
# Fish in Schools: Raise to Release Program (FinS)

## Technical Manual

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## Table of Contents

## The Aquarium Environment

Your aquarium represents a section of a stream where rainbow trout may live. It is a small-scale version of the incubation system used at the Sam Livingston Fish Hatchery: a closed system with everything supplied to ensure a "disease-free" environment.

**NOTE:** DO NOT add natural objects collected from surrounding environments as they could transmit a disease to your aquarium.

| Needs of Rainbow Trout | What the Aquarium Environment Provides |
|---|---|
| Darkness | Styrofoam pieces and a coroplast cover blocks excess sunlight and ultraviolet rays from eggs and alevins. |
| Cold water | A refrigeration unit chills water to the designated temperature of 10 ˚C. The styrofoam also helps keep the water at a consistent temperature. |
| Clean water | Aqua Plus removes chlorine and conditions tap water. Media within the aquarium and Fluval filter removes liquid and solid impurities from the water. Bacteria within the aquarium (biofilter) and Fluval filter convert fish waste products into less toxic chemical forms. |
| Oxygen | A Powerhead Adaptor oxygenates the water and provides some flow within the aquarium. |
| Food | Fish food is provided in 3 different sizes for your growing trout. Refer to the Feeding Schedule for more information. |

# Part 1 - Aquarium Setup

## Step A: Complete the FinS equipment checklist.

| ITEM | DESCRIPTION |
|---|---|
| Aquarium | 102L Glass Aquarium<br>(Aquarium is approximately 102L /27gal capacity, Dimensions: 75cm x 30cm x 45cm) |
| Aquarium Stand/Cabinet | Holds the aquarium & stores the chiller, filter & supplies. Weight capacity up to ~300lbs. |
| Aqua Clear Powerhead #30 | Draws water through the undergravel filter. Also creates water flow/current and provides oxygen. |
| Oceanic Chiller (System A) | Keeps water temperature chilled to 10◦ Celsius |
| Custom Chiller & Compressor unit (System B) | Keeps water temperature chilled to 10◦ Celsius |
| Coroplast aquarium cover | Provides cover & shade. Needs to be custom cut so that pieces fit over top of aquarium and Styrofoam jacket edges. |
| Undergravel filter plate | Provides a filter component within the aquarium (in conjunction with gravel) to aid in filtering solids from the water. |
| Fluval Ammonia Media<br>(filter media) | Filters, cleans & maintains water quality. Removes toxic ammonia from the water. |
| Fluval Bio-Max Media<br>(filter media) | Filters, cleans & maintains water quality. Substrate for beneficial bacteria that help filter water to reduce ammonia & nitrite build-up. |
| Fluval Carbon Media<br>(filter media) | Filters, cleans & maintains water quality. Improves water clarity, color and removes odors |
| Fluval 305 Filter | Filters and cleans the water. Filter canister houses the filter media; carbon, ammonia remover and Biomax. |
| Zeolite rocks (large, white) | Porous rocks that house bacteria and have the potential to remove ammonia & ammonium ions from the water. |
| Marina 2 in 1 Fish Hatchery | Floats in aquarium & houses eggs & alevin until they are ready to be released. Manual refers to this as the “egg incubation basket”. |
| Marina Floating Thermometer | To monitor the temperature of the aquarium. |
| Marina 40 cm handle easy-catch net | To safely remove fish from aquarium (i.e mortalities or preparation for release). |
| Nutrafin Aqua-Plus (water conditioner) | Makes tap water safe for fish by removing chlorine & chloramine, also provides protective coating for fish scales. |
| Nutrafin Cycle (biological aquarium supplement) | Contains beneficial bacteria that aid in breaking down waste by-products, rapidly matures new aquariums. |
| Ph Wide Range 100 Tests | To monitor water quality |
| Small Gravel<br>#2 Granite Grit (25kg bag) OR<br>Freshwater aquarium gravel (25lb bag) | Covers the undergravel filter. It provides substrate for bacteria and prevents fish from escaping. |
| Styrofoam Aquarium Jacket<br>(1” extruded polystyrene Styrofoam “SM”) | Insulates aquarium from temperature fluctuations and blocks out excessive light. |

## Step B: Assemble the undergravel filter, riser tubes and air pump.

There are two different systems that can be setup. One system setup will use a newer Oceanic Chiller (referred to as **System A**) and another setup utilizes an older custom chiller/compressor unit (referred to as **System B**). Please make note of which system you are using and proceed to read the appropriate sections, make note of areas that specify **System A** or **System B**.

1. Place the aquarium on your cabinet/table near a 110-volt outlet but away from direct sunlight, heat registers, or drafts. Clean the surface of the cabinet of any particles before placing the tank on top of it.
2. Place the undergravel filter plate into the tank. Position it against the back and left-side walls.
3. Snap/insert the tube mounts (short flared attachments) into the slots/clips in the undergravel filter plate along the backside or leftside of the aquarium. *Note that these Fluval Filter intakes can be mounted in two different locations depending on the style of chiller you are using. Use Tube Mount B1 for **System A**. Use Tube Mount B2 for **System B**.

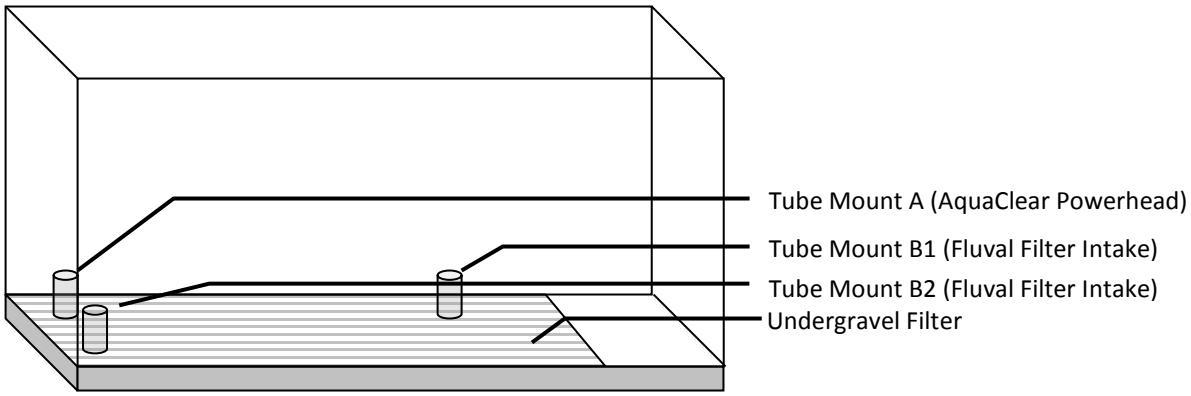



*Figure 1. Assembly of the tube mounts and undergravel filter.*

4. Install one riser tube onto each tube mount.
5. Assemble the Aqua Clear Powerhead (aerator) components using the directions in the box.
6. Carefully slide the adaptor into the top of Riser tube A. Ensure that the fit is good (doesn't have to be extremely tight) and that the riser tube is vertical. The riser tube may need to be custom cut for a proper fit.
7. Attach the air pump to the aquarium wall using the adjustable clamp. The air pump nozzle should point towards the

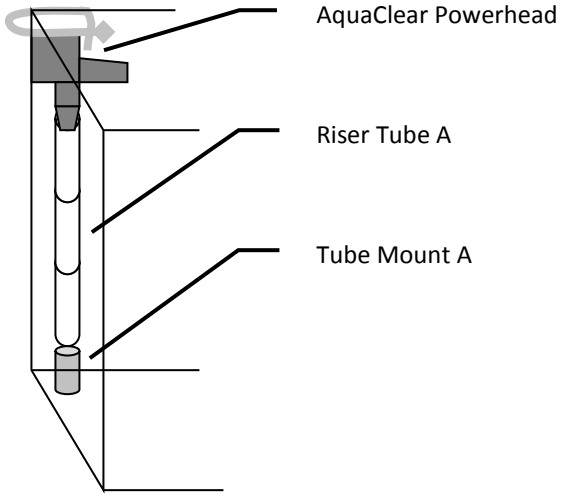



*Figure 2. Aqua Clear Powerhead mounting location*.

centre of the tank.

8. Secure the small clear intake hose by snapping it into the appropriate locations on the aerator.
9. Adjust the aerator as needed to level it near the top of the aquarium wall.

## Step C: Connect the chiller unit.

**NOTE:** The following instructions are adapted from your Oceanic Chiller User Manual: Please read all the **Steps** before assembling and using the filter. Do **not** plug in the chiller until instructed to do so in **Step G**.

**Tools needed:** Utility knife, flathead screwdriver, hacksaw.

**System A**

1. Place the Oceanic Chiller under the aquarium on the left hand side. Ensure that there is sufficient room around the chiller for proper air flow.

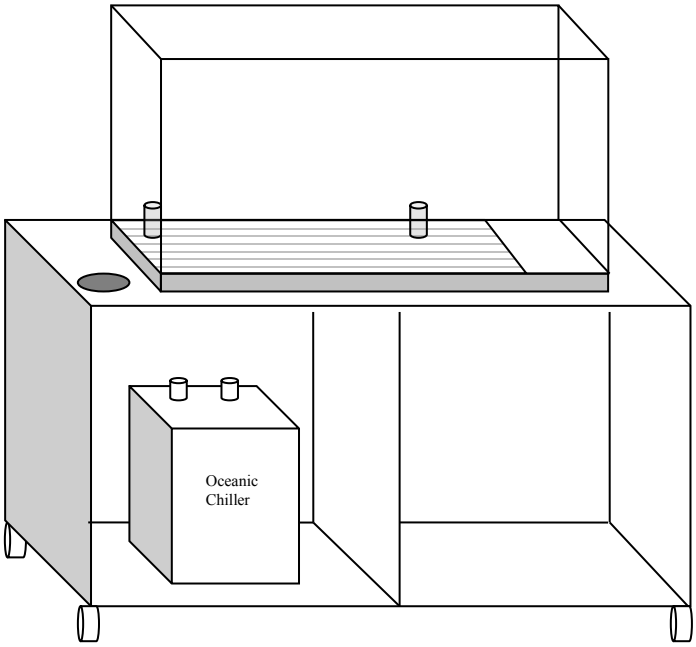



*Figure 3 Proper placement of chiller system*

2. Remove black rubber chamber caps and put aside (do not throw out).
3. Connect the green hose to the hose tubing connector* for the Oceanic Chiller. Use the metal clamp provided, secure using a flathead screwdriver. Put aside. *If this is the first time you are using the chiller, you may need to connect smaller components together first. Refer to the user manual to do so.
4. Connect the factory-finished end of the ribbed 3m flex-hose (from the Fluval Filter

package) to the other hose tubing connector for the Oceanic Chiller. Use the metal clamp provided, secure using a flathead screwdriver. Attach this end to the output water chamber and tighten the compression gasket onto the chiller until secure but not too tight.

5. Run the ribbed 3m flex-hose up through an opening to the top of the aquarium tank so it reaches comfortably from the Oceanic Chiller to inside the aquarium (4 inches past the rim), following a straight path with some slack but no kinks or loops. Cut the hosing using a utility knife.
6. Attach a grey rubber gasket to the end of the hose and secure in place with one of the rim connector assemblies provided with the Fluval Filter. There are suction cups that can also be used to further secure the hose clamps in place.
7. Take apart the intake strainer to remove the small plastic ball that sits inside the cage. Put back together.
8. Add the intake strainer to the end of the hose that was just secured to the aquarium using the rigid plastic rod as a connector between the hose and the strainer. This rod will likely need to be custom cut with a hacksaw to ensure the strainer sits approximately 3 inches above the gravel. Note that the intake strainer is not actually being used on the intake end of this system.
9. Next, connect the free end of the green hose to the output connector of the AquaStop Valve of the Fluval Filter. Tighten counter clockwise using the lock nuts.


*Figure 4 Correct arrangement of tube connections for filter and chiller*

10. The green hose should now have connections on each end to make a connection between the output connector on the AquaStop Valve of the Fluval Filter to the input

chamber on the Oceanic Chiller. Run the hose through any necessary openings so that this connection can be made.

11. Connect the hose tubing connector to the input valve of the Oceanic Chiller however leave the other end free until the Fluval Filter canister is assembled in Step E. Proceed to Step D.

**System B**

1. Remove the back of the custom aquarium cabinet. Place the compressor portion of your custom into the cabinet. Ensure that the compressor fan is away from the cabinet back or side so air can flow freely around it.
2. Line up the thermostat on the chiller unit with the viewing hole in the cabinet side.
3. Gently fit the thick black tubing into a slot on the top of the cabinet.
4. Carefully pick up the tank (help may be required) and place onto the top of the cabinet while fitting the metal heat exchanger coil into the aquarium at the same time. Only allow a few bends or twists in the thick black tubing to do so however DO NOT KINK THE TUBING.
5. Adjust the position of the heat exchanger coil so that it sits inside the aquarium with about 3 cm of clearance from the tank back, and it sits parallel with the tank bottom. The heat exchanger coil should be completely immersed when the tank is filled with water.

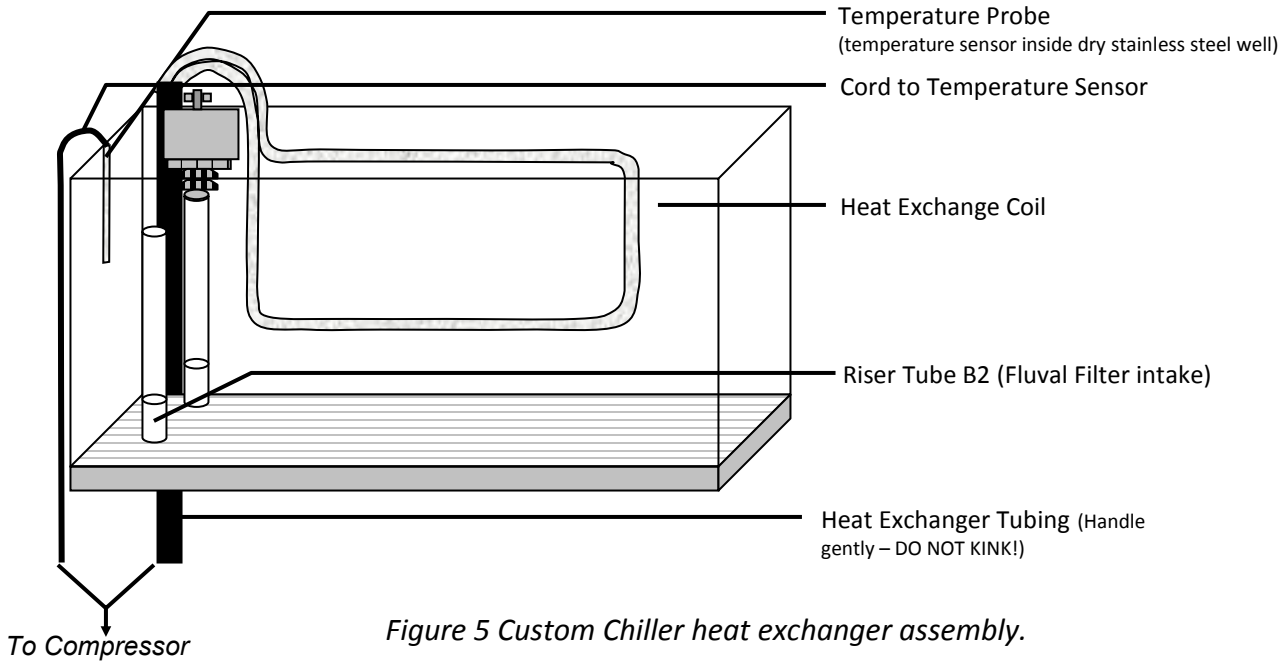



*Figure 5 Custom Chiller heat exchanger assembly.*

6. Place the temperature sensor inside the stainless steel well and hook it on the side of the tank. This probe monitors water temperature for your chiller unit. Be sure that no water enters the stainless steel well; the sensor must stay dry to work properly. Your custom

chiller unit may come with a sensor encased in a tube with suction cups.

7. Fit the back of the aquarium cabinet into place over the chiller system.
8. Centre the aquarium on the cabinet top.
9. While holding the undergravel filter down, pour 5 cm of water (3 full ice cream buckets) into the aquarium. Gently rock the aquarium to ensure all air is removed from under the filter.

## Step D: Connect the Fluval Filter.

**NOTE:** The following instructions are adapted from your Fluval User Manual: Please read all the **Steps** before assembling and using the filter. Do **not** plug in the filter until instructed to do so in **Step G**.

**Tools needed:** Utility knife

1. Plan to place your filter canister in a location that fits the following conditions:
   a. Never more than 4.5 ft below the water level and not above water level.
   b. Hosing follows a straight path from the filter to the aquarium rim, with some slack, but no loops.
   c. Intake tube should not be next to an air source e—an air stone, an aeration device, or the output valve. Air entering the intake strainer reduces filter efficiency.

**System A**

2. Push the factory-finished end of the remaining 3m flex-hose as far as it will go onto the intake connector on the AquaStop Valve of the Fluval Filter, turn the lock nut counter clockwise until it is as tight as possible without forcing.
3. Run the free end of the hose through any necessary openings so that it reaches intake riser tube B1 inside the aquarium. Ensure the hose follows a straight path with some slack but no kinks or loops. The hose can be cut down to size if necessary using a utility knife. Attach the grey rubber gasket to the end.
4. Secure the hose to the aquarium using the rim connector assembly while gently inserting the rubber gasket into intake riser tube B1. Secure the assembly by attaching the suction cup to the glass wall of the aquarium.

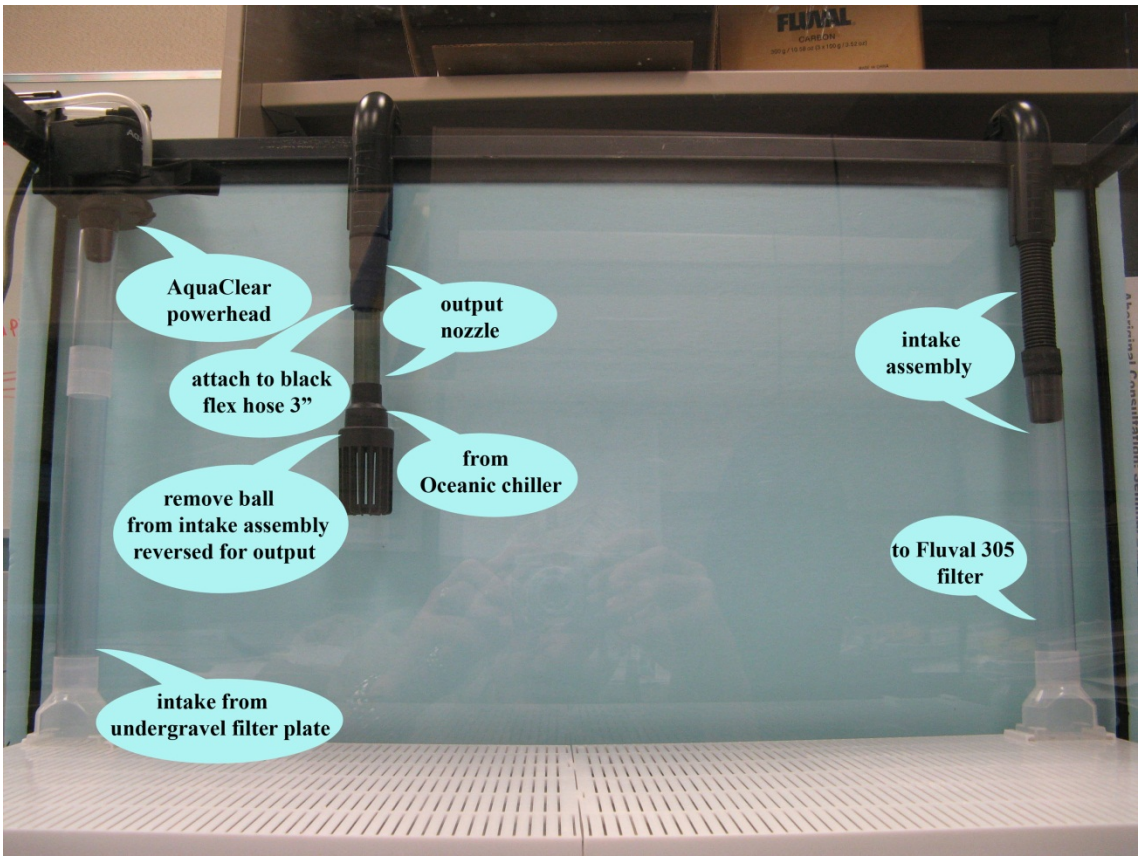



*Figure 6 Correct arrangement of intake/output assembly in the tank*

**NOTE:** If the hosing is too long, the filter will not work properly. To ensure a watertight seal, the cut end of the hosing, which connects to the intake assembly, must be kept about three inches (7.5cm) below the water line.

**System B**

5. Push the factory-finished end of the 3m flex-hose onto the intake connector of the AquaStop Valve of the Fluval Filter, turn the lock nut counter clockwise until it is tight without forcing. Leave this end hanging in a position where it will be connected to the Fluval Filter.
6. Run the free end of this flex-hose to the intake riser tube B2 inside the aquarium. Ensure the hose follows a straight path with some slack but no kinks or loops. You will need to cut the hose down to size with a utility knife, the remaining piece will be used to make the output connection so ensure you will have enough remaining after you make your cut.

**TIP:** First cut the 3m flex-hose in half to ensure you have equal lengths of hose for both the intake and output connections.

7. Attach the grey rubber gasket to the end. Secure the hose to the aquarium using the rim connector assembly while gently inserting the rubber gasket into intake riser tube B2.

8. With the remaining flex-hose push the factory finished end onto the output connector of the AquaStop Valve of the Fluval Filter, turn the lock nut counter clockwise until it is tight without forcing. Again, ensure this end is hanging in a position where it will be connected to the Fluval Filter (it will be connected to the filter canister in Step E).

9. Attach the grey rubber gasket to the free end of this hose and run through any necessary cabinet openings to inside the aquarium. Ensure the hose follows a straight path with some slack but no kinks or loops.

10. The output hose can be placed on either side of the AquaClear Powerhead. Secure the hose with a rim connector assembly. Secure the assembly by attaching the suction cup to the glass wall of the aquarium.

11. Take apart the intake strainer to remove the small plastic ball that sits inside the cage. Put back together

12. Add the intake strainer to the end of the hose that was just secured to the aquarium using the rigid plastic rod as a connector between the hose and the strainer. This rod will likely need to be custom cut with a hacksaw to ensure the strainer sits approximately 3 inches above the gravel. *Note that the intake strainer is not actually being used on the intake end of this system but rather attached to the output connection.

**NOTE:** You can also use the output nozzle for the end of the output connection but it is not necessary and may add to the flow of water being provided by the AquaClear Powerhead. An excessive flow may be too much for the small fish.

## Step E: Assemble the Fluval filter.

The carbon and biomax media supplied with your Fluval filter have been deliberately packed in the upper, mid, or lower level baskets. Be sure to place them back into these baskets for optimal basic filtration.

1. Load the filter canister by doing <u>all</u> of the following:
   a. Remove the foam, foam screen frame, media, baskets, and media cover from the filter canister.
   b. Remove their outer wrappers, but do not remove the carbon from its porous bag.
   c. Rinse all media and baskets with running water.
   d. Place the media in baskets, and the foam in foam screen frame.
   e. Place the baskets and foam screen back in the filter canister and put the cover on the top basket.
   f. Open the gasket bag and fit the gasket carefully into the channel around the base of the cover.
   g. Position the impeller cover over the impeller, aligning the shaft so it is seated in the ring on the cover and then pushing down around the edge until the tabs click into locked position.

h. Place the cover on the canister and lock the lid in place. Do not fill the canister with water.

2. Place the unit in its final position below the aquarium with a distance between the bottom of the canister and the maximum water level that does not exceed 4.5 ft. (1.4m).

## Step F: Add gravel.

The gravel will appear very dirty as you pour it out of the bag, with dust clouds billowing up. DO NOT RINSE THE GRAVEL: use it as is. The minerals in the gravel dust are important to establish the biofiltration system in your tank.

1. Spread 2 ½ ice cream buckets full of aquarium gravel over the undergravel filter plate so that the surface is smooth but sloped with the thickest covering at the Powerhead air pump end of the tank. This prevents alevins from burrowing under the gravel and filter plate, and increases the efficiency of the filter (uneven distribution creates 'short-circuits' in the water flow).

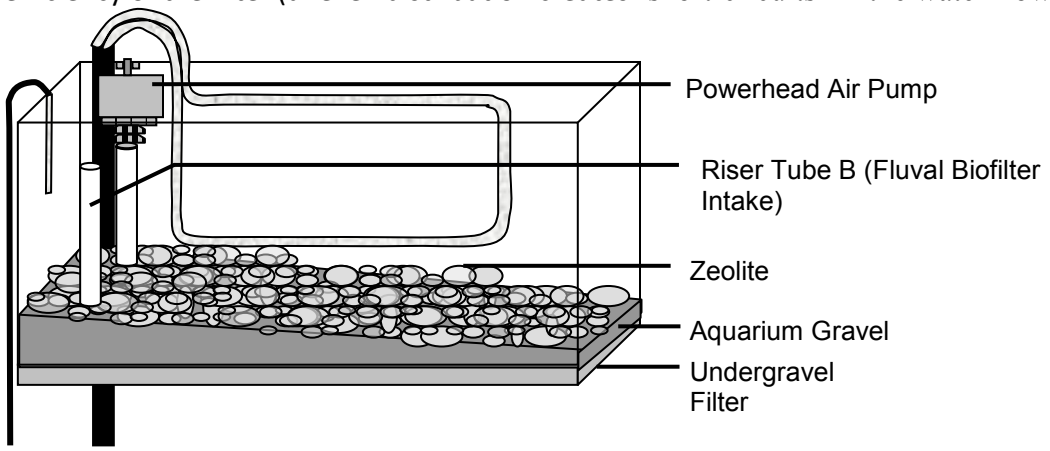



*Figure 7 Gravel Spreading and Placement within your Aquarium*

2. Pour an even layer of Zeolite gravel (2-3 rocks thick) over the aquarium gravel.
3. Fill the spaces between the glass sides of the aquarium, riser tubes and the undergravel filter plate with aquarium gravel, preventing alevins from burrowing underneath the filter plate and zeolite.

## Step G: Add Water and plug in the components.

1. Add water by doing all of the following:

    1. Fill the aquarium with cold tap water **only,** until the water just covers the outlet nozzle of the Powerhead Air Pump.

2. Measure the amount of water as you go, to determine how much Aqua Plus * to add.
3. Pour the water into the aquarium GENTLY so you do not scatter the gravel.
4. Add Aqua Plus per bottle instructions, at the rate to remove chloramine (25 ml at the start/aquarium filled with untreated water). Including the water that you added to immerse the undergravel filter in Step C, you will likely have poured 80 - 90L of water into your aquarium.

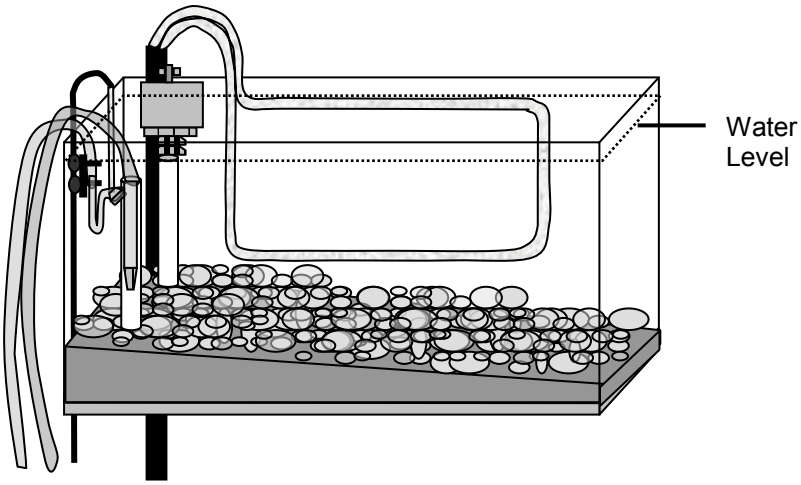



***Figure 8 Water Level in the Aquarium***

2. Connect the Powerhead Air Pump electrical plug to the power bar. You should see and hear a stream of bubbles from the outlet nozzle within 15 to 30 seconds. If not, add more water to the aquarium.

3. Aim the jet at the centre of the tank (the outlet swivels side to side, as well as up and down). During the egg stage, **a low water flow is imperative**. Using the flow control lever, adjust the Powerhead Air Pump as necessary.

4. Double-check the following items on the Chiller Unit (older system)(Oceanic system go to c & d):
    1. Make sure the heat exchanger coil is completely immersed.
    2. Push the temperature sensor to the bottom of the stainless steel well (i.e., below the water level) and ensure no water is **inside** the stainless steel well. If your temperature probe is encased in a tube with suction cups, position it halfway down the inside side wall of the aquarium.
    3. Connect the Chiller Unit electrical plug to the power bar.
    4. Set the thermostat for 10$^{o}$C (50$^{o}$F)

5. Start your filter by doing <u>all</u> of the following:
    a. Insert the AquaStop valve into the intake and output connectors on the cover.
    b. Push the silver lever all the way down to lock it in place.
    c. Open the AquaStop valve by pushing the black lever all the way down. The valve must be fully open before the filter is turned on or primed to let air escape as the canister fills with water, causing the water to bubble.
    d. Check all the connections and make sure the intake assembly and output nozzle are both fully submersed in water.
    e. Pump the instant prime handle until you hear water being drawn in
    f. Return the handle to the down position.

g. Wait until the bubbling in the tank stops, which means the air is out (gently rock the filter to ensure air is out) of the system and the canister is full: You can now plug in the filter. The pump starts immediately. Note: If this is not working close the filter by pulling the black lever up, prime the tank using the grey priming handle, fill the water intake hose

## Step H: Prevent power loss.

Ensure that all electrical connections are snug and will not loosen with a simple tug. Advise custodians, maintenance personnel and even the students about the importance of continuous power to the unit. A battery backup or power supply unit is recommended if one is available.

## Step I: Install protective covers.

1. If you are adding an aquarium background on the outside of the tank you must secure it first with tape. Next, secure Styrofoam blocks to the tank with wide clear duct tape. Cut notches where necessary (i.e for System B) so that the jacket fits snugly.
2. Place the black coroplast cover provided on top of the aquarium, cutting notches where necessary.

**NOTE:** Covering the edges of the Styrofoam jacket with duct tape will make it last longer. The jacket can be decorated with non-water soluble paints, if you wish.

# Part 2 - The Biofilter

## What is the Biofilter?

Your Fluval biofilter starts when you plug in your system, but you do not start growing bacteria in your biological filter system until just after your eggs hatch at 400 ATUs.

The biological filter system has two main parts:

1. gravel filter: made up of the aquarium gravel, zeolite gravel, and undergravel filter
2. Fluval biofilter: The system's Powerhead air pump moves water through the aquarium gravel, zeolite gravel, and undergravel filter. The Fluval biofilter motor circulates water through the carbon, ammonia remover and BioMax beads inside the Fluval unit.

The biological filter system carries out some of the most important biochemical processes that happen in a closed-system aquarium incubator, which includes hosting bacteria that convert fish waste products into less toxic forms. Being made up of living organisms, the biofilter community needs oxygen and food. The Powerhead air pump (and spray bar on the Fluval 105/305) provides this oxygen, while you initially provide food for the biofilter community. Later, as your fish begin to eat and produce waste products, the biofilter bacteria will use the fish waste products for food.

The filter system also controls the levels of ammonia ($NH_3$), a naturally occurring but harmful by-product of protein breakdown. Within your aquarium, ammonia is produced by fish urination, defecation, and respiration, and the breakdown of excess food. Ammonia levels are controlled by nitrification: a process that converts $NH_3$ to $NO_3$ (nitrate), which is less toxic to fish, releases hydrogen ions, and acidifies the water (lowers pH). The two main bacterial species active in this process are *Nitrosomonas spp*. and *Nitrobacter spp.*

## Starting and Maintaining the Biofilter

The following steps are essential to starting and nurturing your biofilter bacterial community

1. Several days after the eggs hatch (400 ATUs at 10$^{o}$C), add Cycle (55ml) at the "New Aquarium Installation" rate to the aquarium water to start the biofilter. There is 90 L of water in your tank.
2. Once you have added Cycle to the aquarium, you should **feed your biofilter** a pinch of fish food once a day to maintain the bacteria. You will feed your biofilter for about the next 14 days, or until you begin feeding the fish (at that point, the biofilter will begin to feed on the fish waste products).
3. 400–500 ATUs: Continue adding Cycle weekly to the aquarium water according to the "New Aquarium Installation" instructions on the bottle.
4. 500–530 ATUs: Begin water changes twice a week. To maintain the biofilter, pour 10ml of Cycle into the aquarium every time you remove water from it.

5. **Do not disturb** the gravel once you have established your biofilter.

NOTE: You must store Cycle in the refrigerator after opening, or the bacteria within will die. Cycle is bacteria in a bottle, providing the initial bacteria needed to start your biological filtration system, namely *Nitrobacter* and *Nitrosomonas.*

# Part 3 - Care and Feeding

## Daily Monitoring Checklist

Complete this checklist every day along with the activities on the following pages appropriate to each developmental stage.

- ❑ Check the ATU Monitoring Development Chart for observable moments (e.g. fish hatching) **or** teacher interventions (e.g. feed changes).
- ❑ Turn off fluorescent lights in the classroom.
- ❑ Remove the top and front of the aquarium Styrofoam jacket.
- ❑ Immerse the thermometer in the aquarium water for 1 minute. Record the temperature and calculate the ATUs on the ATU Calculation Chart
- ❑ Ensure that the chiller unit is plugged in, the thermostat set at 10°C, and the temperature sensor pushed down into the DRY stainless steel well or attached to the aquarium side wall.
- ❑ Ensure that the Powerhead air pump is pumping at an appropriate rate for the fish life stage and is also aerating water.
- ❑ Check that water is flowing out of the directional output nozzle on the Fluval biofilter.
- ❑ Check water level in the aquarium and top up as necessary **with Aqua Plus treated water** (treat at the chloramine removal rate; remember to store Aqua Plus in the fridge) to replace loss from evaporation.
- ❑ Replace the aquarium Styrofoam jacket before turning on the lights.

**NOTE:** Explain to your students and your custodian how important fluorescent lights and continuous operation are to the aquarium chiller, circulation and filtration systems.

## Monitoring the Development of Your Fish

In January, you will receive eyed rainbow trout eggs, delivered to your school by your School Advisor and/or the Fisheries representative.

When the eggs are delivered, insert the tank thermometer into the thermos to verify that the temperature difference between the egg container and the aquarium water is **no more than 2°C**. If it is more than 2°C, equalize temperatures before putting the eggs into the egg basket. You can simply do this by pouring the eggs & water from the thermos into a ziploc bag and immersing it into the aquarium to equalize temperatures before putting the eggs directly into the egg basket.

These **eyed eggs** will hatch into **alevins** at 300–350 ATUs in 8 to 16 days, depending on the number of ATUs at the time of egg delivery. Approximately 40 days after receiving your eggs, the rainbow trout will "swim up" over a period of three to four days as **fry,** ready to eat and grow. Their healthy growth depends on your careful monitoring of their development.

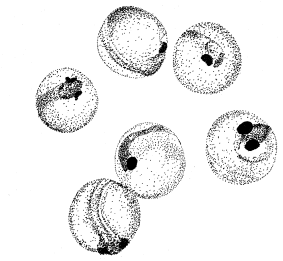
## Eggs

When you receive the eggs, begin charting the ATUs using the ATU Chart.
To learn more about ATUs, read What Are ATUs?

Of the eggs received, it is normal for a few to die. Dead eggs turn milky-white and begin to decay. At 300 ATUs, you should carefully remove any dead eggs to avoid spreading fungus to other eggs. Use a spoon or tweezers with your dip net. Try not to disturb any neighbouring eggs, as they are quite sensitive to shock. Record any mortality on the ATU Calculation Chart.

Needs

- No food or water changes
- 10°C water temperature: avoid temperature changes
- Slow water flow from the Powerhead air pump (not rocking and jarring the egg basket; adjust using the flow control lever on the Powerhead.
- pH between 6.5 and 9.5
- Protection from any physical shock or jarring
- Protection from any sunlight or fluorescent light



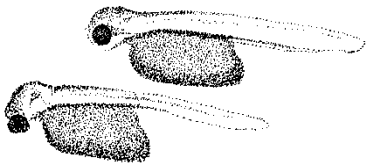
*Rainbow Trout Eggs (magnified 2x)*

## Alevin

Approximately ten days (430–450 ATUs) after all your eggs have hatched, empty your egg basket into the tank. The alevins will swim into the protective spaces in the gravel, remaining there until their yolk sacs are consumed (they will not feed at this stage). Don't be concerned when the alevins "dive" for cover in the protective spaces in the gravel. This is normal behavior for newly hatched trout seeking protection from light and predators.

Needs

- No food (but begin to feed your biofilter)
- No water changes
- 10°C water temperature: Avoid temperature fluctuation.
- Slow to medium water flow from the Powerhead air pump
- 6.5 to 9.5 pH
- Protection from any physical shock or jarring
- Protection from any sunlight or fluorescent light
- No more than two 20-minute viewing times/day
  Remember to turn off classroom lights.



*Rainbow Trout Alevins (magnified 4x)*

## Fry

As alevins begin to "swim up," gradually increase the time that the front Styrofoam jacket is removed (by 2 hours/day), until it is permanently removed. This allows your fry to adapt to day/night changes in light. Exposure to fluorescent light is not a concern at the fry stage.

Leave the Styrofoam jacket around all other aquarium sides to keep the temperature cool. The fry will avoid light and movement at first, but will soon grow accustomed to your classroom. Remember to turn off the lights after school so that they can experience the darkness of night.

After 75% of your fry have emerged or "swum up" (550–570 ATUs), begin your feeding program (as described in Feeding Your Fry) and continue regular water changes.

**Observe your fry carefully!** Changes in feeding or swimming behavior may indicate deteriorating water quality. Potential problems with water quality may be evident from erratic swimming behavior or unusual movement of your fry.

*Rainbow Trout Fry (magnified 2x)*

- The right **amount** and **type** of feed, as described in Feeding Schedule Chart and Feeding Your Fry. Overfeeding your fry is the most common water quality problem.
- Two water changes per week, as described in Water Changes.
- 10°C water temperature: avoid temperature fluctuation.
- Medium to ¾ water flow from the Powerhead air pump.
- 6.5 to 9.5 pH: When you start using the Second Feed, check the pH daily.
- Protection from any physical shock or jarring
- Classroom lights turned off at night to simulate night conditions.

## What Are ATU's?

Rainbow trout are cold-blooded organisms, which means their rate of development is mostly determined by water temperature. Warmer water causes more rapid development; cooler water slows development. The ideal temperature for your project is **10°C**.

You can predict when the eggs will hatch and when the alevins will be free swimming by recording Accumulated Thermal Units (ATUs). Using the ATU Monitoring Development Chart for activities such as growing your biofilter bacterial community or changing the quantity of fish food is a key part of monitoring and ensuring the healthy development of your trout.

## Calculating and Recording ATUs

1. When your eggs arrive, record the date and accumulated ATUs on the ATU Calculation Chart. Your Fisheries representative or project advisor will provide this data.
2. Use the immersible thermometer to measure the water temperature of your aquarium the following day. Record the date and temperature in degrees Celsius. Add this number to the previous day's ATU value. Each Celsius degree is equal to one accumulated thermal unit.
3. Add the temperature each day to the sum of the readings from the preceding days. For example, if your water temperature is 10°C each day, then 10 ATUs are added to the accumulated total each day.

| Date | Temperature (°C) | ATUs |
|---|---|---|
| Feb. 5 | | 170 |
| Feb. 6 | 10 | 180 |
| Feb. 7 | 10 | 190 |

| | | |
|---|---|---|
| Feb. 8 | 10 | 200 |
| Feb. 9 | 9 | 209 |

ATU calculation chart example

4. Use your ATU Monitorir rvable moments and teacher interventions with your class during the development of your rainbow trout.

**NOTE:** Cold water (10°C) is imperative for your aquarium unit to work properly. As water temperature increases, so does a salmonid's metabolic rate; as metabolism increases, so does fecal production; increased fecal production strains the biofiltration system and decreases the amount of dissolved oxygen available.

## ATU Monitoring Development Chart

| ATUs | Date | Observable Moment (OM) or Teacher Intervention (TI) |
|---|---|---|
| 200 | | Receive Eggs |
| 230-250 | | OM: Well eyed |
| 320 – 330 | | OM: First hatching<br>TI: Remove and discard dead whitish eggs, and record mortalities on the ATU Calculation Chart. |
| 360-380 | | OM: All hatched |
| 400 – 410 | | TI: Add Cycle to aquarium to start bacterial community growth in gravel and Fluval Biofilter. Feed biofilter one pinch of food daily for next 14 days. |
| 430 – 450 | | TI: Empty egg basket. Alevins swim to bottom. |
| 500 – 530 | | TI: Start water changes every Tuesday and Friday |
| 550 – 570 | | OM: Fry swim up to begin feeding.<br>TI: Begin feeding schedule after 75% have swum up (Starter Feed).<br>TI: Record ATUs at 75% 'swim up' on the Feeding Schedule Chart. |

| | | |
|---|---|---|
| Approximately 770 | | TI: Switch to next feed, as described in the Feeding Schedule Chart.<br>TI: Begin testing pH daily.<br>TI: Adjust the Fluval biofilter, as described in Biofilter Adjustments. |

## Feeding Schedule

The total amounts of First, Second and Third Feed have been pre-measured for the *FinS* Project (Table 1), and should last until your fry are released in early June. The daily feed amount (total grams/day) is calculated so that your fish will grow at a certain rate. This will give them a good chance for survival when released and will make it easier to maintain them in your aquarium.

Table 1. FinS feed calculations for 50 fish.

| ATU's | Week | Feed Amount (grams/week) | Feed Amount (grams/day) | Approximate tsp/day | Feed Size |
|---|---|---|---|---|---|
| 550 – 620 | 1 | 3 | 0.43 | < ¼ tsp | #1 (0.5) |
| 620 – 690 | 2 | 4 | 0.57 | = ¼ tsp | #1 (0.5) |
| 690 – 760 | 3 | 6 | 0.86 | < ½ tsp | #1 (0.5) |
| 760 – 830 | 4 | 7 | 1.00 | = ½ tsp | #1 (0.5) |
| 830 – 900 | 5 | 8 | 1.14 | = ½ tsp | #2 (0.7) |
| 900 – 970 | 6 | 10 | 1.43 | < ¾ tsp | #2 (0.7) |
| 970 – 1040 | 7 | 11 | 1.57 | = ¾ tsp | #2 (0.7) |
| 1040 – 1110 | 8 | 13 | 1.86 | > ¾ tsp | #2 (0.7) |
| 1110 – 1180 | 9 | 15 | 2.14 | = 1 tsp | #2 (0.7) |
| 1180 – 1250 | 10 | 18 | 2.57 | = 1 tsp | #3 (No. 2) |
| 1250 – 1310 | 11 | 20 | 2.86 | > 1 tsp | #3 (No. 2) |
| 1310 – 1380 | 12 | 22 | 3.14 | = 1 ¼ tsp | #3 (No. 2) |
| 1380 – 1450 | 13 | 25 | 3.57 | = 1 ½ tsp | #3 (No. 2) |
| 1450 – 1520 | 14 | 28 | 4.00 | < 1 ¾ tsp | #3 (No. 2) |
| 1520 – 1590 | 15 | 31 | 4.43 | = 1 ¾ tsp | #3 (No. 2) |
| 1590 – 1660 | 16 | 34 | 4.86 | < 2 tsp | #3 (No. 2) |

*Note – because it is not likely you can measure the feed to two decimal places refer to this column to indicate an amount in relation to a teaspoon. These amounts are not exact so please consider this as a guideline only.

**When to start feeding:**

Do not begin feeding your fish until most of your alevins have "swum up," having absorbed their yolk sacs completely. The fry will rise from the gravel and begin swimming about, looking for food. When at least 75% of your fry are free-swimming you should begin feeding them. Table 1 provides starting indicator points (ATU's & # of weeks) and specifies how much and what kind of feed the fry should receive.

**Quantities:**

Many feedings of a small amount of food are much better than a lot of food over a few intervals (small fish have small stomachs and can only eat a little at a time). Optimally, you should try to spread the daily ration into 4 – 6 feedings, several hours apart. When feeding, grind the food finely between your fingers, and sprinkle it over the water surface with a minimum amount of arm movement (if the fry are startled they will not eat immediately). Only feed as much as the fry will eat. If the fish are not eating the entire daily ration then you may need to lower the quantity.

**Do not overfeed!** It is better to keep them a little hungry and attacking the food rather than having the food reach the bottom of your tank and creating additional waste by-products. Evidence of overfeeding can include murky waters and/or extra waste hanging from the fish.

**Weekends:**

On a regular weekend, feed your fish before you leave and as soon as you return. The fish can survive without feed for the weekend. During holiday weekends when there is an extra day (or more) away from the fish, ensure that you make arrangements to feed them during that time.

**Adjustments:**

When mortalities occur you will need to take these into account as the chart above is calculated for 50 surviving fish. If significant amounts of fish die, you should correct your feeding rate by subtracting a percentage of the total feed to ensure that you do not overfeed.

**For example**: If you suffer a 20%, or 0.20 mortality rate,

Multiply the total grams/day by 20%

2.0 grams/day X 0.20 = 0.40

Then subtract this number from the original total grams/day.

2.0 grams/day – 0.40 = 1.6 grams/day

Therefore the new daily ration, factoring in a 20% mortality rate would be:

**1.6 grams/day**

**Food storage:**

The food you receive contains a high percentage of fat and therefore **should be kept refrigerated**, except for the daily rations.

*Once you have switched over to the 2nd feed you can begin pH testing!*

## Water Changes

To change the water, you need four clean ice cream buckets (approximately four litres or a gallon each), Aqua Plus, and Cycle. You will remove two buckets of water twice a week (two buckets on Tuesday and two on Friday) and replace each bucket of water with the same amount of Aqua Plus treated water to reduce the impact on the aquarium's biofilter.

1. Begin your water changes approximately two weeks after your eggs hatch (500 to 530 ATUs at 10$^{o}$C).
2. Remove two ice cream buckets of water from the aquarium. Do not disconnect the Powerhead air pump, refrigeration unit, or Fluval biofilter.
3. Pour in two Aqua Plus treated buckets of water that have been sitting since the last water change. Do not disturb the gravel or the fish.

NOTE: If this is your first water change, fill two buckets with tap water and add 5ml of Aqua Plus to each, letting the buckets sit for a minimum of 15 minutes before

4. Add 2 capfuls of Cycle to the water in the aquarium.
5. Add a capful of household bleach to each bucket of wastewater you just removed from the aquarium; let it sit for 10 minutes, then pour it down the drain. **Sterilizing your wastewater with chlorine is a requirement of your Fish Research License to prevent the spread of any diseases**. Rinse out the wastewater buckets.
6. Fill two buckets with tap water and add 5ml of Aqua Plus to each. Let the buckets sit in a safe place until the next water change.

Label the buckets with “Wastewater” and “Treated Water”.

## Media Replacement

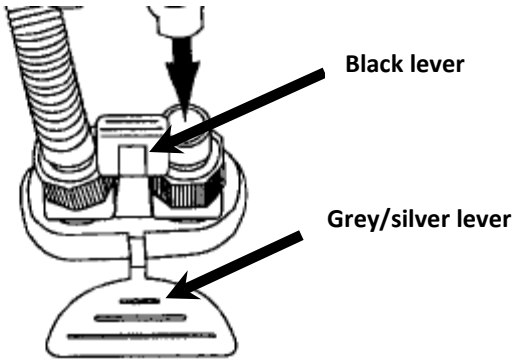
The following steps identify steps to perform a media change mid-project. The media change should occur when Fry have reached ~ 1000 ATU’s (usually at the beginning of April). The media change is essential to maintain water quality as some of the media products (carbon and ammonia remover) have a maximum capacity and will no longer help clean the water once this capacity is reached.

**Preparation and removing the Fluval Filter**

1. Prepare materials and supplies. Get the media replacements (ammonia remover & carbon) ready. The mesh media bags need to be taken out of the plastic bags and should be rinsed or placed in water while you are preparing the other supplies. It is a good idea (not necessary) to have some towels or rags (for spillage) and a

bucket/tub to hold different components while you are replacing the media. A small flat dishwashing tub is a good option. You may also need some extra water (4-5 litres) to top up your aquarium when this task is completed. Get it ready by treating it with some Aqua Plus.

2. Unplug the Aqua Clear Powerhead unit (aerator).
3. Close the AquaStop valve on the Fluval Filter by closing the black lever located on top of the unit (see image below). There are some markings to help identify the closed position (lever lifted to the top is closed). This seals the hosing connections and maintains the vacuum that is necessary to restart the system without priming. NOTE that if this lever is not closed the water will continue to flow out AquaStop valve (onto the floor).




4. Unlock or release the AquaStop valve by lifting up the grey/silver release lever. This will then allow you to pull out the AquaStop valve head. Note that the filter canister is filled with water and may spill if the canister is tipped over while doing this task.
5. Take away the Fluval Filter canister and empty some of the water by tipping it over a sink or drain. Once some of the water has been removed it is safe to unlock the side lift-lock clamps to release the cover from the canister.

**Replace the media**

6. Push down on the clamps to help lift the cover off of the canister. DO NOT pry off the cover, this will damage the cover/canister and you may not get a tight seal again.
7. With the cover off, and minimal water in the canister, lift out the media baskets. If the filter screen is also inside the canister remove it for cleaning purposes. Place the baskets into a bucket/tub or sink.
8. Rinse out the canister and the foam screen with clean WATER ONLY. Try to use dechlorinated tap water on the foam screen.
9. Replace the used media components (ammonia remover and carbon) with the new media that was prepared earlier (rinsed off). If you are replacing some of the Biomax only replace 1 bag. If you only have one bag already inside then do not remove this bag – it contains beneficial bacteria that you do not want to remove. Throw out any used media.
10. Replace the foam screen (if you are using it).

11. Inspect and lubricate the gasket if needed. Clean off the impeller cover area if needed.

**Reassemble the filter**

12. Ensure the canister is almost but not completely full with water. Use the treated water that was prepared earlier. Note that the manual that comes with the Fluval Filter states that you should not fill the canister with water however it is much easier to get the water flowing again if it has some water already inside.
13. Replace the cover and lock the side clamps. You will need to align the “MSF” logo on the front side of the canister to do so.
14. Put the filter back into place under or near the aquarium. Re-insert the AquaStop valve and lock into place (grey/silver lever down).
15. Push down the black lever to open the AquaStop valve. You should start to hear the water start to flow and see some bubbling from the hosing that leads into the aquarium.
16. Plug the Fluval Filter back in. You may need to give the canister a few shakes to ensure all of the air bubbles have exited the system.
17. Ensure that the water level in the aquarium is level with the nozzle of the Aqua Clear Powerhead (aerator). You may need to use some of the treated water that was prepared earlier in Step 1.
18. Plug in the Aqua Clear Powerhead (aerator).
19. Monitor the system closely for the next while (30 min – 1 hour) to check for any water leakage.

# Part 4 – Release Event

## Releasing Your Fry

When your project advisor and Fisheries representative visit your classroom in mid-March, they will inform you and your class of the site chosen for the release of your fry. You might want to coordinate a release date at this time as well. This will allow you to begin to plan the events of your release day (e.g. transportation of students and fish to release site, water quality and invertebrate sampling activities on-site). Your fry should be about 4 cm long at the time of release. Their growth has been calculated so that lake temperatures and food availability are optimal for the survival of your fry as they leave the aquarium.

## Pre-Release Checklist

- ❑ Confirmation of attendance by Fisheries representative and project advisor
- ❑ Transportation
- ❑ Parent permission forms
- ❑ School approval of fieldtrip
- ❑ Press release: Coordinate with Coordinating Team
- ❑ Release equipment organized:
  - 4 large (23 L) buckets for transporting fish (lids should have holes drilled in them)
  - 4 (or more) ice cream buckets
  - thermometer(s)
  - dip net(s)
  - one Ziploc bag per student
  - water quality test kits (optional)
- ❑ Timetable for the day organized (time to catch fish, travel time, acclimatization time, choosing a micro-site, releasing the fish, celebrating)
- ❑ Printed copy of the final project report.

# Part 5 – Disassembling and Cleaning the Aquarium

The cleanup, disinfection and storage of your *FinS* unit are important to ensure a healthy, disease free environment for future eggs and fish. Attention to the little details now will avoid expensive repairs or maintenance next year.

Your *FinS* unit should be drained and thoroughly cleaned immediately after the release of fish in the spring. Stagnant water, if left in the unit, will soon start to smell and become an excellent medium for bacterial growth.

Please keep the following principles in mind as you begin the cleanup and disinfection process.

1. Disinfectants work only on a clean surface. You cannot disinfect dirt!
2. All disinfectants have a specific contact time to destroy target organisms. Ensure the equipment is **submerged** in the disinfectant for the specified time.
3. All disinfectants, especially chlorine, are corrosive and will damage equipment if used at inappropriate concentrations or if left too long. Measure all amounts carefully and be sure all surfaces are thoroughly rinsed after the specified contact time.
4. Because many fish diseases are waterborne (i.e. passed from fish to fish through the water), it is important to disinfect all components of your unit that have been wet. For example, buckets, dip net, thermometer, aquarium, undergravel filter, Zeolite gravel, etc.
5. All disinfectants should be handled with caution, using appropriate hand and eye protection to prevent personal injury.

## Equipment and supplies

You will need the following supplies before you start the cleanup process:

- all-purpose cleaner with a degreasing/disinfecting agent (e.g. Mr. Clean with bleach). Do not use soap or detergent as these leave residues in your tank which are harmful to fish.
- glass cleaner (e.g. vinegar and water)
- household bleach (e.g. Javex or Chlorox, usually found in a 3% or 5% concentration of sodium hypochlorite)*
- disposable wipes (paper towels or J-cloths)
- cleaning cloths/rags

- rubber or disposable gloves
- measuring cup
- 2-3 pails (20L) with handles
- additional tubs (dishwashing type) are helpful
- a short length of hose (2 metres) for a siphon and a siphon bulb (e.g. Fluval Starter bulb) or a gravel cleaner.
- scrub brush and 2 test tube brushes (1 thick and 1 thin; long handles are helpful.
- Sieve (to assist in removing and/or cleaning gravel)

*Note – if you are using a stronger or weaker concentration of bleach your disinfection solution may vary. Commercial grade bleach can be greater than or equal to 12% sodium hypochlorite. Your solution must equal 300 ppm of chlorine which will depend on the strength of your bleach. See examples below:

Low grade:

3% sodium hypochlorite bleach - use 10 ml of bleach for every 1L H20

Household grade:

5% sodium hypochlorite bleach – use 6 ml of bleach for every 1L H20

Commercial/Industrial grade:

12% sodium hypochlorite bleach – use 2.5 ml of bleach for every 1L H20

## Step A: Disassembling and cleanup (System A and B)

1. Unplug the chiller unit, Powerhead air pump and Fluval filter. Remove the air pump and set aside. If you are using an older custom chiller, leave the heat exchange coil in the aquarium until the aquarium has been emptied.
2. Using two of your pails with handles, siphon water from your aquarium into the pails. For a 20L pail add 120 mL of undiluted household grade bleach to the pail, mix and let sit for 10 minutes then pour down the drain. Repeat until the aquarium is empty. This procedure is mandatory to meet the terms of your *Fish Research License*.
3. Remove the Zeolite gravel (large white rocks) from the aquarium. Thoroughly rinse the rocks in a pail of clean water. Disinfect with household grade bleach (6ml for every 1L H20). Let sit for 30 minutes then discard water. Rinse off zeolite with clean water, let sit for 30 minutes. Lay rocks flat to dry for 48 hours. If you let the rocks dry in sunlight this will help regenerate the zeolite.

NOTE: Do not throw out Zeolite: you can reuse it indefinitely. The only exception is a disease/fungus outbreak in your aquarium, which case all the gravel and zeolite should be sterilized and thrown out.

4. Remove the aquarium gravel (small rocks) from the aquarium and divide into two 20L pails then fill with enough water to cover the gravel.
    a. If you are using grit #2 you must discard the gravel. Add enough bleach as suggested in the 'Note' above, stir and let sit for 10 minutes. Pour the water down the drain and discard the gravel. This gravel **cannot** be adequately cleaned and must be **replaced annually**.
    b. If you are using standard aquarium gravel you can clean, disinfect and reuse it (unless there has been a disease/fungus outbreak). Add a vinegar solution and let sit for a few minutes. Stir and agitate (using a brush is ideal) to loosen any organic materials. Pour the water down the drain. Rinse and repeat until most of the organic materials have been removed. Once the gravel is completely rinsed then add enough bleach as suggested in the 'Note' above. Stir and let sit for 10 minutes. Pour excess water down the drain. Using a sieve collect the gravel from the bucket and lay flat onto a protected area (clean garbage bag with paper towels to soak up any additional water). Let the gravel dry for up to 48 hours. Aquarium gravel should only be reused up to 3 times then new gravel should be purchased. It is important that the gravel be rinsed well and left to dry out completely.
5. Disassemble all components (e.g. pull the rubber elbow off the spray bar and scrub both pieces separately) since fish waste finds its way into every nook and cranny. Remove and scrub (with cleaner) your undergravel filter, tube mounts, riser tubes, spray bar, rubber elbows, Fluval intake/output hoses, and Fluval intake stem and strainer. Rinse well with clean water.
6. Place the aquarium on the floor or on a lower surface so that it is easy to clean. It is also handy to clean near a utility drain (usually found in utililty or custodial rooms/closets). If you are using an older chiller unit, make sure you slide the empty aquarium carefully out from under the heat exchange coil to move. Be careful not to kink the black tubing.
7. Clean the aquarium thoroughly with an all-purpose cleaner, rinse out the grime, and then use a vinegar and water solution to finish the job. The heat exchange coil should also be cleaned.
8. Clean off any visible grime from the external surfaces of the Powerhead air pump, thermometer, dip net and stainless steel well (which holds the temperature sensor for the custom chiller).

9. Disassemble the Fluval filter (it is best to do this in a flat square tub or sink as water may leak onto the floor). Throw out the filter media (bio-max beads, charcoal, ammonia remover). If a sponge was used then it should also be thrown out. In recent filter models a reusable sponge is provided however it should not be reused (a sponge filter is not required in these systems). Add a capful of bleach to the water in the filter canister and let sit for 10 minutes to treat the water. Pour the water down the drain and rinse the canister with clean water. Do not use cleaning agents on the canister however you can let it sit in a warm solution of water and vinegar then scrub the inside components. You may also use the vinegar solution to clean other parts of the Fluval filter including the rubber elbows, intake/output hoses, intake stem and strainer, and the top components of the filter canister. Be sure to remove the impeller cover for thorough cleaning with a brush and that you also clean around the rubber gasket.

## Step B: Disinfection

### System A - Oceanic Chiller Unit

Once all wet parts of your FinS unit are cleaned then they must be disinfected with a 300 ppm chlorine solution (bleach recommendations are found in '*Note' above). In order to disinfect the Ocean Chiller unit the system will be started and continue to run for 3 hours to disinfect the internal components.

1. Set up the complete system in order to have water run through the system again. Place the undergravel filter in the bottom.

2. Add water to fill the aquarium. Start the flow of water.

3. Once flow has been established add 700 ml of household grade bleach to the system (for a 28 gallon aquarium).

4. Add thermometer, dip net, and any other used components into the aquarium for 30 minutes then remove, rinse with clean water and let air dry.

5. Allow the system to run for 3 hours.

6. Have two, preferably three 20 L pails (with handles) ready to collect and dispose the water. An additional person to assist will allow this part to run more smoothly and much faster.

7. Turn off any power sources if applicable. You are going to collect the water out of the system simply by utilizing the existing flow of water. Simply take the hose with the

water output (water being directed back into the aquarium) and place into an empty pail. When the pail becomes full then move the output hose into another pail to collect more water or back into the aquarium if you need more time (if you are working alone). Empty the first pail and return to collect more of the waste water. Your disposal drain needs to be close by if this system of removing the water is going to work efficiently.

8. Continue to fill the pails and dispose of the water until the aquarium has been emptied.

9. Disassemble components and let air dry. Be sure to empty the excess water from the Fluval filter and let it dry as well. Remove all hoses, let dry. There will be water that you can pour out from the Oceanic Chiller. If the chiller is tilted at an angle it will not damage it however you must not operate it immediately afterwards (a few hours of sitting upright is recommended). Leave the caps off of the hose outlets in order to let any internal water evaporate.

### System B - Custom Chiller Unit

Once all wet parts of your *FinS* unit are cleaned, you disinfect them with the recommended amount of bleach (see Note above). This solution must remain in contact with the equipment for 30 minutes. Ensure all equipment is thoroughly rinsed with clean water after disinfection.

1. Set up the undergravel filter, tube mounts, riser tubes and heat exchange coil in the aquarium.
2. Fill the aquarium to the top with clean tap water.
3. Add 200 mL of undiluted bleach to the water in the aquarium, immerse remaining submersible equipment (i.e. dip net, stainless steel well, thermometer) in the aquarium and let stand for 30 minutes.
4. Siphon water out of the aquarium with a siphon starter bulb and then use the aquarium water to rinse out any remaining buckets, pails, etc., to disinfect them.
5. Rinse all disinfected components, aquarium, buckets, etc., with clean tap water.

## Step C: Storage

All components of your *FinS* unit should be completely dry before storage. The unit can be left ready to set up if the unit will be stored in a secure, warm environment otherwise all components should be packed up into their original packaging or other storage container. If the system will be left partially set up, ensure that the aquarium is covered as well as all of the components (items can be put away into cabinet or kept in the aquarium and covered).

# Part 6 – Troubleshooting

Your fish tank is a complicated mini-ecosystem with many parts so inevitably things will occasionally go awry. As a result we've compiled a list of common maladies that may occur with your tank, and possible solutions. As always, if you're unsure as to how to how to respond to a condition you are welcome to contact your school advisor.

**Fish behaviour and condition(s)**

1. *Fish turning dark in colour*
    - Dark colours are often brought about by ammonia burns from the increased levels of ammonia from fish waste/uneaten food.
    - Check the ammonia levels. If they are high do a water change immediately.
2. *Fish sitting at the bottom of the tank*
    - Another indication of high ammonia/nitrite levels from fish waste and decomposing uneaten food
    - Check the ammonia levels. If they are high do a water change immediately.
    - Inactivity may also be a sign of ill health so check for signs of fungus or bacterial growth on body. If growths are apparent please proceed to appropriate section below.
3. *Fish gulping for air at the surface*
    - This is generally an indication that the fish are not getting enough oxygen
    - Ammonia and nitrites can make it difficult to extract oxygen from the water. As a result, double check the ammonia levels and make water changes if necessary.
    - Double check the powerhead aerator to confirm it is working
4. *Fish with white growth(s) or fuzzy appearance*
    - Fin rot or water mould, which are caused by fungi or bacteria
    - The affected fish should be treated or removed.
    - For treatment isolate the affected fish, and treat the water with either salt (about 1 $g/cm^3$) or a specific medicine from a pet retailer
5. *Fish with excessive waste hanging from body*
    - Fish that are producing prodigious amounts of waste are very likely being fed too much (i.e. what goes in must come out)
    - Too much food can have other effects as it decomposes such as increasing ammonia and affecting general water quality.
6. *Fish swimming in circles, sideways, or upside down*
    - These behaviours are indicative of a swim bladder disorder or another disease.
    - Many swim bladder issues are caused by constipation, which can be remedied by reducing your feeding for 3-4 days and giving your fish a frozen pea to eat (skin removed)

- These issues can be exacerbated by poor water quality so make a water change and test ammonia levels accordingly

7. *Fish with obvious reddened gills*
    - Another readily apparent sign of an ammonia spike
    - Check ammonia levels. If they are high do a water change immediately

**Water Condition(s)**

1. *Water appears tinged green/yellow*
    - Often discolouration is caused by dissolved organic compounds. These are compounds that have broken off of decaying plant or animal material (i.e. waste and leftover food), and are suspended in the water.
    - If the tank has lots of uneaten food, decayed plants, or possibly a dead fish, it needs some cleanup. Likewise, if the water is foamy, or foams when shaken, there are plenty of dissolved organics in the water. In this case, the best course of action is to clean things up. That means removing all decaying materials. Vacuum the gravel and make sure the filter is running at normal output. If the filter is slow, odds are it's clogged with debris, which is another potential source of organics.
    - Please note that if you need to clean the tank to stagger your cleaning regimen to give your fish and beneficial bacteria colonies the chance to recover.
2. *Water is murky/cloudy*
    - Your water will have a murky appearance when water is first added until all of the sediments settle to the bottom.
    - Another issue may be residual phophates or heavy metals that will cause the pH to increase. If the pH is found to be high, treat the water with conditioner and it should solve the problem.
    - If neither of these options resolves the situation it may be a bacterial bloom. It takes time for the bacteria in the tank to create its cycle, so it’s not abnormal for cloudy water to correct itself. These blooms are also often caused by excessive organic waste meaning that removing the waste, doing regular water changes, and reducing feedings will all help to alleviate the situation.
3. *Water pH is reading outside range of 6.5 – 9*
    - It is important to note that pH can have a wide range of variation, and fish are remarkably adaptable. Before taking drastic actions consider how your fish are behaving and whether it is absolutely necessary to make changes.
    - pH tends to exist in an equilibrium so micromanaging it can cause huge fluctuations to occur afterwards. As a result avoid chemical pH treatments as much as possible. Fish (and the biofilter) adjust best to slow changes, and making hard adjustments to pH can have dire consequences.

- It's also important to note that different water sources for different communities will have a different pH based on the amount of dissolved minerals and ions, and that if your pH is noticeably different than someone else from somewhere else
- By maintaining your water change schedule and removing any waste material your tank should maintain a constant pH
- If you feel a pH change is necessary you can slowly decrease the pH by adding a piece of driftwood to the tank or some peat to the filter (note that both of these may stain your water yellow or brown). If your pH needs to be increased you can add a shell or coral skeleton. All of these options won't change the pH overnight, but rather add buffers that slowly alter it.

**Equipment Failure/Noise(s)**

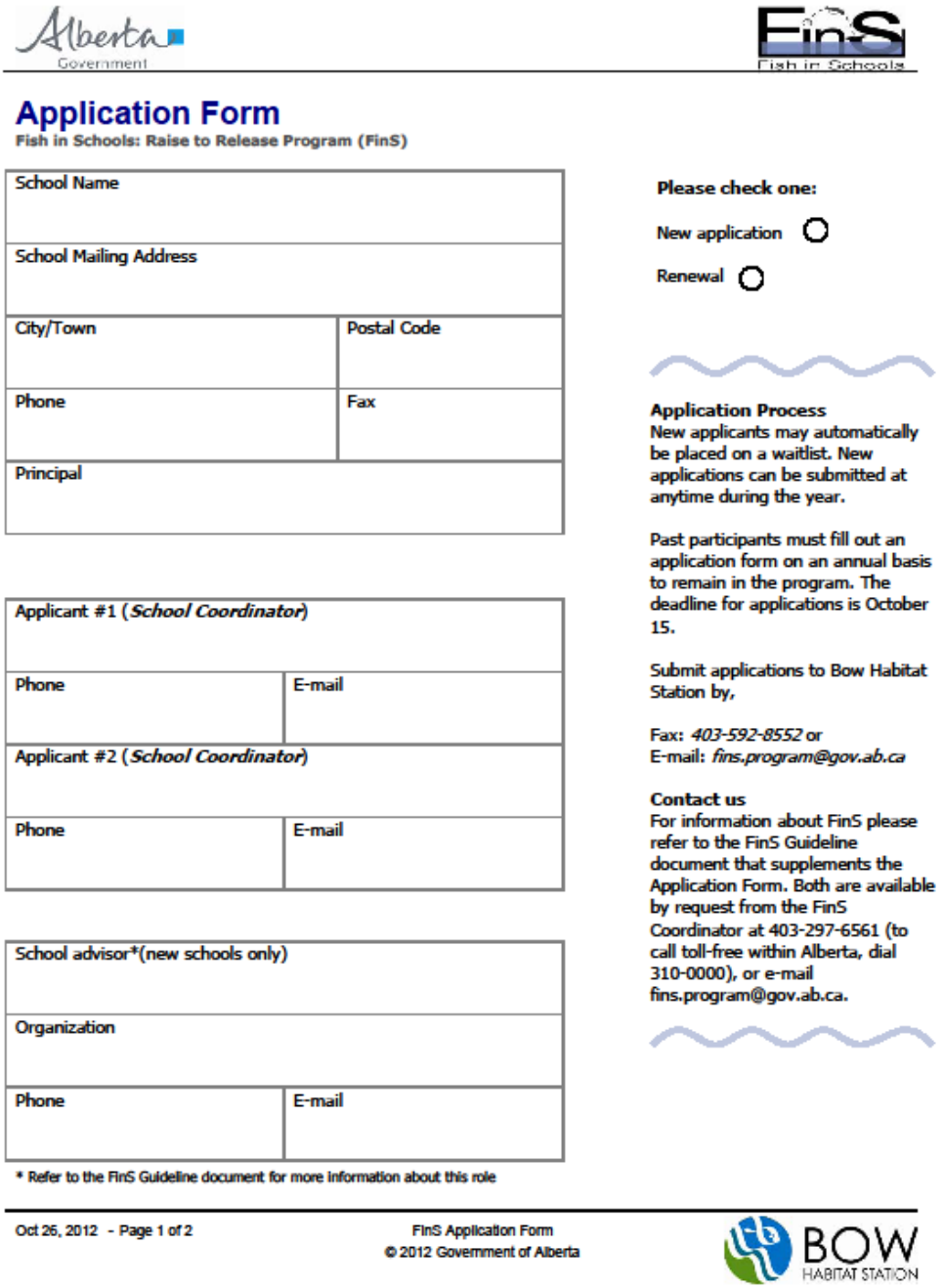
1. *Powerhead aerator making loud noises*
   - First double check that the water line is above the aerator. Aerators are meant to function under the water line, and if its too low the water movement will make noise.
   - If the water line is ok some type of debris may be caught in the impeller. Unplug and remove the aerator from the tank, and open it up. Clear out any rocks or other debris that may be causing the pieces to grind.
2. *Water leaking from…….*
   i. Chiller
      - Double check that compression gasket cap is on tightly
      - Double check flexible tubing and attachment to chiller. If they are loose, tighten the hose clamp.

   ii. Filter
      - Double check AquaStop valve and attached tubes are fully secured to the filter by ensuring that the silver lever is pushed down to lock it in.
      - Double check hosing attachment to the rubber connector on the valve.
      - Ensure that the clasps on the sides of the filter are both snapped closed

   iii. Aquarium
      - Look around aquarium for any obvious wetness. In particular take a look at any metal that has separated from the glass or any protruding sealant.
      - If not obvious feel around the edges for wetness and move up until you find a dry patch. That's your target area.
      - Lower the water level and dry the area of the leak. Remove any excess sealant with a razor whilst ensuring that none of the refuse drops into the aquarium.
      - Use acetone to remove any remaining residue, and then apply a new layer of non-toxic 100% silicone sealant. Allow it to dry before refilling.

# Appendices

## Appendix 1



Alberta Government

FinS Fish in Schools

**Application Form**

**Fish in Schools: Raise to Release Program (FinS)**

| | |
|---|---|
| School Name | |
| School Mailing Address | |
| City/Town | Postal Code |
| Phone | Fax |
| Principal | |

| | |
|---|---|
| Applicant #1 (*School Coordinator*) | |
| Phone | E-mail |
| Applicant #2 (*School Coordinator*) | |
| Phone | E-mail |

| | |
|---|---|
| School advisor*(new schools only) | |
| Organization | |
| Phone | E-mail |

* Refer to the FinS Guideline document for more information about this role

**Please check one:**

New application ○

Renewal ○

**Application Process**
New applicants may automatically be placed on a waitlist. New applications can be submitted at anytime during the year.

Past participants must fill out an application form on an annual basis to remain in the program. The deadline for applications is October 15.

Submit applications to Bow Habitat Station by,

Fax: *403-592-8552* or
E-mail: *fins.program@gov.ab.ca*

**Contact us**
For information about FinS please refer to the FinS Guideline document that supplements the Application Form. Both are available by request from the FinS Coordinator at 403-297-6561 (to call toll-free within Alberta, dial 310-0000), or e-mail fins.program@gov.ab.ca.

Oct 26, 2012 - Page 1 of 2

FinS Application Form


BOW HABITAT STATION

1. How many students would be engaged in FinS? Please identify grades. ☐

2. Have you participated in FinS before? Yes No

If yes, identify which years (approximate): _____

If no, please read and answer the following questions:

a. Training is mandatory to participate in the program. Are you willing to participate in a half-day training event in Calgary or Edmonton?
Yes No

b. New applicants are asked to recruit their own School Advisor from the community. Have you recruited a School Advisor?
Yes No

c. If you have recruited a School Advisor, are they aware that they must also participate in a half-day training event in Calgary or Edmonton?
Yes No

3. Have you read the attached FinS Guideline and understand the following:

a. Financial requirements necessary to secure an aquarium system and/or to purchase upgrades?
Yes No

b. In addition to standard program forms and abiding by the fish research licence you are required to submit a classroom resource to be posted to the FinS website.
Yes No

Please provide a brief overview of why your school/class is interested in participating in FinS?

The School Coordinators and principal must sign and date below.

| | |
|---|---|
| School Coordinator | Date |
| School Coordinator | Date |
| Principal | Date |

| For Office use ONLY | | Date | Code(s) | Signature |
|---|---|---|---|---|
| *Approved* | ___ | | | |
| *Waitlist* | ___ | | | |
| *Not Approved* | ___ | | | |





BOW HABITAT STATION

## Appendix 2

# Fish in Schools: Raise to Release Program (FinS) Guidelines

Thank you for your interest in FinS. This document provides an overview of the program details. It is reviewed and updated annually.

**Overview**

FinS is an annual fisheries education initiative coordinated by Bow Habitat Station, Alberta Environment and Sustainable Resource Development (ESRD). It provides students and teachers the opportunity to raise fish in the classroom. Over a four to five month period, students and/or teachers maintain and monitor the development of trout in their aquariums from egg to fry then release those fish into a provincially approved water body. Schools that participate in FinS may incorporate the study of life cycles and their stages, needs, adaptations and habitat of trout into their learning environment. Participants discover that their ability to maintain a healthy aquarium environment is critical to the survival of their fish. Students are encouraged to make the connections between trout and their environments then use that knowledge to identify impacts and actions that can make a difference. Furthermore, FinS aims to instil a sense of stewardship in all participants!

**Program Goal**

FinS will help to foster an awareness and understanding of fish while demonstrating the importance of healthy aquatic environments.

**Program Objectives**

- To raise trout fry from eggs within an aquarium system.
- To maintain a healthy aquarium environment for trout.
- To participate in a release event.
- To study and investigate trout life cycles and stages, habitats, needs and adaptations.
- To develop an awareness about human impacts and actions on aquatic ecosystems.

**Eligibility and Requirements**

To be eligible to participate in FinS, two applicants are required from the same school and must fit these criteria:

- a teacher or other permanent role (e.g. librarian, assistant principal, etc.) at a school within Alberta (if application is accepted both applicants will be referred to as School Coordinators);
- have consent from the school principal (signature required); and
- remain in good standing with FinS (past participants only).

School Coordinators have various responsibilities outlined under the following section titled Structure and Roles. You must fully read and understand these responsibilities. FinS is a time intensive program that requires daily monitoring, feeding and/or cleaning while fish are present. In addition, documentation submission and reporting are also necessary components that start before the fish arrive and end after the fish have been released. If School Coordinators cannot meet the necessary deadlines they may not be approved the following year.

## Structure and Roles

FinS is contingent on an integrated structure of systematic roles that coordinate and provide the support necessary for the program. FinS is coordinated from Bow Habitat Station in Calgary by the FinS Team. The FinS Team is responsible for maintaining, planning, and reporting on all aspects of FinS. School Advisors and Fisheries Representatives are roles that provide fundamental support to School Coordinators (teachers). The following section gives a brief description of these roles and how they interact:

### School Coordinators

The two applicants from the school are designated as School Coordinators on the application and co-coordinate the project at the school. Both School Coordinators are responsible for the project and any requirements as necessary. Requirements of the School Coordinators include, but are not limited to:

- attending a one day training session (new participants only);
- setting up and maintaining the aquarium;
- coordinating egg pick-up/delivery;
- ensuring the trout are adequately cared for;
- coordinating the class/school's participation and transportation for the release of their trout into a provincially approved water body;
- developing and submitting a curriculum resource to share with other participants;
- submitting required program documents; and
- meeting the terms of a Fish Research Licence.

### FinS Team at Bow Habitat Station

The FinS Team consists of ESRD staff who coordinate and maintain the program under the direction of the Fins Coordinator.

The FinS Coordinator can be contacted by:

Phone: 403-297-6561
E-mail: fins.program@gov.ab.ca

### School Advisor

School Advisors are representatives from the community (e.g. volunteer societies), recognized organizations (e.g. Fisheries and Oceans Canada) or the Government of Alberta who provide primary and front line support to School Coordinators.
It is recommended that new applicants recruit their own School Advisor for their project. If this is not completed by the School Coordinators then the FinS Team will assist in recruitment however this may delay the application process. If a School Advisor is not available then applications may be waitlisted and participation will be delayed to subsequent years.
School Advisors should have relevant knowledge in aquatic aquariums, fish management, fish rearing or other related experience. It is the school's responsibility to approve and ensure that the School Advisor meets their standards and/or follows school protocols. Expectations of a School Advisor include but are not limited to:

- attending a one day training session (new participants only);
- acting as the formal liaison between the School Coordinators, Fisheries Representative and the FinS Team **(the School Advisor will be the primary contact for the School Coordinators)**;

- providing technical assistance (including initial set up and general maintenance) for the FinS unit and advice on fish health;
- visiting the classroom/school at least once mid-project (School Advisors may choose to provide a presentation during this visit);
- notifying the Fisheries Representative of mortalities; and
- coordinating and attending the release of the fish with the School Coordinators and Fisheries Representative.

**Fisheries Representative**
Fisheries Representatives are ESRD Fisheries Biologists or Fisheries Technicians who provide expert technical, biological and aquatic ecosystem advice to School Advisors. It is the responsibility of the FinS Team to coordinate the assignment of a Fisheries Representative to each project. Expectations of a Fisheries Representative include but are not limited to:

- collecting and properly disposing of mortalities;
- approving the provincial water body where fish will be released; and
- attending the release day as per the terms of the Fish Research Licence and providing information at the release (biological, habitat, fish management, aquatic ecosystems).

## Program Details

**Application – Submission, Waitlist, Form**
New applications can be submitted at anytime during the year however program intake only occurs in the fall of every year (see Important Dates, pg. 6).

In some geographical areas of Alberta program demand is high therefore program spots are limited. In those areas a waitlist may be in effect and new applicants may be entered into the waitlist before being considered. New applicants that have recruited their own School Advisor for the project may increase the likelihood of being approved for the upcoming year. Applicants on a waitlist may transfer their waitlist status (priority) to other interested teachers within the same school upon notification to the FinS Coordinator.

Application forms can be requested by contacting the FinS Coordinator (see contact information on Pg. 6) or online at bowhabitat.alberta.ca.

In the event that one of the past participating School Coordinators wishes to transfer their current participation status to a new teacher (within the same school) then approval is required. Please contact the FinS Coordinator before the application deadline to make this request.

*Past participants must fill out an application form on an annual basis to remain in the program (see Important Dates on pg. 6 for deadlines).*

**Financial Responsibility**
New schools will be required to purchase the selected aquarium system and any necessary replacement parts thereafter from Bow Habitat Station. The cost of a new aquarium system is approximately $700, GST included. For more details on costs, contact the FinS Coordinator.

Designated FinS sponsors are not available at this time however we encourage schools to seek sponsors at their own discretion.

Past participants may utilize existing systems, however upgrades may be required. Upgrade requirements will be determined based on equipment failures, success rates and/or other factors. This will be reviewed on a case by case basis. Any equipment upgrade purchases will be the responsibility of the school.

**Egg Delivery**

School Advisors are expected to coordinate egg delivery arrangements with School Coordinators. In some cases, eggs are shipped to a pre-selected ESRD office and are to be picked up the same day either by the School Advisor or School Coordinators. Eggs may also be picked up directly from one of four fish culture facilities in Alberta however this must be arranged in advance. Egg delivery details will be arranged and communicated in December/January.

Approximately sixty eggs will be delivered to each project. Included with the egg delivery will be a copy of the Fish Research Licence. School Coordinators must sign and retain the original copy for their records as it is required for the term of the project and at the fish release event.

At the time of egg delivery, detailed information must be recorded and is required to complete the Egg Delivery Form. This form can be found on the FinS website and must be submitted by the end of January to the FinS Coordinator. After delivery, the shipping supplies (e.g. thermos, cooler and ice packs) must be returned to Bow Habitat Station as soon as possible.

**Trouble Shooting and Maintenance**

FinS projects must be monitored daily. To maintain the project or for troubleshooting, it is recommended that participants utilize the FinS Manual found on the FinS website (see Resources section, pg. 5).

For preventative measures, participants must ensure that maintenance or custodial staff are aware of the project so units are not accidentally unplugged. It is also recommended that School Coordinators have an emergency plan in the event that the aquarium loses power as a result of a power outage.

Fish health is dependent upon many factors and some mortality is expected to occur. Mortalities must be reported to the School Advisor, who will notify the Fisheries Representative. The Fisheries Representative is responsible for disposing of mortalities and will advise the School Advisor as necessary. If a project has an extensive mortality rate (>80%) for two consecutive years, a review will be conducted to determine possible solutions. This review may require documented information that School Coordinators must maintain throughout the project. If mortalities continue to occur after implementing recommended measures then future applications to FinS may be denied.

**Release of Fish**

School Advisors are expected to coordinate the release of the fish at the end of the project (May or June) with School Coordinators and Fisheries Representatives. In the event that a school does not maintain surviving fry, School Coordinators must advise the FinS Coordinator. The FinS Coordinator may be able to arrange for replacement fry in order for a release event to continue. School Advisors need to liaise with the Fisheries Representatives and School Coordinators to determine a release site and date. Final approval of the provincial water body must be made by the Fisheries Representative. This information will be documented on the FinS Final Project Report form.

Involvement of the local media is encouraged to showcase FinS projects. **Please ensure all media involvement is communicated to the FinS Coordinator in advance. FinS is a Government of Alberta initiative therefore communications protocols must be followed.**

**Closing the Project**
Following the release day the FinS unit needs to be disinfected, please refer to the FinS Manual for instruction. The Final Project Report Form and curriculum resource must also be submitted to the FinS Coordinator (see Important Dates on pg. 5 for deadlines).

**Planning for Next Year**
Past participants must fill out an application form on an annual basis to remain in the program (see Important Dates, pg. 6 for deadlines). Participants that do not wish to continue participating in the program for the following season are required to fill out a Withdrawal Form and submit it to the FinS Coordinator as soon as possible. The FinS Coordinator will contact all past participants before the application deadline as a reminder to send in their application forms.

## Resources

**FinS Website**
The FinS website is the primary source of program information. It features:

- the FinS Manual;
- a resource library;
- a discussion board;
- a Q & A section;
- a calendar of key dates; and
- new announcements.

**The FinS website address is:** https://srdsp.alberta.ca/fins/default.aspx
*Please note that a User ID and temporary password are required to access this site.

School Coordinators should visit the FinS website regularly as important program information will be updated on this site. Please keep in mind that in order for a username to remain active, participants must visit the site once every 60 days. In addition, users must also change their password once every 60 days.

The FinS Team is continually compiling education resources for FinS. If participants have presentations, lesson plans, or ideas that they would like to add to the resource directory they may email them to fins.program@gov.ab.ca. The FinS Team greatly appreciates all opportunities to enrich the program.

## Important Dates

Note that the following dates are a general timeline only. These dates may vary slightly from year to year.

- New and/or renewal applications - **October 15**
- Approval confirmations - **October 30**
- Fish Research Licence applications - **November 15**
- FinS equipment requests - **November 30**
- FinS equipment shipments - **December 7**
- FinS training sessions – **November/December** (exact dates TBA)

The FinS unit should be set up, without water, prior to the Christmas holidays to ensure all necessary parts are present.

- FinS units must be set up and fully operational - first week in **January**
- Eggs will be delivered - second week of **January**
- Egg delivery forms - **January 31**
- Final Project Report form and curriculum resource - **June 30**

**Thank you for your interest in FinS. Please do not hesitate to contact the FinS Coordinator at Bow Habitat Station for additional information.**

**Bow Habitat Station**
**1440 – 17A St. SE**
**Calgary, AB T2G 4T9**

**Email: fins.program@gov.ab.ca**

**Ph: 403-297-6561**
**Fax: 403-592-8552**

## Appendix 3

Alberta Government

Environment and Sustainable Resource Development

# Fish Research Licence Application Form

Research Permits and Collection Licences

**Date Submitted*:**

**Licensee/Firm:**

**Research On Behalf Of:** Fish in Schools: Raise to Release Program (FinS)

**Contact Person:**

**Individuals Involved:**

**Address:**

Street

City PC

E-mail

Phone Fax

**Reason Licence Required*** (Please provide details on purpose of the proposed work sampling area(s) and frequency; species and life stages involved; proposed number to be sampled, tagged or marked and released; number of fish to be anesthetized or sacrificed. If fish will be held live, describe the holding facility and under what conditions the fish will be held):

Education school project for FinS. Closed aquarium system with recirculating tap water. RNTR; eyed egg stage to fry.

**Specific Waterbody(s) or Watershed (include legal descriptions):**

**Sampling Gear:**

**Dates of Activity:** January 8, 2013 to June 28, 2013

* Applications are to be submitted **at least 10 working** days prior to the start of the research.

## Appendix 4

Alberta Government

FinS Fish in Schools

### EQUIPMENT CHECKLIST

At the beginning of each season, you will receive the following annual supplies at no cost. Upon delivery, check that you have received all identified supplies. This list will also be included with your package.

| *Annual Supplies* | ☑ |
|---|---|
| BioFilter Media (Charcoal, Biomax, Ammonia remover) | |
| Aqua Plus (16 oz.) | |
| Aqua Cycle (16 oz.) | |
| pH Test Kit | |

---

Returning participants - review current equipment and indicate any replacement parts on the table below.
New participants - must select and purchase all equipment listed except any item identified as "optional".
Shipping costs are not included and will be calculated after your order is processed. Do not submit payment until your TOTAL cost is confirmed.

School: _____

| *FinS Equipment* | ☑ | *Cost (GST incl.)* |
|---|---|---|
| Aquarium *(102L)* | | $72.45 |
| Oceanic Chiller Unit | | $435.75 |
| Fluval BioFilter *(305)* | | $143.85 |
| Powerhead Adapter | | $23.52 |
| Undergravel Filter | | $17.88 |
| Egg Incubation Basket | | $3.36 |
| Thermometer | | $1.05 |
| Dip Net | | $1.37 |
| Gravel Siphon/Cleaner (optional) | | $12.50 |
| Custom Aquarium Stand (optional) | | $763.60 |
| ***SUBMIT BY*** | *SUB-TOTAL* | |
| *Fax: 403-592-8552* or | ***SHIPPING**** | |
| *E-mail: fins.program@gov.ab.ca* | ***TOTAL**** | |

***Office use only***

*Shipping cost and total to be confirmed.

Payments can be made by VISA, MasterCard or cheque. To pay by credit card please call Bow Habitat Station at 403-297-6561. Cheques can be made payable to "*Government of Alberta, ESRD, BHS*" and sent to:

Bow Habitat Station - FinS
1440-17A St. SE
Calgary, AB T2G 4T9



FinS Equipment Checklist



BOW HABITAT STATION

## Appendix 5

# EGG DELIVERY FORM

| SCHOOL: | SCHOOL COORDINATOR: | PROJECT TEAM MEMBERS PRESENT AT DELIVERY: |
|---|---|---|
| | | |

**To be filled out at the fish culture facility:**

| | |
|---|---|
| FACILITY OF ORIGIN: | SPECIES/STRAIN/LOT #: |
| TIME AND DATE OF EGG PICK-UP/DELIVERY: | NUMBER OF EGGS: |
| THERMOS TEMPERATURE AT TIME OF PACKING: | NUMBER OF ATU'S AT TIME OF EGG PICK-UP/DELIVERY: |

**To be filled out at the school:**

| | |
|---|---|
| THERMOS WATER TEMPERATURE AT TIME OF DELIVERY: _____°C | TIME AND DATE OF EGG DELIVERY: |
| TANK WATER TEMPERATURE AT TIME OF DELIVERY: _____°C | EGGS REQUIRED WARMING/COOLING BEFORE PLACING IN TANK? ☐ YES ☐ NO |

EGGS DELIVERED BY: _____ EGGS RECEIVED BY: _____

Once egg delivery is completed, please return this form and all delivery supplies to Bow Habitat Station (return label supplied in cooler). If you have any questions please contact your Project Advisor or the FinS Team at (403) 297-6561.

## Appendix 6

### FinS Aquarium Chart - January

| Jan 2013 | Sun | Mon | Tues | Wed | Thur | Fri | Sat | |
|---|---|---|---|---|---|---|---|---|
| | 6 | 7 | 8 | 9 | 10 | 11 | 12 | Notes |
| Tank Temperature | NA | NA | | | | | | |
| pH | NA | NA | | | | | | |
| Feeding (✓) | NA | NA | | | | | | |
| Water Change (✓) | NA | NA | | | | | | |
| Mortality # | NA | NA | | | | | | Weekly ATU - Weekly Mortality Total - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 13 | 14 | 15 | 16 | 17 | 18 | 19 | Notes |
| Tank Temperature | | | | | | | | |
| pH | | | | | | | | |
| Feeding (✓) | | | | | | | | |
| Water Change (✓) | | | | | | | | |
| Mortality # | | | | | | | | Weekly ATU - Weekly Mortality Total - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 20 | 21 | 22 | 23 | 24 | 25 | 26 | Notes |
| Tank Temperature | | | | | | | | |
| pH | | | | | | | | |
| Feeding (✓) | | | | | | | | |
| Water Change (✓) | | | | | | | | |
| Mortality # | | | | | | | | Weekly ATU - Weekly Mortality Total - |

| | | | | | | FEB | FEB | |
|---|---|---|---|---|---|---|---|---|
| | 27 | 28 | 29 | 30 | 31 | 1 | 2 | Notes |
| Tank Temperature | | | | | | | | |
| pH | | | | | | | | |
| Feeding (✓) | | | | | | | | |
| Water Change (✓) | | | | | | | | |
| Mortality # | | | | | | | | Weekly ATU - Weekly Mortality Total - |

**Food conversion 1 gram ~ .25 teaspoon**

**ATU Calculation - ATU (Accumulated Temperature Units) is calculated by multiplying number of days in a period with average temperature during the period in question.**

This example will calculate the approximate # of days until eggs begin to hatch.

Current ATU = (Average Temperature) x (# of days)
E.g. One week at at an average of 10°C = 10 x 7 = 70 ATU

Approximate ATU until hatching = 350

Hatching ATU - Current ATU = remaining ATU
E.g. 350 ATU - 230 ATU = 120 ATU
Remaining ATU's/avg. temp. of 10° = # days to hatch
120/10 = 12 Days left to hatch based on 10°

## Appendix 7

Alberta Government

FinS Fish in Schools

# Project Report

| School Coordinator |
|---|
| Name: |
| School: |

Present at release? Y or N

| School Advisor |
|---|
| Name: |

Present at release? Y or N

| Fisheries Representative |
|---|
| Name: |

Present at release? Y or N

Your Project Report form must be must be completed in full and submitted by June 15th of the program year. Send completed forms by fax or e-mail to;

Fax: 403-592-8552

E-mail: fins.program@gov.ab.ca

| # of eggs received: | Additional comments: |
|---|---|
| Date eggs received: | |
| ATU's of eggs when received: | |
| # Mortalities (egg stage): | |
| # Mortalities (alevin & fry stage): | |
| # of fish released: | |
| Location of release: | |
| Date of release: | |
| ATU's of fish when released: | |

Identify the # of students/classes/grades that attended the fish release:

School Coordinator or School Advisor

Date



FinS Project Report Form



BOW HABITAT STATION

## Project Feedback

How did you integrate the FinS program into your curriculum?

What was your favorite part of being part of the FinS program?

What is something you'd like to see improved for next year?

Thanks for your help in improving our programs!!!

## Appendix 8

Alberta Government

FinS Fish in Schools

# Withdrawal Form

| School Coordinator (teacher) |
|---|
| Name: |
| School: |
| Phone: |
| E-mail: |

| School Advisor |
|---|
| Name: |
| Organization: |

Have you notified the School Advisor of your withdrawal? Yes/No

| Fisheries Representative |
|---|
| Name: |
| City/Town: |

Have you notified the Fisheries Representative of your withdrawal? Yes/No

To officially withdraw from FinS this form must be completed in full and forwarded to Bow Habitat Station.

Bow Habitat Station
1440 – 17A St. SE
Calgary, AB T2G 4T9
Attn: FinS Program Coordinator

Fax: 403-592-8552
Phone: 403-297-6561
E-mail: fins.program@gov.ab.ca

Withdrawal reason:

Would the school like to donate the FinS aquarium system to a future participant? Yes/No.
*Note: In the event a donating school chooses to reapply in the future, there is no guarantee that a donated system will be available.

By signing below I/we understand that submission of this withdrawal form will terminate the school's participation in FinS. If the school would like to participate again, the school will need to reapply as a 'new' applicant.

School Coordinator _____ Date _____

School Principal _____ Date _____



BOW HABITAT STATION

## Appendix 9

Alberta Government

FinS Fish in Schools

### Student Project Feedback

What was something you learned while having had the trout in your class?

_____

_____

_____

_____

_____

_____

What was your favorite part of being part of the FinS program?

_____

_____

_____

_____

_____

_____