into read mode.

4.6 The meter must now be calibrated for reading in the water. Refer to 4.2 and 4.3 for this procedure. The calibration constant for the water is -216.6.

4.7 Refer to 4.4 for the procedure of taking readings. The first reading in the water is taken with the spherical quantum sensor just under the surface of the water on the sunny side of the boat.

4.8 Readings are then taken at three foot intervals until a reading of 1% of the surface reading is achieved.

4.9 The meter is then turned off by pressing and holding the OFF button. Unplug the coaxial cable from the light meter and prepare for storage. See Section 5.

5. SAMPLER STORAGE

5.1 The light meter is stored in a plastic zip lock type bag which is placed in the tool box.

5.2 The coaxial cord is reeled up on the cord reel and a sock is placed over the spherical quantum sensor. The entire apparatus is then placed in one of the Rubbermaid totes.

Author:
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Revised:

STANDARD OPERATING PROCEDURES
MILLIPORE DIRECT-Q 3 UV ULTRAPURE WATER SYSTEM

1. SCOPE/PURPOSE

1.1 This Standard Operating Procedure (SOP) describes the procedure for using the Millipore Direct-Q 3 UV Ultrapure Water System to produce water for laboratory and rinsing uses at Platte River State Fish Hatchery.

2. REFERENCE

2.1 DIRECT-Q 3 UV SYSTEM, User Manual, Millipore Corporation, 2006.

3. DEFINITIONS

3.1 Ultrapure water comes in two forms from the DIRECT-Q 3 UV water system. Type I water is used for mixing solution used in spectrophotometry and Type III water is used for general rinsing of lab ware.

4. PROCEDURE

4.1 Type I Water

4.1.1 Connect tubing to barbed outlet at the top of the unit.

4.1.2 Put vessel to be filled under the unit and put tubing from upper outlet into bottle opening.

4.1.3 Press the blue-green button just above outlet one time and wait.

4.1.4 Water will begin to be dispensed from the unit. The system will also display the temperature and resistivity of the water that is being dispensed.

4.1.5 The unit will turn itself off when the internal reservoir is emptied or when the blue-green button is pressed once again.

4.2 Type III Water

4.2.1 Place vessel to be filled under the unit and blue ball valve.

4.2.2 Open blue ball valve.

4.2.3 Unit will drain internal reservoir through valve and continue to make Type III water at the rate of approximately 2.4 L/Hour.

4.2.4 Once bottle is filled to desired level, close valve and remove vessel and put cap on.

5. MAINTENANCE

5.1 Smartpak must be replaced and new one installed and flushed when the pack alarm display is blinking.

5.2 Vent filter must be replaced when the Smartpak is replaced.

5.3 Millipack must be replaced and new one installed and flushed when the Smartpak is replaced.

5.4 UV lamp must be replaced when the UV lamp alarm display is blinking.

5.5 The system and the tank should be sanitized yearly.

5.6 The screen filter on the inlet tubing female fitting should be checked and cleaned twice yearly.

5.7 All of the maintenance procedures can be seen in full detail by looking at the manual.

Author:
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Revised:

STANDARD OPERATING PROCEDURES
FOR COLLECTING SAMPLES FOR PHYTOPLANKTON ANALYSIS

1. SCOPE/ PURPOSE

1.1 This Standard Operating Procedure (SOP) describes the procedure for using the tube sampler to collect samples for phytoplankton analysis. This sample allows a composite water sample to be collected from the entire column of the photic zone. It is assumed that the photic zone of the lake being studied is two times the Secchi depth.

2. REFERENCES

2.1 Handbook of Common Methods in Limnology, Lind, Owen T., 1995.

2.2 Fish Hatchery Management, Piper, et al., 1982.

3. DEFINITIONS

3.1 Phytoplanktons are minute plants suspended in water with little or no capability for controlling their position.

3.2 Photic zone is the column of water reaching from the surface to the photic depth. The Photic depth is the depth that receives 1% of surface illumination.

4. MATERIALS

4.1 Tube sampler.

4.2 5 L brown Nalgene bottle.

4.3 10 L Nalgene bottle.

4.4 Four 250 mL bottles.

5. SAMPLE COLLECTION

5.1 Phytoplankton is collected seasonally (spring, summer, fall)

5.2 The tube sampler is lowered 30 feet into the water column and then emptied into a 5L brown Nalgene bottle labeled “Tube”.

5.3 The bottle is then shaken vigorously and one 250 mL bottle is filled.

5.4 Add 10 drops of Lugol iodine to the 250 mL sample bottle and mix.

5.5 Pour the remaining sample into the 10L nalgene bottle. The contents will be processed at the hatchery lab.

5.6 This procedure is repeated three times to provide enough water for complete sample collection.

5.7 The Kemmerer is used to collect a composite of water samples from depths 45, 60, 75, and 90 feet. This is done by using the Kemmerer to collect a sample from each of those depths and emptying all of them into a single 5 L Nalgene brown bottle labeled “45+”.

5.8 From the “45+” 5 L brown Nalgene composite bottle, shake vigorously and fill one 250 mL bottle.

5.9 Add 10 drops of Lugol iodine to the 250 mL sample bottle and mix.

5.10 Put all 250 mL sample bottles in cooler for transport back to the hatchery laboratory.

Author:
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Revised:

STANDARD OPERATING PROCEDURES
FOR PROCESSING TOTAL PHOSPHOROUS (TP) ANALYSIS

1. SCOPE/ PURPOSE

1.1 This Standard Operating Procedure (SOP) describes the procedure of processing samples for Total Phosphorous (TP) analysis. These results can be used for performance evaluation of hatchery methods and processes, as well as watershed trends.

2. REFERENCES

2.1 Standard Methods. American Public Health Association. 2005.

3. DEFINITIONS

3.1 Total phosphorous (TP) is a combination of the different forms of Phosphorus including dissolved and non-dissolved orthophosphate.

3.2 Photic zone is the column of water reaching from the surface to the photic depth. The Photic depth is the depth that receives 1% of surface illumination.

4. MATERIALS

4.1 Water Samples.

4.2 Di-ionized (DI) water from Millipore Direct-Q3 UV (Type I).

4.3 Test Tubes.

4.4 Conc. Sulfuric Acid.

4.5 Sodium Hydroxide, 10N

4.6 Ammonium Molybdate Tetrahydrate.

4.7 Abscorbic Acid.

4.8 Antimony Potassium Tartrate Trihydrate.

4.9 Potassium Persulfate.

4.10 Assorted laboratory glassware.

4.11 Tin foil.

4.12 Cut-off calibrated graduated cylinder (50 mL).

4.13 Calibrated glass scoop.

4.14 Purchased Phosphorus standards.

4.15 Parafilm.

4.16 Repeating Pipetter and dispensing tips.

4.17 Digester.

4.18 Stir plate and stir bar.

4.19 Jenway Spectrophotometer.

4.20 100 mm glass cuvette.

4.21 Kimberly Clark Kimwipes

5. SAMPLE PROCESSING

5.1 Gather samples to be processed and the corresponding bottle report. Import the bottle report in to the PRSFH Lab Data Template and create a new file using the format of "PRSFH Lab Data yymmdd". Once imported, the TP Results page will automatically list the samples to be processed in the order they should be read.

5.2 Put the appropriate number of test tubes in rack for the samples to be processed and four additional for the standards to be read and the calibration blank.

5.3 For the calibration blank, rinse test tube, calibrated graduated cylinder, and sample funnel with Type I DI water. Add 50 mL of Type I DI water using the calibrated graduated cylinder, and the sample funnel to the test tube.

5.4 Starting with the standards, agitate well, pour a small amount in to the test tube using the appropriately labeled funnel; and cap, shake, and drain. Also pour a small amount of the standard in to the cut-off graduated cylinder, and pour off while rotating to thoroughly rinse the vessel. These steps are done to rinse the lab ware with the standards prior to gathering the amount to be processed.

5.5 After the lab ware has been rinsed properly, agitate standard once again and fill calibrated graduated cylinder with 50 mL of standard and pour in to test tube using the standards funnel.

5.6 Repeat steps 5.4 and 5.5 using water samples to be processed instead of standards and the sample funnel.

5.7 Turn on digester and let it go through its start up cycle. Once it has done so, turn off and then back on to set soak time at 150 minutes @ 121° C.

5.8 Add 1.0 mL of 11N Sulfuric acid to each test tube, including the calibration blank, standards, and water samples.

5.8.1 To make 11N Sulfuric acid, mix 300 mL of conc. Sulfuric acid with 700 mL of Type I DI water and store in glass stoppered flask.

5.9 Add 0.5 grams of Potassium Persulfate to each test tube, including the calibration blank, standards, and water samples using the calibrated glass scoop. Once added, screw cap tight, and invert tube twice.

5.10 Place each test tube, including the calibration blank, standards, and water samples in to digester block. Soak tubes for 150 minutes @ 121° C.

5.11 Once the tubes have been fully digested, remove and allow to cool to room temperature.

5.12 Add 1 mL of 10N Sodium Hydroxide to each test tube, including the calibration blank, standards, and water samples. Agitate each tube for approximately 20 seconds.

5.13 Make Ascorbic acid solution by mixing Ascorbic acid in to Type I DI water in the following proportion. 1.76 g to 100 mL of Type I DI water. Put the solution on the stir plate with the stir bar, and mix. This is a one-time use solution only, discard any extra.

5.14 Make combined reagent using the following proportions, in this order, and stir after each addition. 50 mL of 5N Sulfuric acid, 5 mL of Antimony Potassium Tartrate solution, 15 mL of Ammonium Molybdate solution.

- 5.14.1 To make 5N Sulfuric acid, mix 140 mL of conc. Sulfuric acid in to 860 mL Type I DI water. Store in a glass stoppered flask.
- 5.14.2 To make Antimony Potassium Tartrate solution, dissolve 3.42 g of Antimony Potassium Tartrate powder in to 1 L of Type I DI water. Store in a glass stoppered flask.
- 5.14.3 To make Ammonium Molybdate solution, dissolve 40 g of Ammonium Molybdate powder in to 1 L of Type I DI water. Store in a glass stoppered flask.

5.15 Mix the combined reagent (5.14) with the Ascorbic acid solution (5.13) in the following proportion. Mix 70 mL of combined reagent with 30 mL of Ascorbic acid solution on the stir plate using the stir bar. Yellow color should form upon the mixing of the two solutions. If no color occurs, then repeat steps 5.13 and 5.14 before combining.

5.16 Take mixed solution and put tin foil over the top and place in small red cooler to keep out of the light.

5.17 Once the calibration blank, standards, and water samples have reached room temperature, the mixed solution can be added to each test tube. Using repeating pipetter, add 8 mL of mixed solution to each tube, cap, and invert twice.

5.18 Upon adding the mixed solution to the final tube, start a timer for 20 minutes.

5.19 After 20 minutes is up, the samples are ready to be read.

5.20 Calibrate the spectrophotometer at 880 nm by pouring the contents of the calibration blank tube in to the cuvette. Once the absorbency has stabilized press the CAL button on the spectrophotometer. It should now read 0.00 with the cuvette still in the unit.

5.21 The first tubes to be read are the standards. These values must be put in to the lab data file for updating the standard curve. If the curves remain within tolerance the rest of the samples may be run.

5.22 Following the Jenway SOP read the rest of the samples and import the Jenway file in to the lab sheet. This will automatically calculate the TP for each sample.

Authors:
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Revised:
Paul Stowe and Nicole Sherretz 2014

STANDARD OPERATING PROCEDURES PROCESSING TOTAL SUSPENDED SOLIDS

1. SCOPE/PURPOSE

1.1 This standard operating procedure (SOP) describes the procedure for processing samples for total suspended solids (TSS) in the Platte River State Fish Hatchery water quality lab. TSS in water is measured by the mass of non-filterable material collected and dried in a known volume of water.

2. REFERENCES

4.22 Standard Methods. American Public Health Association. 2005.

3. PROCEDURE

3.1 Prepare glass fiber filter disk (Millipore type AP40, 2.0µm pore size or less).

3.2 Put filter disk on filtering apparatus, turn on vacuum pump, and rinse with 3 successive washes of at least 20 mL of reagent grade water.

3.3 Continue suction to remove all traces of water and then turn off the vacuum pump.

3.4 Remove the disk from filtering apparatus and transfer to an aluminum drying dish using filter tweezers.

3.5 Place drying dish in drying oven at 103-105ºC for 1 hour.

3.6 Place drying dish in desiccator and allow it to come to room temperature.

3.7 Remove the filter from desiccator and weigh using an analytical balance that is properly calibrated for accuracy and precision.

3.8 Record weight of rinsed and dried filter on data sheet.

3.9 Place filter on filtering apparatus and turn on vacuum pump.

3.10 Agitate sample to be processed by vigorously shaking sample repeatedly as it is poured in to a 1 L graduated cylinder.

3.11 Measure out 1 L of water or the total amount of sample, whatever is greater. Record the amount to be filtered on the data sheet.

3.12 Pour the sample in to the filtering apparatus.

3.13 Rinse the graduated cylinder and the filtering apparatus with type III water multiple times to capture any residual material that may have adhered to the walls of the lab ware.

3.14 Continue vacuum to remove all traces of water and then turn off vacuum pump.

3.15 Remove the disk from filtering apparatus and transfer to the aluminum drying dish using filter tweezers.

3.16 Place drying dish in drying oven at 103-105ºC for 1 hour.

3.17 Place drying dish in desiccator and allow it to come to room temperature.

3.18 Remove the filter from desiccator and weigh using an analytical balance that is properly calibrated for accuracy and precision.

3.19 Record weight of filtered and dried sample and record value on the data sheet.

3.20 Calculate the TSS by using the following equation…

$$\text{mg TSS/L} = ((A - B) \times 1000) / \text{sample volume, mL}$$

where:

A= weight of filter + dried residue, mg, and
B = weight of filter, mg.

Author:
Paul Stowe 2013
Revised:

STANDARD OPERATING PROCEDURES PROCESSING TURBIDITIES USING HACH TURBIDIMETER

4. SCOPE/PURPOSE

4.1 This standard operating procedure (SOP) describes the procedure for using the Hach Turbidimeter (Model Number 2100N) in the Platte River State Fish Hatchery water quality lab. Turbidity in water is the presence of suspended solids, which reduce the transmission of light either through scattering or absorption.

5. REFERENCES

5.1 Laboratory Turbidimeter Instruction Manual, Hach Company, 1999

6. DEFINITIONS

6.1 The turbidimeter is used to measure the presence of suspended solids.

7. PROCEDURE

7.1 Warm samples to room temperature to avoid condensation on the sides of the sample tube.

7.2 Turn ON turbidimeter and allow warm up time of 30 minutes.

7.3 Fill sample tube to the white line at the top. Apply a thin bead of silicone oil to the surface of the sample cell. Spread the oil uniformly across the surface using the black oiling cloth. The surface should appear dry, not wet.

7.4 The sample cell is then placed into the turbidimeter. Open the cover and line up the white down arrow on the sample cell with the arrow on the turbidimeter. Close cover and press ENTER.

7.5 The first number to appear on the display is used for the first reading, readings are NTU. Readings are done in triplicate, repeat procedure with two more samples.

7.6 The meter's calibration must be checked every lake and/or tributary sampling day.

- 7.6.1 Agitate formazin standards and measure each of them and record values in S:\FIS\PLIA Stuff\DO, pH, and Turbidity Calibration.xls.
- 7.6.2 Calibrate the unit following the "Quick Reference Guide" procedures and the formazin standards.
- 7.6.3 After calibrating the unit, measure the samples from the lake and/or tributary sampling.
- 7.6.4 Once all samples have been completed, re-agitate the formazin standards and measure each of them and record values in S:\FIS\PLIA Stuff\DO, pH, and Turbidity Calibration.xls.

7.7 When finished using the turbidimeter turn OFF and replace transparent dust cover.

Author:
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Revised:

STANDARD OPERATING PROCEDURES
SAMPLING PREPARATION

1 SCOPE

1.1 The Platte River Fish Hatchery collects water quality data from Platte Lake and its tributaries as part of an ongoing water quality program. This data is used to detect changes in water quality over time.

2 PURPOSE

2.1 The purpose of this document is to provide a detailed outline of the procedures used in sample collection. Adherence to a consistent sampling protocol is vital to ensure data is of a known quality and integrity.

3 RESPONSIBLITIES

3.1 The Technician performing the preparation work shall be trained in standard procedures described within.

4 PROCEDURE

4.1 Day before event –

4.1.1 Conduct an inspection of YSI, sonde, all electronic equipment, and change batteries if needed.

4.1.2 Inspect boat and trailer and make sure there is plenty of gas in can.

4.1.3 Gather together equipment.

4.1.4 Gather together bottles and coolers.

4.1.5 Clean any equipment or bottles that have not been cleaned.

4.2 Day of event -

4.2.1 Calibrate YSI following SOP before departure.

4.2.2 Fill coolers with ice or ice packs if weather dictates.

4.2.3 Conduct sampling in accordance with SOPs.

4.2.4 After sampling is completed. Return all equipment to designated storage location and conduct post calibration check on YSI.

4.2.5 Refrigerate samples.

4.2.6 Run calibration, samples, and drift check on turbidimeter following SOP.

4.2.7 Clean bottles and related equipment.

4.2.8 Enter data collected into Access database “Sample FP”.

4.2.9 Create Export files, check for QA/QC, print, and put copies into binder in lab.

4.3 Day after event -

4.3.1 If not done already, conduct any items not complete from the day before.

4.3.2 Conduct maintenance as needed on any equipment.

Author:
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Revised:

STANDARD OPERATING PROCEDURES
PLATTE HATCHERY, BIG PLATTE LAKE, AND TRIBUTARY SAMPLING

1. SCOPE

1.1 The Platte River Fish Hatchery collects water quality data from Platte Lake and its tributaries as part of an ongoing water quality program. This data is used to detect changes in water quality over time.

2. PURPOSE

2.1 The purpose of this document is to provide a detailed outline of the procedures used in sample collection. Adherence to a consistent sampling protocol is vital to ensure data is of a known quality and integrity.

3. RESPONSIBILITIES

3.1 The individual technician responsible for sampling shall be trained in the standard operating procedures described within.

4. PROCEDURES

4.1 Platte Hatchery sampling - per location (NOTE: Sample only the water sources being used at the present time.)

4.1.1 Wastewater Pumps Reservoir (10)

Equipment and bottles
- (3) 250ml acid washed plastic bottles
- (1) Hatchery Data Sheet
- (1) Labeled Turbidity bottle

Step 1: Remove 10 liter Nalgene bottle from ISCO sampler.
Step 2: Shake sample container vigorously.
Step 3: Pour a small amount of water into 250ml plastic bottle. Recap shake and empty.
Step 4: Shake Nalgene bottle one more time.
Step 5: Refill to neck of bottle.
Step 6: Repeat for two remaining bottles. Swirl Nalgene bottle to keep sample well mixed before filling each bottle.
Step 7: Place sample bottles in refrigerator.
Step 8: Shake Nalgene bottle and collect sample for turbidity.

4.1.2 Brundage Spring (11)

Equipment and bottles (1100 series – pink labels)
- (3) 250ml acid washed plastic bottles
- (1) Hatchery Data Sheet
- (1) Labeled Turbidity bottle

Step 1: Remove 10 liter Nalgene bottle from Sigma sampler.
Step 2: Take temperature of sample water from mixing drum, turn off pump and drain drum.
Step 3: Perform maintenance/cleaning on pump, assembly and drum.
Step 4: Shake sample container vigorously.

Step 5: Pour a small amount of water into 250ml plastic bottle. Recap shake and empty.
Step 6: Shake Nalgene bottle one more time.
Step 7: Refill to neck of bottle.
Step 8: Repeat for two remaining bottles. Swirl Nalgene bottle to keep sample well mixed before filling each bottle.
Step 9: Place sample bottles in refrigerator.
Step 10: Shake Nalgene bottle and collect sample for turbidity.

4.1.3 Brundage Creek (12)

Equipment and bottles (1200 series – yellow labels)
(3) 250ml acid washed plastic bottles
(1) Hatchery Data Sheet
(1) Labeled Turbidity bottle

Step 1: Remove 10 liter Nalgene bottle from Sigma sampler.
Step 2: Take temperature of sample water from mixing drum, turn off pump and drain drum.
Step 3: Perform maintenance/cleaning on pump, assembly and drum.
Step 4: Shake sample container vigorously.
Step 5: Pour a small amount of water into 250ml plastic bottle. Recap shake and empty.
Step 6: Shake Nalgene bottle one more time.
Step 7: Refill to neck of bottle.
Step 8: Repeat for two remaining bottles. Swirl Nalgene bottle to keep sample well mixed before filling each bottle.
Step 9: Place sample bottles in refrigerator.
Step 10: Shake Nalgene bottle and collect sample for turbidity.

4.1.4 Effluent Pond Intake (14)

Equipment and bottles (1400 series – green labels)
(3) 250ml acid washed plastic bottles
(1) Hatchery Data Sheet
(1) Labeled Turbidity bottle

Step 1: Remove 10 liter Nalgene bottle from Sigma sampler.
Step 2: Take temperature of sample water from mixing drum, turn off pump and drain drum.
Step 3: Perform maintenance/cleaning on pump, assembly and drum.
Step 4: Shake sample container vigorously.
Step 5: Pour a small amount of water into 250ml plastic bottle. Recap shake and empty.
Step 6: Shake Nalgene bottle one more time.
Step 7: Refill to neck of bottle.
Step 8: Repeat for two remaining bottles. Swirl Nalgene bottle to keep sample well mixed before filling each bottle.
Step 9: Place sample bottles in refrigerator.
Step 10: Shake Nalgene bottle and collect sample for turbidity.

4.1.5 Upper Discharge (15)

Equipment and bottles (1500 series – red labels)
- (3) 250ml acid washed plastic bottles
- (1) Hatchery Data Sheet
- (1) Labeled Turbidity bottle

Step 1: Remove 10 liter Nalgene bottle from Sigma sampler.
Step 2: Take temperature of sample water from mixing drum, turn off pump and drain drum.
Step 3: Perform maintenance/cleaning on pump, assembly and drum.
Step 4: Shake sample container vigorously.
Step 5: Pour a small amount of water into 250ml plastic bottle. Recap shake and empty.
Step 6: Shake Nalgene bottle one more time.
Step 7: Refill to neck of bottle.
Step 8: Repeat for two remaining bottles. Swirl Nalgene bottle to keep sample well mixed before filling each bottle.
Step 9: Place sample bottles in refrigerator.
Step 10: Shake Nalgene bottle and collect sample for turbidity.

4.1.6 Clarifier Overflow (28)

Equipment and bottles (2800 series – orange labels)
- (3) 250ml acid washed plastic bottles
- (1) Hatchery Data Sheet
- (1) Labeled Turbidity bottle

Step 1: Remove 10 liter Nalgene bottle from ISCO sampler.
Step 2: Shake sample container vigorously.
Step 3: Pour a small amount of water into 250ml plastic bottle. Recap shake and empty.
Step 4: Shake Nalgene bottle one more time.
Step 5: Refill to neck of bottle.
Step 6: Repeat for two remaining bottles. Swirl Nalgene bottle to keep sample well mixed before filling each bottle.
Step 7: Place sample bottles in refrigerator.
Step 8: Shake Nalgene bottle and collect sample for turbidity.

4.1.7 Backwash Line (39)

Equipment and bottles (3900 series – white labels)
- (3) 250ml acid washed plastic bottles
- (1) Hatchery Data Sheet
- (1) Labeled Turbidity bottle

Step 1: Remove 10 liter Nalgene bottle from ISCO sampler.
Step 2: Shake sample container vigorously.
Step 3: Pour a small amount of water into 250ml plastic bottle. Recap shake and empty.
Step 4: Shake Nalgene bottle one more time.
Step 5: Refill to neck of bottle.
Step 6: Repeat for two remaining bottles. Swirl Nalgene bottle to keep sample well mixed before filling each bottle.
Step 7: Place sample bottles in refrigerator.
Step 8: Shake Nalgene bottle and collect sample for turbidity.

4.2 Big Platte Lake

Equipment Requirements

Boat and motor
Life jackets
YSI 600R/Sonde/cord
Kemmerer/messenger
Secchi disk/line
Tube sampler
GPS
Extra batteries C/AA/ 9V
Pencil x2
Lake Data Sheet

Bottles

(2) 10 L acid washed plastic bottle
(1) 15 L acid washed plastic bottle

4.2.1 90+ ft Location

Step 1: Record the lake gauge height (by outhouse) on data sheet.
Step 2: Locate sampling waypoint (Buoy) on GPS unit and anchor boat at that position.
Step 3: Lower secchi disk until it is no longer visible on the shaded side of the boat. Record the number of feet that it was lowered in to the water on the datasheet. (see Secchi Disk SOP)
Step 4: Calibrate YSI 650 MDS and 600R sonde for depth (see YSI calibration SOP).
Step 5: Lower sonde on cable to each required depth. Allow values to stabilize approximately two minutes and record values for temperature, conductivity, D.O, pH and ORP on data sheet.
Step 7: Use Kemmerer to collect water at the surface and place water in a 10L plastic bottle. Lower and collect samples at 7.5, 15, 30, 45, and 60 feet and place the water in the 15L plastic bottle. Lower the Kemmerer and collect samples at 75, and 90 foot depths, and place in the other 10L bottle. (See Kemmerer SOP)

4.3 Tributaries – per location

4.3.1 North Branch Platte River at Dead Stream Rd.

Equipment and bottles

(1) Dip Sampler
(3) 250ml acid washed plastic bottles
(1) 200ml rinsed bottle
(1) Tributary Data Sheet
(1) PVC Staff Gage
(1) YSI and Sonde

Step 1: Lower Dip Sampler off center of catwalk.
Step 2: Fill bottle, agitate and empty.
Step 3: Refill to neck of bottle.
Step 4: Repeat for two remaining bottles.

Step 5: Record bottle numbers on data sheet.
Step 6: Fill 200ml bottle for turbidity readings.
Step 7: Read staff gauge height at the upper section of the fish ladder and record value on data sheet.
Step 8: Lower PVC staff gage along the north keyway on the dam read staff gage at the top of the keyway and record value on data sheet.
Step 9: Take photo of water that includes substrate.
Step 10: Using YSI and sonde allow unit to stabilize after approximately two minutes and record values on data sheet.

4.3.2 Platte River at US Hwy31 Bridge below Honor

Equipment and bottles

(3) 250ml acid washed plastic bottles
(1) 200ml rinsed bottle
(1) Tributary Data Sheet
(1) YSI and sonde

Step 1: On the down stream side of the bridge, face up stream and take out bottle and hold up stream.
Step 2: Fill bottle, agitate and empty.
Step 3: Refill to neck of bottle.
Step 4: Repeat for two remaining bottles.
Step 5: Record bottle numbers on data sheet.
Step 6: Fill 200ml bottle for turbidity readings.
Step 7: Read gauge height and record value on data sheet.
Step 8: Take photo of water that includes substrate.
Step 9: Using YSI and sonde allow unit to stabilize after approximately two minutes and record values on data sheet.

4.3.4 Platte River at Stone Bridge

Equipment and bottles

(3) 250ml acid washed plastic bottles
(1) 200ml rinsed bottle
(1) Tributary Data Sheet

Step 1: On the down stream side of the bridge, face up stream and take out bottle and hold up stream.
Step 2: Fill bottle, agitate and empty.
Step 3: Refill to neck of bottle.
Step 4: Repeat for two remaining bottles.
Step 5: Record bottle numbers on data sheet.
Step 6: Fill 200ml bottle for turbidity readings.
Step 7: Read gauge height and record value on data sheet.
Step 8: Take photo of water that includes substrate.

Author:
Aaron Switzer 2003
Revised:
Paul Stowe 2012
Paul Stowe 2013
Paul Stowe 2014

STANDARD OPERATING PROCEDURES
SLUDGE HAULING

1 SCOPE

1.1 The Platte River Fish Hatchery collects water quality data from Platte Lake and its tributaries as part of an ongoing water quality program. This data is used to detect changes in water quality over time. Part of this program includes modeling of a phosphorus budget for the Platte River State Fish Hatchery. The phosphorus contained in the sludge that leaves the hatchery is a major component of the whole-hatchery phosphorus budget.

2 PURPOSE

2.1 The purpose of this document is to provide a detailed outline of the procedures used in sample collection while the sludge tank is being emptied. Adherence to a consistent sampling protocol is vital to ensure data is of a known quality and integrity.

3 RESPONSIBLITIES

3.1 The Technician performing the preparation work shall be trained in standard procedures described within.

4 PROCEDURE

4.1 Day before event –

4.1.1 Notify PLIA contacts via email.

4.1.2 Gather together 250 ml sample bottles labeled in red lettering - sludge.

4.1.3 Print waste collection data sheets.

4.1.4 Gather together digital camera and GPS.

4.2 Day of event -

4.2.1 Meet with truck drivers to discuss sampling protocol.

4.2.2 Collect three samples from each load leaving the hatchery grounds. Collect samples at the beginning, middle and end of each load.

4.2.3 Record date, time, gallons loaded and sample bottle numbers.

4.2.4 It is essential that the Technician ride along or follow truck drivers to the injection site. Digital photographs should be taken at the site and GPS coordinates recorded. Photos should include the injection unit during the actual injection process. Send this information, including photos, to the PLIA contacts.

4.2.5 Combine all samples from triplicate sampling during emptying in to a composite carboy for later analysis.

4.2.6 Enter data collected into Access database “Sample FP”.

4.2.7 Create Export files, check for QA/QC, print, and put copies into binder in lab.

4.3 Day after event -

4.3.1 Send Export files to PLIA Contacts.

4.3.2 Monitor level of sludge tank

4.4 Weeks after event –

4.4.1 Monitor level of sludge tank during refill, and average sludge depth once a month and enter in to preventative maintenance data sheet.

Author:
Aaron Switzer 2003
Revised:

STANDARD OPERATING PROCEDURES
SLUDGE TANK AND CLARIFIER OVERFLOW SAMPLING

1. SCOPE

1.1 The Platte River Fish Hatchery collects water quality data from Platte Lake and its tributaries as part of an ongoing water quality program. This data is used to detect changes in water quality over time. Part of this program includes modeling of a phosphorus budget for the Platte River State Fish Hatchery. This data is used to detect changes in water quality over time.

2. PURPOSE

2.1 The purpose of this document is to provide a detailed outline of the procedures used in sample collection. Adherence to a consistent sampling protocol is vital to ensure data is of a known quality and integrity.

3. RESPONSIBLITIES

3.1 The Technician performing the preparation work shall be trained in standard procedures described within.

4. PROCEDURE

4.1 Clarifier Overflow Sampling - Site 28

Equipment and bottles

(3) 250ml acid washed plastic bottles - 2800 series, “28xx”
(1) 200ml rinsed bottle – labeled “28”
(1) Production Waste Data Sheet

Step 1: Check clarifier to assure it is full and overflowing.
Step 2: Collect samples at the pipe that enters the effluent pond on the east side bank.
Step 3: Fill bottle, agitate and empty.
Step 4: Refill to neck of bottle.
Step 5: Repeat for two remaining bottles.
Step 6: Record bottle numbers on data sheet.
Step 7: Fill 200ml bottle for turbidity readings.
Step 8: Place 250ml bottles in Ziploc bag and store in refrigerator.
Step 9: Run turbidities and record on data sheet.

4.2 Sludge Tank Overflow Sampling - Site 27 (Only Sample if bypass is Open)

Equipment and bottles

(3) 250ml acid washed plastic bottles - RED labels
(1) 200ml rinsed bottle – RED labels
(1) Production Waste Data Sheet

Step 1: Check sludge tank to assure it is full and overflowing.
Step 2: Collect samples at the pipe that enters the effluent pond on the east side bank.
Step 3: Fill bottle, agitate and empty.
Step 4: Refill to neck of bottle.

Step 5: Repeat for two remaining bottles.
Step 6: Record bottle numbers on data sheet.
Step 7: Fill 200ml bottle for turbidity readings.
Step 8: Place 250ml bottles in Ziploc bag and store in refrigerator.
Step 9: Run turbidities and record on data sheet.

Author:
Aaron Switzer 2003
Revised:

STANDARD OPERATING PROCEDURES
SECCHI DEPTH TRANSPARENCY

1. SCOPE/ PURPOSE

1.1 Secchi disk transparency is used to estimate photic depth.

2. REFERENCES

2.1 Handbook of Common Methods in Limnology, Lind, Owen T., 1985.

3. DEFINITIONS

3.1 The Secchi dick is a 20-cm disk on which opposite quarters are gloss black and gloss white.

3.2 Photic zone is the column of water reaching from the surface to the photic depth.

3.3 The photic depth is the depth that receives 1% of surface illumination.

4. MATERIALS

4.1 Secchi disk.

4.2 Calibrated line.

5. PROCEDURES

5.1 Lower the Secchi disk on the calibrated line until it disappears from view. Record this depth.

5.2 Raise disk until it reappears and record depth.

5.3 The average of these depths is “Secchi Disk Transparency.”

5.4 Make the determination of Secchi disk transparency in the shade of the boat.

5.5 Do not wear sunglasses when making the determination.

Author:
Aaron Switzer 2003
Revised:

STANDARD OPERATING PROCEDURES FOR WATER SAMPLE SHIPPING

1. SCOPE

1.1 The Platte River Fish Hatchery collects water quality data from Platte Lake and its tributaries as part of an ongoing water quality program. This data is used to detect changes in water quality over time. Part of this program includes modeling of a phosphorus budget for the Platte River State Fish Hatchery. This data is used to detect changes in water quality over time.

2. PURPOSE

2.1 The purpose of this document is to provide a detailed outline of the procedures used in sample preparation collection. Adherence to a consistent sampling protocol is vital to ensure data is of a known quality and integrity.

3. RESPONSIBLITIES

3.1 The employee performing the preparation work shall be trained in standard procedures described within.

4. PROCEDURE

4.1 Gather cooler and bottles.

4.2 Be sure to check each bottle cap and bottle to ensure that they are securely fastened and not damaged or leaking.

4.3 Add the data sheet and any additional packing material.

4.4 Place an ice pack in the cooler and close the lid tight.

4.5 Use the clear packing tape in the lab to secure the cooler lid.

4.6 Using UPS smart pick up and send to receiving address.

Author:
Aaron Switzer 2003
Revised:

STANDARD OPERATING PROCEDURES
SIGMA MODEL 900 PORTABLE SAMPLER

1. SCOPE/PURPOSE

1.1 This standard operating procedure (SOP) describes the procedure for using the Sigma 900 portable samplers. There are five of these samplers located on the hatchery grounds. The design of the sampler allows it to sample a calibrated volume of water at programmed time intervals over a 72 hour period.

2. REFERENCES

2.1 Model 900 Standard Portable Sampler – Instrument Manual, American Sigma, 2002

3. DEFINITIONS

3.1 Platte River State Fish Hatchery uses this type of automated sampler to monitor the amount total phosphorus entering and exiting the hatchery.

4. PROCEDURE

4.1 The Sigma sampler is opened by removing the cover that contains the keypad.

4.2 The properly labeled acid washed 10L wide mouth poly carboy is placed inside the unit.

4.4 Replace cover.

4.5 Press the START button located in the center of the keypad at the top.

4.6 The display will read “START OR RESUME PROGRAM?” - press the START button.

4.7 Within 30 seconds the display will read “PROGRAM RUNNING”.

4.8 Return in approximately 72 hours.

4.9 Press the CHANGE/HALT key, #2 on the keypad. The display will read “PROGRAM HALTED”. Collect the sample and replace cover.

5. SAMPLER MANTENANCE

5.1 The sampler tubing should be replaced at least once every six months or as needed.

5.2 The sampler should be calibrated at the time of tube replacement or as needed. Refer to the Sigma binder in the lab for these methods.

5.3 Any maintenance and/or modifications to the program is recorded and entered into the Sigma Log - Access database and the Sigma binder.

Author:
Aaron Switzer 2003
Revised:

STANDARD OPERATING PROCEDURES
STREAM FLOW METER

1. SCOPE/PURPOSE

1.1 This standard operating procedure (SOP) describes the procedure for ensuring accurate meter performance (Pygmy and Price AA) in the field.

2. REFERENCES

2.1 USGS, Office of Surface Water Technical Memorandum No. 89.07

3. DEFINITIONS

3.1 The current meters are used to determine flow and velocity of the flowing waters in the Platte Lake Watershed.

4. PROCEDURE

4.1 The meters are visually inspected before field measurements are made. Bent cups and other signs of wear will give inaccurate flow results.

4.2 Before taking field measurements, a full timed spin test should be performed. A spin test simply means spinning the cups and recording the time it takes for the cups to stop moving.

Minimum acceptable spin test times are:
Pygmy meter: 0:45 seconds
Price AA meter: 2:00 minutes

4.3 A record of spin tests is kept in the current meter log.

4.4 Between measurements in the field, the cups are spun (not timed) to check for smooth operation.

5. SAMPLER STORAGE

5.1 The meters are dried and stored in their protective cases provided by the manufacturer.

Author:
Aaron Switzer 2003
Revised:

STANDARD OPERATING PROCEDURES
HOBO WATER LEVEL LOGGER

1. SCOPE/ PURPOSE

1.1 The HOBO water level logger is used to as an aid in calibrating flow rates entering and exiting the hatchery.

2. DEFINITIONS

2.1 The water level logger is a 6" x 1" solid stainless steel cylinder.

2.2 The Optic USB Base Station is device used for communication between the water level logger and the computer. It is located in the laboratory at the hatchery.

2.3 The stilling well is a 4" PVC pipe that is used to stabilize the water surrounding the level sensor.

3. MATERIALS

3.1 HOBO water level logger.

3.2 Optic USB Base Station.

4. PROCEDURES

4.1 Launching Logger

4.1.1 Insert water level logger into optic USB base station and open HOBOware program on computer desktop.

4.1.2 Follow onscreen prompts to launch logger.

4.1.3 Once logger is successfully launched remove from base station and transfer to clarifier stilling well.

4.1.4 Insert water level logger into screw cap and lower into the stilling well.

4.2 Retrieving Logger

4.2.1 Remove water level logger from the stilling well.

4.2.2 Insert water level logger into optic USB base station and open HOBOware program on computer desktop.

4.2.3 Follow onscreen prompts to retrieve data from logger.

4.2.4 Transfer data into an Excel spreadsheet and email to implementation coordinator.

Author:
Aaron Switzer 2003
Revised:

STANDARD OPERATING PROCEDURES FOR CALIBRATION OF YSI 650 MDS AND 600R SONDE

1 SCOPE

1.1 The Platte River Fish Hatchery collects water quality data from Platte Lake and its tributaries as part of an ongoing water quality program. This data is used to detect changes in water quality over time.

2. PURPOSE

2.1 This (SOP) describes the proper procedure for calibration of YSI 650 MDS and 600R sonde units. These instruments are used for the collection of water quality data on Big Platte Lake and its tributaries. Adherence to a consistent calibration protocol is necessary to ensure effective and consistent water quality data collection.

3. REFERENCES

3.1 YSI Environmental Operation Manual

4. CALIBRATION

4.1 The YSI 650 MDS and 600R sonde are calibrated in the lab at Platte River State Fish Hatchery. All calibration solutions are stored in the lab. The YSI 650 MDS and 600R are always calibrated prior to use on the day that it is used in the field.

4.2 Conductivity Calibration

4.2.1 Rinse the calibration cup twice with distilled water, then once with 0.02N KCL solution. Fill the calibration cup with the 0.02N KCL solution such that the conductivity block is fully submerged. Tap the sonde unit to dislodge any possible air bubbles.

4.2.2 Select “Sonde Menu”, then “calibrate”, “conductivity”. Then “spcond”.

4.2.3 Enter the value 2.76 ms/cm for calibration of (0.02N KCL). The display will then return to the data display screen, with the option “calibrate” highlighted. Record the displayed spcond value as the initial reading. Then select enter; the calibration will stabilize and be completed. Record the displayed value in the YSI calibration logbook as the calibrated value. Select the highlighted option “continue” by pressing enter. The display will then continue with options. Advance to “sonde run”.

4.2.4 Rinse the calibration cup twice with distilled water then once with 0.01N KCL solution. Fill the calibration cup with the 0.01N KCL solution such that the entire conductivity block is fully submerged. Tap the unit to dislodge any air bubbles.

4.2.5 Record the displayed conductivity value in the logbook as the “initial reading”.

4.2.6 After use in the field, conduct the post-calibration procedure by repeating 4.2.1 and 4.2.3. The displayed value for each solution should be recorded as the “after use” value. The difference between the “after use” value and the “calibrated value” (for 0.02N KCL) and “initial value” (for 0.01N KCL) should be recorded as drift.

4.3 Oxidation Reduction Potential (ORP)

4.3.1 To determine if the sensor is functioning correctly place the probe in 3682 Zobell solution and monitor the millivolt reading. The probe should read in the range of 221-241 at normal ambient temperature (17-32 degrees Celsius). If the reading is out side this range, the probe can be calibrated to the correct value outlined in section 2.6.1 of the operations manual.

4.4 Temperature

4.4.1 The temperature sensor is factory calibrated.

4.5 Depth Calibration

4.5.1 Calibration of depth should occur in the field immediately prior to use.

4.5.2 Suspend sonde unit so that the probe is just above water surface. Select "sonde menu", then "calibrate", then "pressure –ABS" on display unit. Enter calibration value (0.0 feet). The display will then return to the data display screen, with the option "calibrate" highlighted. Select enter, and the calibration will stabilize and be complete.

4.6 pH Calibration

4.6.1 Remove the weighted probe guard from sonde. Rinse calibration cup and probes with distilled water. Thoroughly mix container of pH 7 buffer, making sure the solution is dated and fresh. Rinse the probes in the calibration cup with pH 7 buffer, and then fill the cup with buffer until all probes are submerged. Allow readings to stabilize for approximately 90 seconds.

4.6.2 Select "Sonde Menu", then "Calibrate", then "pH" then "3 point cal" on the display unit. Enter the first pH buffer for calibration (pH 7). The display will then return to the data display screen, with the option "calibrate" highlighted. Record the displayed pH value as the initial reading in the YSI calibration logbook. Then select enter, the calibration will stabilize and be completed. Record the new displayed value in the YSI calibration logbook as the calibrated value. Select the highlighted option "continue" by pressing enter.

4.6.3 Repeat for both pH 10 and pH 4.

4.6.4 After use in the field conduct the post-calibration procedure by repeating 4.6.1 for all three-pH solution. The displayed values should be recorded as the after use value in the YSI calibration logbook. The difference between the "after use" value and the "calibrated" value is the drift.

4.7 Dissolved Oxygen (DO) calibration

4.7.1 Start the vacuum pump attached to air stones. The air stones are in two 10L glass bottles, one refrigerated and one at room temperature. Let the vacuum pump run at least one half hour to completely saturate the water.

4.7.2 Place sonde (with attached weighted probe guard) into five-gallon DI water bucket in lab. Allow the unit to stabilize in bucket for 10 minutes.

4.7.3 Obtain the current barometric pressure from weather station, read in inches (in.) of Hg. Convert this value to millimeters (mm) of Hg through a multiplication factor of (25.4). Record the mm of Hg value in YSI calibration logbook.

4.7.4 Select "Sonde Menu", then "Calibrate", then "DO%" on the display unit. Enter the calculated barometric pressure "mm/Hg". The display will return to the data display screen, with the option "calibrate" highlighted. Press enter and the calibration will stabilize and be completed.

4.7.5 Place the sonde into the refrigerated 10L glass bottles from 4.7.1 which are now saturated with oxygen. Let the 650 stabilize approximately 90 seconds. Record the value for DO% and DO mg/L. Repeat this procedure for the 10L glass bottle at room temperature. Compare these readings to the Oxygen Saturation at Temperature spreadsheet posted on the side of the refrigerator. The 650 DO mg/L readings should be within the hundredth. If not consult the YSI Operations Manual for proper recalibration procedures.

4.7.6 After use in the field, conduct the post-calibration procedure repeating 4.7.1 through 4.7.5 as listed above. The difference between the displayed DO value recorded in the logbook and the post-calibration reading is the drift, which should be recorded in the logbook.

5. MAINTENANCE

5.1 After use the YSI 650 MDS and 600R sonde should be cleaned and stored in the lab.

5.2 The cable is cleaned and recoiled. Clean and lubricate the rubber connectors. Store the sonde unit with ~ ½ inch of tap water in storage cup.

5.3 Replace Dissolved Oxygen (DO) membrane every 30 days. Avoid over stretching the membrane, invert sonde unit several times; check for trapped air bubbles under the membrane.

5.4 Rinse pH bulb with tap water to remove any film or debris. If good readings are not established, soak the probe in a dishwashing liquid 10-15 minutes. A cotton swab can be used gently to clean the bulb if needed.

5.5 Clean the conductivity block and electrodes with dishwashing liquid solution every four months.

5.6 The temperature sensor is factory set and requires no maintenance.

5.7 The function of the Redox (ORP) sensor should be checked quarterly against a standard Zobell's solution.

Author:
Aaron Switzer 2003
Revised:

STANDARD OPERATING PROCEDURES
COLLECTION AND PRESERVATION OF ZOOPLANKTON SAMPLES

1. SCOPE/ PURPOSE

1.1 A zooplankton tow net is used to collect zooplankton in Platte Lake. The samples are preserved and sent to the lab for analysis.

2. DEFINITIONS

2.1 The zooplankton net is conical in shape and has a metal frame at the large opening and a male plastic connection at the small opening.

2.2 The plankton bucket attaches to the male plastic connection at the smaller opening on the zooplankton net.

3. MATERIALS

3.1 Zooplankton net and plankton bucket.

3.2 Calibrated line.

4. PROCEDURES

4.1 Connect the calibrated line to the frame at the large end of the zooplankton net.

4.2 Lower the zooplankton net slowly into the water. Make sure there are no air bubbles trapped in the net. Continue to lower the net until the 85' mark is reached. The 85' mark is bright red edged with black.

4.3 Once the 85' mark is reached allow the line to become taut and begin retrieving the net. The average rate of retrieval is 60 seconds.

4.4 When the net reaches the surface hold vertically above the water surface and splash surface water onto the sides of the net to wash down any zooplankton stuck to the inside of the net.

4.5 Remove the plankton bucket form the net and pour its contents into a 250ml sample bottle, be sure to record the bottle number on the Laboratory Data Form.

4.6 Spray down the inside of the plankton bucket with a squeeze bottle filled with tap water from the hatchery. Repeat.

4.7 Add formalin to the sample bottle to preserve the zooplankton. The amount of formalin is approximately 20% of the total sample volume.

5. STORAGE

5.1 Following sampling the net is rinsed and hung in the lab to dry. The plankton bucket is removed, rinsed and inverted for drying.

5.2 Once dry the plankton bucket is placed back on the net. A sock is used to cover the bucket to prevent damage to the net. The net is carefully folded up in a towel and put into storage.

Author:
Aaron Switzer 2003
Revised: