

Greetings!

After nearly forty years of evolution in British Columbia classrooms, the Classroom Incubation Program (CIP) remains a cornerstone of Fisheries and Oceans Canada's integrated "Stream to Sea" education package. Today, over 50% of schools in the Capital Regional District operate a classroom incubation project.

Fisheries and Oceans Canada (DFO) receives considerable assistance from the Goldstream Volunteer Salmonid Enhancement Association and other community partners to deliver this Program. The CIP fosters an appreciation for the importance of habitat, and kindles a strong sense of stewardship for the Pacific salmonid and other creatures that share its domain.

DFO curriculum packages, such as Salmonids in the Classroom, continue to be an excellent resource for classroom incubation activities.

This manual will help you set up and maintain a classroom salmon incubator, and care for salmonids at different stages of development. Concepts and procedures are straightforward, and the Department provides technical and logistical support.

For contact or curriculum order information, go to www.streamtosea.ca.

I would like to thank Fisheries and Oceans Canada for sponsoring this revision of the CIP manual. I wish you the best of luck with your project.

Best Fishes!



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Images by Tony Bounsall Photo-Design and Don Lowen.

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I PRIOR TO ASSEMBLY

It is critically important to begin operating your incubator at least 5 days prior to receiving the eggs.

This strategy:

- Allows the biofilter community to establish itself before incubation begins;
- Provides time for you and your class to become thoroughly familiar with the system, and;
- Ensures that the system functions properly before egg delivery.

Prior to assembly and operation, read this section thoroughly. You will know the concepts required to operate the classroom incubator as a representation of a healthy stream; assemble kit components and identify their function, and; prepare components for assembly.

A. KNOW THE CONCEPTS

1. The Habitat Perspective

The best way to teach the importance of habitat to your students is to treat your salmon incubator as a microcosm of a nearby stream. The incubator, like a healthy stream, provides suitable habitat for rearing salmonids to the fry stage, and allows students to foster and experience this process in the classroom.

Although designs vary across the Pacific Region, these basic incubator components (See illustrations pages 4 to 6) address the following habitat requirements:

SALMONIDS NEED...	THE INCUBATOR INCLUDES...
Darkness at egg/alevin stages	Styrofoam jacket blocks sunlight and ultraviolet rays from classroom fixtures.
	Substrate (River rocks)
Cold water – 6 to 10°C	Aquarium chiller cools water to a designated temperature.
	Styrofoam jacket keeps the heat out.
Clean water, free from chlorine and other toxins	Dechlorinator removes chlorine and ammonia, and precipitates some heavy metals.
	Fluval pump moves water through its filter media.
	Filter gravel provides biofilter habitat and removes copper.
	Crushed oyster shells maintain a healthy PH at late stages of incubation.
Oxygen	Aerator on Fluval pump oxygenates water.

2. The Biological Filter

The biological filter system, or biofilter, accomplishes some of the most important biochemical processes that occur in a closed-system incubator. The biofilter operates as the Fluval pump moves water through the filter media contained in the filter case. This media facilitates the creation of a community of living organisms, and therefore requires oxygen and food.

In addition, a small amount of filter gravel is excellent biofilter habitat, and may reduce copper levels in the water.

The biofilter primarily controls the levels of NH₃, a naturally occurring but harmful by-product of protein breakdown. This process, called Nitrification, converts NH₃ to NO₂, releases hydrogen ions and tends to acidify the water, or lower PH.

The biofilter is more efficient at high PH, and therefore tends to reduce its own efficiency. The addition of crushed oyster shells will help to increase PH.

It is important to remember that the biofilter community requires food and oxygen, and that it is easily destroyed by chlorine or chloramines.

3. What are ATU's?

A salmonid's rate of development is primarily determined by water temperature. Warmer water causes more rapid development. The ideal range is 5°C to 9°C.

You can predict when the eggs will hatch and when the fry will emerge or "swim up" by recording Accumulated Thermal Units (ATU's) on the chart provided on page 20 of this manual.

An ATU is defined as the exposure of an organism to one Celsius degree of heat over 24 hours. Examples - one hundred ATU's are the equivalent of 10 days of exposure at 10 Celsius, or 20 days at 5 Celsius.

Here are ATU guidelines corresponding to developmental stages for five species of Pacific Salmon:

SPECIES	TO EYED STAGE	TO HATCH	TO EMERGENCE
Pink	224 – 257	545 – 662	868 - 1034
Chum	217 – 250	498 – 546	845 - 1126
Chinook	242 – 258	512 – 526	825 - 1029
Coho	217 – 237	448 – 475	777 - 829
Sockeye	236 – 257	614 – 694	943 - 1088

To calculate and record ATU's:

- Starting Point - When your eggs arrive, record the date and your eggs' ATU value (provided by your Coordinator) on the ATU chart (Page 20).
- Twenty-four hours later, take your incubator water temperature. Record the date and temperature as degrees Celsius, then add this number to the previous day's ATU value to get today's ATU value. One Celsius degree of temperature is equal to one thermal unit.
- Add each day's temperature to the sum of the readings from preceding days. For example, if your water temperature is constant at 6°C each day, then 6 ATU's will be added each day.

B. GATHER YOUR INCUBATOR COMPONENTS

1. Materials Supplied For Your Project - Fisheries and Oceans Canada and its community partners supply the following materials:

Figure 1 – Supplied Components

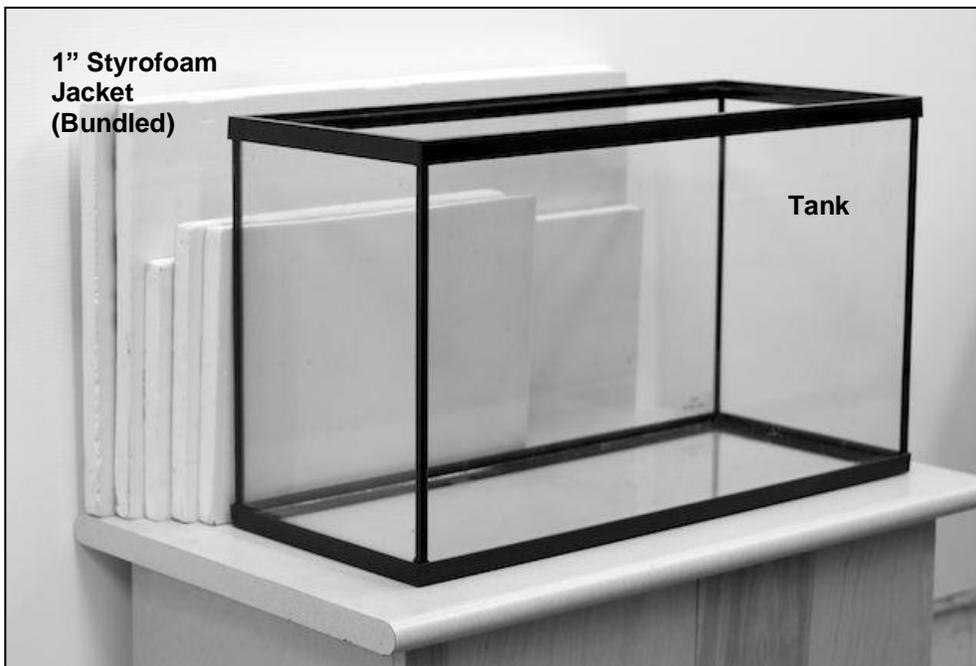
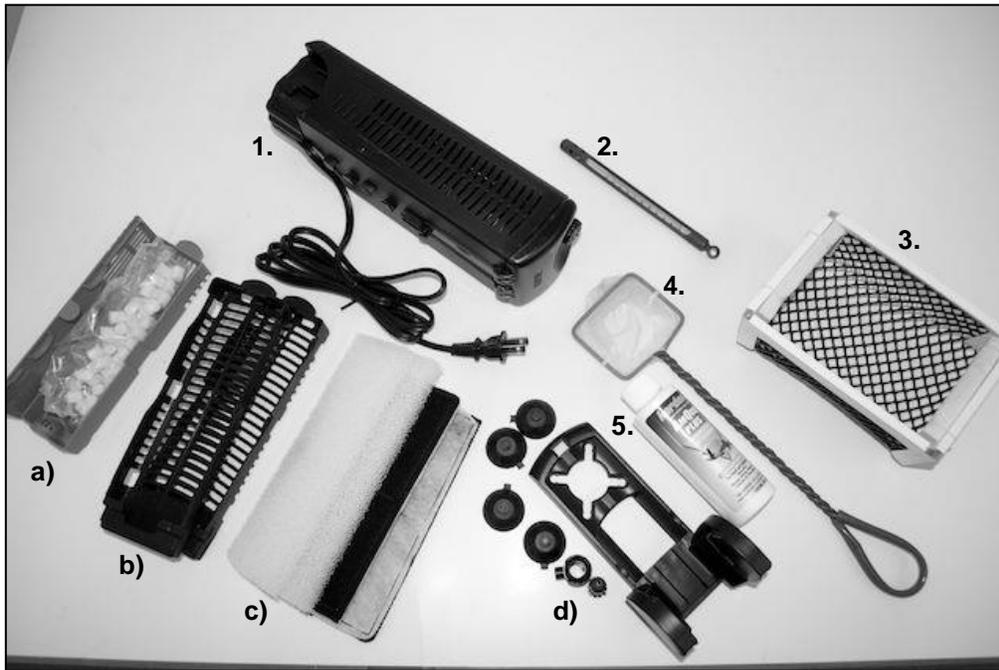


Figure 2 – Supplied Components



1. Fluval U3 Pump/Filter Case with -
 - a) Biomax Cartridge
 - b) Filter Cartridges
 - c) Foam and Poly/Carbon Filter Pads
 - d) Mounting Bracket
2. Thermometer
3. Egg Basket
4. Dip Net
5. Dechlorinator
6. (Not shown) 10 pounds filter gravel and 1 pound of crushed oyster shells

2. Materials You Will Supply

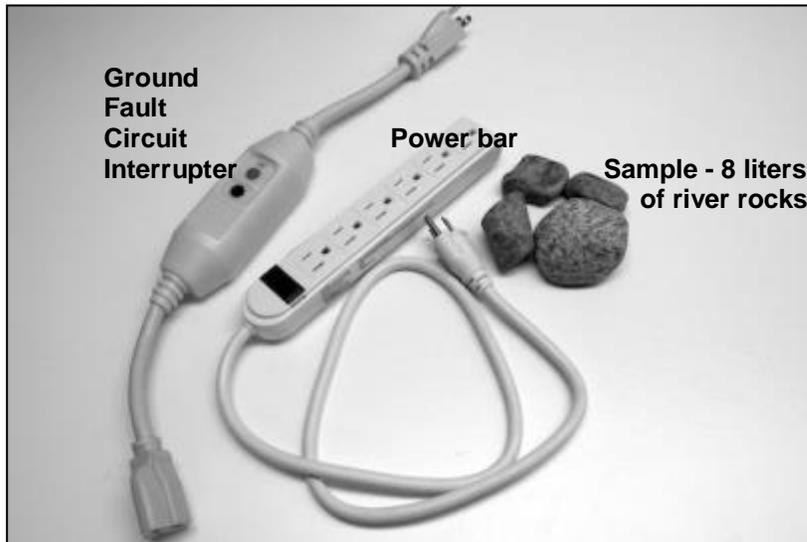
Contact your Education Coordinator for more information concerning the following: (Figures 3 and 4)

Figure 3 – Components To Purchase



* You may be able to purchase these components at a subsidized price. Contact Don Lowen at (250) 213-8582 or donlowen27@gmail.com for more information. Quantities are limited.

Figure 4 – Components You Will Supply



C. COMPLETE THE FOLLOWING STEPS PRIOR TO ASSEMBLY

1. Collect Substrate

Collect 8-10 liters of clean, rounded river rocks (Make it a field trip!). Stones can be 2-4 centimeters in diameter.

2. Disinfect Components

Twenty-four hours prior to assembly, disinfect your equipment with iodine. Do not use vinegar.

- a) Collect all pieces that will get wet during incubation and place inside the tank. (Fluval case, cartridges, thermometer, dip net, probe well, egg basket) Place substrate (River rocks) in a separate container. If necessary, open filter case, remove and discard used media in all three filter cartridges.
- b) Fill tank and substrate container with fresh water until all pieces are under water.
- d) Add 1/4 cup of iodine concentrate to each container. With this solution, wash aquarium chiller's heat exchanger, and inside of tank.
- e) After 2 hours, rinse all components thoroughly with fresh water.

3. Test your aquarium chiller

(If you are unfamiliar with your chiller's operation, see page 14, Figure 16: "Set the Thermostat" before continuing.)

- a) Plug in the unit, wait until it begins to operate, then reset the thermostat above room temperature. When you do, the system should stop.
- b) If it does not stop, ensure that the thermostat is set above room temperature. If it is properly set, then unplug the unit, discontinue the test and contact your Program Coordinator.
- c) If the unit does stop, continue the test.
- d) With the unit plugged into power, now reset the thermostat well below room temperature. The unit should start.
- e) If it does not start, unplug the unit, stop the test and contact your Program Coordinator.
- f) If the unit does start, continue the test.
- g) Wait for at least five minutes for the heat exchanger to feel cold to the touch. If the unit is running and the exchanger does not get cold, unplug the unit, stop the test and contact your Program Coordinator.
- h) If the exchanger does get cold, unplug the unit and continue with preparation for assembly.
- i) Look for signs of corrosion on the probe or heat exchanger of your aquarium chiller. If you find damage, contact your coordinator.

4. Check all other components, and report damage to your coordinator.

II ASSEMBLY AND OPERATION

Now that you understand some of the basic principles of “closed system” incubation, and have disinfected and/or tested your kit components, you should begin the assembly process at least 5 days prior to egg delivery.

A. PLACEMENT

1. Find a quiet, secure location for your incubator near an outlet and sink, if possible.
2. If you are using an aquarium cart, ensure that the surface is clean.
3. If you are not using a cart, ensure that the location surface will accommodate the tank and chiller, and is level, clean and able to support up to 150 kilograms.
4. Place the tank on the cart or selected surface so that there is room around the sides for jacket and chiller lines.

B. CONSTRUCT SUBSTRATE

1. Spread 10 pounds of filter gravel evenly over bottom of tank.
2. Spread 1 pound of crushed oyster shells evenly over the filter gravel.
3. Spread river rocks evenly and carefully over the filter gravel and shells. (Figure 15, Page 13)

C. ASSEMBLE THE FLUVAL U3

See Figure 2, page 5 for inventory. If you have a Fluval 3 Plus system, go to page 20 for assembly instructions, (Part 1. a to g).

You will need:

- A pail with 2 or 3 liters of dechlorinated water (Mix in 7 or 8 drops of dechlorinator)
 - Clean Fluval filter case and three clean, empty plastic filter cartridges (2 dark blue, 1 light blue)
 - 2 new white foam pads (A-487)
 - 2 new polycarbon pads (A-491)
 - New Biomax crystals (A-495)
 - (Optional) If possible, a quantity of last year’s crystals to help start up the biofilter.
1. Attach suction cups to the filter bracket using the top 4 slots. For easy filter bracket removal later on, position the cups so that the tabs are facing outwards.
 2. (See Figure 5 below) Insert the output nozzle with venturi vent (It has a small vent on top) into the top output on the filter body, making sure that the vent is facing up. Do not insert the second output nozzle into the bottom output on the filter body.
 3. Place the Venturi valve into the top of the vent. Turning the valve located on the top of the venturi valve will regulate the quantity of air produced. Turn the valve counterclockwise to maximize flow.
 4. Line up setting “A” with the marker. The “A” should point toward the back of the filter.

Figure 5 – Top View, Fluval U3 Filter Case



5. If necessary, open the filter cover and remove all cartridge frames out of the filter body.

Figure 6 – Fluval U3 Filter Case, Filter Cartridges



6. Snap the debris receptacle off the bottom of the dark blue cartridge frames.

Figure 7 – Fluval U3 Filter Cartridge, Dismantled



7. Rinse 2 foam and 2 poly/carb media in dechlorinated water.

8. If you are assembling a new Fluval pump, pull open the tab on the side of the light blue Biomax cartridge, opening the cover. Remove and open the bag of new Biomax crystals, rinse them in dechlorinated water, and refill the cartridge. Snap cartridge shut.
9. If you are refitting a used Fluval pump with new media, pull open the tab on the side of the light blue Biomax cartridge, opening the cover. Rinse a mixture of new and old crystals, and fill cartridge. Snap cartridge shut.

Figure 8 – Fluval Biomax Case and Crystals



10. (See Figures 7 and 9) Insert a new foam pad in each of the dark blue cartridges. Make sure the foam is positioned behind the tabs on the sides of the frame.
11. Insert a new poly/carbon pad in each of the dark blue cartridges, with the white side next to the foam. Insert the lower end of the media into the lower end of the cartridge frame, and then snap the topside of the media under the two tabs on the topside of the frame. Do not press too hard as the media must sit on the top of the tabs on the sides of the frame.
12. Replace the debris receptacle.
13. Re-insert dark blue filter cartridge frames into the filter. (Round edges of frame are on the outside, with pull-tabs on top).
14. Re-insert light blue Biomax cartridge frame into the filter, with pull-tab on top.

Figure 9 – Fluval U3 Filter Case, Assembled



15. Close the filter case lid.
16. Press the power cord into the slots on the back of the filter case so that cord sits flat against case.
17. Slide the filter case onto the filter bracket and then lock it in place by squeezing the filter case and filter bracket together. Do not install the Fluval in the tank.

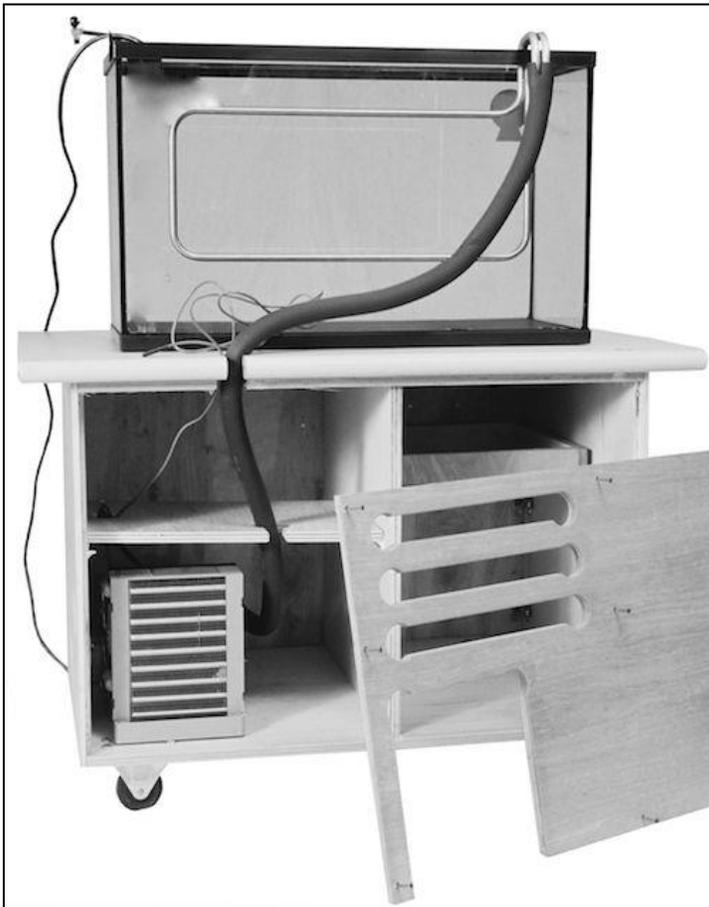
D. INSTALL THE CHILLER

If you do not have an aquarium cart, go to page 11, #2.

1. If you have an Aquarium Cart:

- a) Facing the back of the cart and with no substantial weight on the cart, remove the back plate. (If the left side of the back wall is pegboard, remove the pegboard only).
- b) Place the aquarium chiller inside on the bottom left shelf. In most cases, the thermostat should appear at the portal on the side of the cart.
- c) Feed power cord and temperature probe wire up through hole in shelf, then continue feeding probe wire up through notch in top.
- d) With a minimum of bends and twists, adjust the copper lines carefully so that they fit in the notches cut in the back of the shelf and the top. The heat exchanger eventually sits inside the tank with about 3 cm. of clearance from the back of the tank. Avoid kinks. The heat exchanger should be one centimeter clear of rocks, glass and probe well.

Figure 10 – Back View, Cabinet Back Detached



- e) Replace the back of the cart and fasten securely before filling the tank. The removable back on the new cart design is part of its structural integrity. **Do not continue until you have completed this step.**
- f) Go to Part E below.

Figure 11 – Back View, Cabinet Back Installed



2. If you do not have an Aquarium Cart:

- a) Find a space below or beside the tank for the aquarium chiller so that the heat exchanger can reach the tank, the compressor fan is out of easy reach, and air flows freely around it.
- b) Ensure that you orient the chiller so that you can easily read the thermostat.
- c) With a minimum of bends and twists, adjust the copper lines carefully so that the heat exchanger eventually sits inside the tank with about 3 cm. of clearance from the back of the tank. Avoid kinks. The heat exchanger should be one centimeter clear of rocks, glass and probe well.

E. FINAL STEPS

- 1. Run the tap** for your water source for 5 minutes before filling the tank.
- 2. Fill the tank** with cold water until heat exchanger is immersed, and water level is about 5 centimeters below top. To maintain substrate distribution, pour water onto a plastic lid, Frisbee or piece of styrofoam.
- 3. Add Dechlorinator** - Remove the squirt cap from your bottle of dechlorinator, and pour 3 teaspoons or 15 milliliters of product into the water.
- 4. Mount Fluval in tank.**
(If you have a Fluval 3 Plus system, go to page 19, Part 1, h to l, for installation instructions.)
 - a) Completely immerse the entire filter case in the tank, turning it until bubbles no longer emerge from the case.

- b) Grasp the filter case by the sides and hold it in position against the glass on the right end of the tank.
- c) Push against the filter, adhering the suction cups to the wall of the aquarium.

Note – To have the airflow/venturi work properly, it must remain above water. Keep this in mind when putting the filter into its final position. At the same time, ensure the outlet is at a minimum of 1 cm below the aquarium's water surface.

Figure 12 – Fluval U3 Filter Mounted in Tank



5. Install Probe Well - Remember that the temperature probe with a flexible coated wire will malfunction if it corrodes or gets wet.

- a) If you have a stainless steel probe well (Figure 13), discard and contact your Coordinator to acquire a PVC replacement. See Figure 14.

Figure 13 – Stainless Steel Probe Well Mounted in Tank



- b) If you have a PVC probe well (Figure 14) and a temperature probe with a flexible coated wire, pull the probe through the collar clamp, then push the probe inside the well as far as it will go. Tighten the collar clamp so that the wire will not slide through it.

Once assembled, you can position this unit anywhere below the water surface, and secure to the glass using the suction cups.

Figure 14 – PVC Probe Well Mounted in Tank



- c) If you have a PVC probe well (Figure 14) and an older temperature probe with a bare “coat hanger” type wire (Not illustrated), remove the probe well collar and place the probe inside the well. Affix the probe well vertically to the inside of the tank so that the top of it is above water, similar to Figure 13 on page 12. Seal top of well with plasticine or duct tape.

6. Connect to Power

- Connect the aquarium chiller and Fluval to a power bar, leading to a ground fault circuit interrupter (GFCI).
- Plug GFCI into wall outlet. You should see and hear a stream of water and bubbles from the Fluval outflow.
- Adjust the hood on the outflow so that water is deflected downward as much as possible.

Figure 15 – Assembled Tank in Operation (Filter gravel and oyster shells not shown.)



7. Set the Thermostat

Set the thermostat at the target temperature. The unit should start up and cool the water in 8-12 hours. The following information explains Fahrenheit and Celsius scales, and the operation of two kinds of temperature controls.

Once a month, synchronize your incubation temperature with recipient stream temperature.

Fahrenheit vs Celsius - Celsius is the working scale for this Program. Some older aquarium chillers only have a Fahrenheit scale.

- To change a Fahrenheit reading to Celsius, $C = 5/9(F-32)$. Subtract 32 from your Fahrenheit reading, then multiply that figure by 5/9.
- To change a Celsius reading to Fahrenheit, $F = 9/5C+32$. Multiply the Celsius reading by 9/5, then add 32.

a) *Non-Digital Thermostat* (Not shown)

- i) Turn the rotary dial to the target temperature in the appropriate scale.
- ii) Use your thermometer, not this thermostat, to determine actual water temperature.

b) *Digital Thermostat* (Figure 16)

Figure 16 – Digital Thermostat

You have three buttons to press. The two buttons with “Up” and “down” arrows allow you to change the setting. The “Set” button programs your chosen setting and moves to the next one. The current water temperature will be visible at all times unless you are re-programming the above settings. You can use this thermostat to record temperature data.

- i) Press “set”. Your first set of choices is “C” for Celsius and “F” for Fahrenheit.
- ii) Press the up/down button so that “C” is visible.
- iii) Press set. The number that now appears is the target temperature for the unit.
- iv) Adjust the up/down button until you have the target temperature.
- v) Press set. The number that now appears is the range, or the number of degrees the water will warm up before the unit starts up again.
- vi) Press the up/down button to set at 2.
- vii) Press set. Your choices now are “H” for heat or “C” for cool.
- viii) Adjust to “C”.
- ix) Press set. The number that now appears is current water temperature. If it is higher than your programmed target temperature, the unit should start up at this time.



8. Cut Jacket to Fit

Where necessary, cut notches in the styrofoam jacket lid for heat exchanger and Fluval so that jacket fits snugly, then attach jacket to tank.

IMPORTANT

Run the Fluval pump and cooling system 24 hours a day during incubation to ensure a constant supply of oxygen and cold, clean water.

Do **not** begin salmon incubation until you have operated your system with new filter media for at least 5 days.

III INCUBATION - DAILY ROUTINE AND LIFE CYCLE STAGES

Follow these instructions once you have assembled and begun to operate your incubator (Section II).

A. PRIOR TO EGG DELIVERY

Ensure that:

1. You have operated your system for at least 5 days prior to receiving the eggs.
2. In your Fluval filter, you have installed new foam and poly/carbon cartridges, and if possible, a mix of new and used Biomax crystals. (See pages 7-10 for filter assembly.)
3. There is a steady temperature, no more than 2 degrees of variation.
4. There are no leaks in the tank.

B. FROM EGG DELIVERY TO HATCH

1. As the alevin grows inside, the shell takes on a silvery, translucent look (especially coho); however, a dead egg is milky white, and should be carefully removed. A dead egg develops a fungus that can kill healthy eggs nearby.
2. Oxygen requirements at this stage are low.
3. You can schedule regular viewing times (15 minutes once a day).
4. Calculate and record temperature and ATU's daily (Page 4 and 20) and remove dead eggs.
5. If you lose more that 5% of your eggs before hatch, contact your Coordinator.

C. AT HATCH

During hatch, you will observe foam on the water surface and a "rotten egg" smell. Inside the egg, the alevin is producing an enzyme that weakens the egg shell. This enzyme - laced with ammonia - is toxic to the alevin in a closed incubation system.

Your incubator's pump, filter media and gravel eliminate toxins that would be removed naturally in a stream or "flow-through" system. Water and media changes are not recommended.

1. Once the hatch is complete, carefully **dump any alevins remaining in the basket into the tank** and remove basket.
2. **Remove the top and/or front of jacket for daily maintenance, recordkeeping and viewing.** Otherwise, the incubator should be completely covered to stay dark and cool.
3. **Record temperature** and calculate ATU's daily.

D. ALEVIN STAGE

1. Remove the top and/or front of jacket for daily maintenance, recordkeeping and viewing. Otherwise, the incubator should be completely covered to stay dark and cool.
2. Alevins will find areas to congregate in the substrate you have provided. Try to check on them daily.
3. Water changes are not necessary. Alevins are relatively inactive.
4. You can schedule regular viewing times (15 minutes once a day).
5. Carefully remove dead alevins. A turkey baster works well. Dead alevins lose colour and sour the tank's odour.
6. Report an alevin loss in excess of 5% to your Coordinator.
7. Record temperature and calculate ATU's daily.

E. FRY STAGE

As alevins use up their yolk sacs, they become more active before they actually require food. They do not all emerge from the substrate at the same time. Swimming styles may be quite erratic as they fill their air bladders and adapt to the new surroundings.

Once most of your alevins have “buttoned-up” (Ingested their yolk sacs) and started feeding, water quality will deteriorate with the presence of uneaten food and waste matter.

At this stage, low water temperature is a significant hedge against poor water quality. As water temperature increases, so does a salmonid’s requirements for food and oxygen; unfortunately, the availability of dissolved oxygen decreases.

1. General Maintenance

- a) At the fry stage, remove the front covering on your tank every morning. Leave all other sides covered to keep temperatures cool. The fry will be shy of light and movement at first, and will soon grow accustomed to your classroom. They need the natural cycle of daylight and darkness, so re-cover your tank in the evening.
- b) Carefully remove dead fry with a turkey baster.
- c) Report a loss in excess of 5% to your Coordinator.
- d) Record temperature and calculate ATU’s daily.

2. Feeding Salmon Fry

Store your salmon food in a cool dry place. A small amount (3 tablespoons) should last until your fry are released. If you require more, contact your Coordinator.

Do not feed until at least 75% of your fry are free-swimming and all are buttoned-up. Continue to operate Fluval filter and chiller as you feed.

- a) Sprinkle the food over the water surface with a minimum of arm movement - if the fry are startled, they will not immediately eat. Repeat the feeding procedure three or four times a day, five days a week.
- b) Only feed as much as the fry will eat. Begin by using a pinch of food; if they will eat more, continue to feed. Do not overfeed.
- c) If you can, vary the feedings through the week. Increase the amount Monday through Wednesday, then decrease amount through to Friday. Start again on Monday with a minimal amount. You do not need to feed fry on weekends or during the spring break. In nature, fry often go without food for several days.

3. Fry Release

Schedule your fry release one week to ten days after you begin feeding them.

Contact your Coordinator for information on a suitable release site and date. This is an excellent time to also plan a Gently Down the Stream field study.

- a) Stop feeding one day before you plan your release event.
- b) On the day of the event, allow 45 minutes to one hour to have the fry ready for transport.
- c) Turn off the power head and cooling system. Fill a large pail (25 liters) 3/4 full with tank water.
- d) Remove and discard the rest of the tank water until water level is 2-3 centimeters above the rocks. Remove rocks by hand.
- e) Use the dip net to transfer fry to container. Ensure there’s an air space, then cover with a tight lid. Try not to leave fry in the container longer than one hour before releasing them.
- f) Bring a class set of ziplock bags, your dip net(s) and thermometer for use at the release site.
- g) When you arrive at the release site, acclimatize the fry to the stream temperature by putting the container(s) in shallow water. Add stream water to each container. Make sure that any temperature change over 1°C happens slowly.
- h) While waiting for the water to cool, discuss with your class or group whether or not the site appears to be suitable habitat for salmon fry, or begin your Gently Down the Stream field study.
- i) When the water is sufficiently cooled and aerated, move the container(s) to shore locations where the students have easy access to them and to the release site.

- j) Designate a release area that is safe for the participants, and has suitable cover and stream flow for salmon fry.
- k) Review the release procedure with your class. Each participant half-fills a ziplock bag with clear water from the stream, then returns to the container(s) on shore. Leaders dip a few fry into each bag. At the stream, participant lowers and tips bag gently into the water, taking care not to disturb the stream bank. Participant refills the bag with water before returning to the fry container.
- l) Record where and how many fry you released, and forward this information to your Coordinator. (Fisheries and Oceans Canada requires this information.)

Optional: You can release most of your fry at this time and leave a few in your tank to grow and develop further. Remember that the longer you keep the fry, the more work is required to maintain suitable water conditions.

F. EQUIPMENT CLEANING AND STORAGE

1. Keep half a cartridge of used Biomax crystals to "seed" your filter system next year. Rinse and dry before storing them.
2. Remove and discard all other used Fluval filter media.
3. Complete the disinfection procedure (See page 6).
4. Clean chiller fan blades and screen.
5. Once everything is clean and dry, store it in a low-traffic area away from household cleaners and other chemicals.

Note - Aquarium chillers are expensive to repair or replace. The safest place for your chiller is inside your cart with the heat exchanger inside the tank. If you do not have an aquarium cart, store it carefully in the box supplied with your kit.

IV APPENDIX

A. HOT TIPS

1. When fish are under stress or dying, reduce temperature and cancel visiting hours. As temperature decreases, the amount of available oxygen increases, the salmonid's need for oxygen and food decreases, and the result is a lower potential for stress.
2. Familiarize your staff with your project. Custodians are key allies.
3. Try to approximate the temperature of the recipient stream throughout your project.
4. Power failure! Agitate the water regularly. Use ziplock bags of dechlorinated ice in the tank to keep the temperature down.
5. The styrofoam jacket will last longer if you border each piece with duct tape. Wide, clear packing tape works well to fasten the jacket pieces to each other. Use duct tape to cover the connection to your power bar to prevent accidental loss of power for refrigeration and/or aeration.
6. Ensure that you introduce no metal objects into the water.
7. Alevins do not require food and should be relatively inactive. Do not be concerned if they are hard to find in the stream gravel.
8. Take a camera to the fry release!

B. PROGRAM SERVICES

This schedule ensures a high quality classroom incubation program with almost ½ day of support per project year. Technical support for projects in the Capital Regional District does not include classroom instruction, individual incubator setup, field study activities on aquatic insects, storm drain marking, Gently Down the Stream, or any of the Streamkeeper modules.

This Program's Coordinators provide the following services:

OCTOBER

- Visit all project schools, establish contact, outline project schedule, evaluate all kit components for wear, damage, etc.
- Forward list of required materials and project contacts to DFO coordinator, or order materials.
- Identify and collect chillers requiring repair

NOVEMBER

- Some after-school visits may be required
- Schedule/host after-school meeting for new teachers and distribute new equipment.
- Facilitate chiller repairs, distribute repaired equipment.

JANUARY

- Organize/host after-school setup in-service
- Inspect all incubators in operation (setup required 5 days before egg delivery)
- Count, package and deliver batches of eyed eggs and fish food
- After-school visits as requested following egg delivery

FEBRUARY

- Schedule one visit to all new projects to ensure correct incubation procedure
- Schedule/host dissection workshop

MARCH TO MAY

- Schedule one visit to all new projects
- Project visits as required
- Organize fry release with all new projects
- Assist other projects with fry release, as time permits

JUNE

- Distribute memo re proper kit storage and release data collection
- Attend evaluation meeting
- Collate/forward fry release data

C. PARTICIPANT'S RESPONSIBILITIES

OCTOBER

- Book classroom presentation (if available)
- Contact your Coordinator re field trip opportunities
- Assist your coordinator with material inventory (30 minutes)

NOVEMBER – New teachers attend organizational meeting (1 hour)

DECEMBER - Pick up/receive required materials (1 hour)

JANUARY

- Attend after-school in-service (2 hours – Required for new teachers)
- Assemble and operate incubator at least 5 days prior to egg delivery (2 hours)
- After egg delivery, complete maintenance protocols
- Record ATU's daily

FEBRUARY (1-2 hours weekly)

- Eggs hatch, alevin stage begins
- Complete maintenance protocols after hatch
- Record ATU's daily
- Attend dissection workshop

MARCH (1-2 hours weekly) - Record ATU's daily

APRIL TO JUNE (1-2 hours weekly)

- Fry stage begins
- Start feeding schedule
- Complete maintenance protocols during feeding schedule
- Record ATU's daily
- Release fry to native stream
- Clean and store equipment
- Report fry release data to your Coordinator

D. FLUVAL 3 PLUS: ASSEMBLY

You will need:

- A pail with 2 or 3 liters of dechlorinated water (Mix in 7 or 8 drops of dechlorinator)
 - Clean Fluval 3 Plus filter case and clean, empty plastic filter cartridge
 - 2 new white foam pads (A-184)
 - 2 new carbon pads (A-196), one to install now, the other to install at feeding stage.
- Attach suction cups to the suction cup bracket.
 - Slide the Hose Adapter/Airflow Control Venturi Nozzle into the water outlet on the filter, making sure that the hole is facing up.
 - Push the airflow control device/venturi valve into the top of the nozzle.
 - If necessary, open the filter case and remove cartridge frame out of the filter body.
 - Rinse 2 foam and 1 carbon pad in dechlorinated water.
 - Place foam pad in each of the cartridge frames, and place carbon pad in between.
 - Close the cartridge and slide inside the filter case.
 - Slide the suction cup bracket onto the rear of the filter and hold it in place while attaching the filter to the inside of the aquarium.
 - Ensure the outlet is at a minimum of 1 cm below the aquarium's water surface.

Note: To have the airflow control device/venturi valve work properly, it must remain above water. Turning the valve located on the top of the airflow control device/venturi valve will regulate the quantity of air produced.

- Plug into power source.
- Adjust the water jet direction by moving the horizontal water outlet from side to side.

