TROUT IN THE CLASSROOM

"HOW TO RAISE VIRGINIA TROUT"

Virginia Council

2008

Table of Contents

Information in this "How To Raise Virginia Trout" manual was obtained from the Trout In The Classroom website, Winchester and Blacksburg TIC coordinators, various aquarium books, and the personal knowledge and experience of many individuals. It is not represented to be the final authority on raising trout in Virginia, but is presented as a help guide. This manual is always available to be updated/modified as new information or techniques are received.

Let it be said that there are only two things that really matter when raising Trout in Virginia:

1. *monitor your water chemistry daily, and*
2. *change 10% - 20% of the water weekly.*

How everything else is done does not really matter. There is no right way or wrong way. If it works, it works!

Section I. Equipment Needed

Suggested Equipment List:

Item	1st Year Set-Up	On Going Set-Up
Items from ThatPetPlace.com	**KIT #1**	**KIT #2**
Fluval 405 Filter	X	
Mag Drive 700 Water Pump w/ 10' cord	X	
UV Sterilizer & Bulb	X	
UV Bulb		X
Water Chiller	X	
Whisper 20 Air Pump	X	
Battery Operated Digital Thermometer	X	
BioZyme or PondZyme	X	X
16 oz bottle of Stress Zyme	X	X
Freshwater Master Testing Kit	X	X
20' ½" I.D. tubing	X	
Dechlorinating Solution	X	X
¼" Check valve	X	
6" Aquarium Net	X	
Foam Pre-filter	X	
12" Air Stone	X	
10' ¼" airline tubing	X	
1 Tube of Aquarium Sealant	X	X
Large Gravel Vacuum	X	X
55 Gallon Aquarium	X	
Battery Operated Weekend Feeder	X	X
3 Piece Brush Set	X	X
Other Source Items		
55 Gallon Tank	X	
Chiller	X	
Turkey Baster	X	
Home Improvement Store		
Foam Board Insulation	X	
5 Outlet Surge Protector	X	
SS clamps	X	
Gravel – nickel/quarter in size	X	
Lava Stone and Plexiglas	X	

The buckets you will need for water changes can be from any source as long as they are clean. As strange as it sounds, plastic kitty litter containers are great as they can hold about 4-5 gallons and have a lid. They can also be used when it is time to transport the fry to the release site.

All of the recommended TIC equipment (except the tank, chiller, and items from a home improvement center) is now available in a kit, which can be purchased through the online

company ThatPetPlace.com (https://www.thatpetplace.com). When ordering either kit, please reference the quote number associated with each kit. The person to contact for ordering information is:

Stephanie Welsh
Senior Business Account Representative
That Fish Place/That Pet Place
237 Centerville Road
Lancaster, PA 17603
Phone: 717-299-5691 x1288
Local Fax: 800-786-3829 Direct Fax: 717-381-2266
email: stephanie.welsh@thatpetplace.com

If you don't need any of the recommended equipment, please tell Stephanie to omit the item(s).

KIT #1 - Recommended Equipment List for 1st Year Set Up

Quote Number: 219
Quote Date: 07/17/2008

A Quote generated for the TIC programs for the VIRGINIA COUNCIL OF TROUT UNLIMITED

Whisper 20 Aquarium Air Pump **Item #: 205960**	**1**	**$5.24**
Sandstone Airstone - 12 in. x 3/4 in. x 3/4 in. **Item #: 196870**	**1**	**$1.72**
Check Valve - 1 pk **Item #: 204235**	**1**	**$1.45**
Battery Operated Digital Thermometer **Item #: 209362**	**1**	**$4.57**
Freshwater Master Test Kit **Item #: 199591**	**1**	**$11.28**
405 Fluval Aquarium Canister Filter - up to 100 gallon **Item #: 214941**	**1**	**$132.75**
Stress Zyme - 16 oz. **Item #: 199616**	**1**	**$5.57**

Siphon Kleen - X-large **Item #: 214013**	**1**	**$6.90**
Tap Water Conditioner - 16 oz. **Item #: 199664**	**1**	**$3.44**
Biozyme for Freshwater - 8 g **Item #: 209009**	**1**	**$2.69**
Mag Drive 700 Water Pump with 10 ft. Cord **Item #: 206397**	**1**	**$71.89**
Turbo Twist 3X Aquarium UV Sterilizer - 125gal. - 9W **Item #: 209649**	**1**	**$109.99**
UV-C Replacement Lamp PL Type - 9W **Item #: 209334**	**1**	**$29.99**
Flexible Tubing - Clear - 1/2 in. (Sold per foot) **Item #: 204154**	**20**	**$25.80**
Net - 6 in. **Item #: 212723**	**1**	**$1.79**
Foam Prefilter Replacement for Maxi-Jets - 2 pk **Item #: 198263**	**1**	**$7.89**
Flexible Airline Tubing - 8 ft. **Item #: 212445**	**1**	**$.67**
Aquarium Sealant - 3 oz. **Item #: 211988**	**1**	**$4.39**
EKOMIXO Fish Feeder - Battery Operated with Air Connect **Item #: 205199**	**1**	**$24.99**
Aquarium Brush Kit - 3 pk **Item #: 214963**	**1**	**$3.49**

Total Items:	39	$456.50
Shipping & Handling:		$17.99
Sales Tax:		**$.00**
Total:		$477.49

KIT #2 - Recommended Equipment List for On Going TIC Set Ups

Quote Number: 220
Quote Date: 07/17/2008

A Quote generated for the TIC programs for the VIRGINIA COUNCIL OF TROUT UNLIMITED

UV-C Replacement Lamp PL Type - 9W **Item #: 209334**	**1**	**$29.99**
Biozyme for Freshwater - 8 g **Item #: 209009**	**1**	**$2.69**
Stress Zyme - 16 oz. **Item #: 199616**	**1**	**$5.57**
Freshwater Master Test Kit **Item #: 199591**	**1**	**$13.50**
Tap Water Conditioner - 16 oz. **Item #: 199664**	**1**	**$5.19**
Aquarium Sealant - 3 oz. **Item #: 211988**	**1**	**$4.39**
Siphon Kleen - X-large **Item #: 214013**	**1**	**$8.25**
EKOMIXO Fish Feeder - Battery Operated with Air Connect **Item #: 205199**	**1**	**$24.99**
Aquarium Brush Kit - 3 pk **Item #: 214963**	**1**	**$3.49**

Total Items:	9	$98.06
Shipping & Handling:		$10.99
Sales Tax:		**$.00**
Total:		$109.05

Chiller Options

You will need a chiller to keep the tank's water temperature at about 50° Fahrenheit. Most chillers are only designed to chill aquarium water to around 60°-70° Fahrenheit. Therefore, for our program, we must purchase chillers that are rated for a larger size tank-

-for example, for a 55-gallon TIC tank; we purchase 1/4 horsepower chillers, which are technically designed for 100-125 gallon tanks. By using a more powerful chiller, we decrease our chances of burning our chiller out after only a year or two.

Here are the three most popular chiller options:

1. Glacier Corporation Chiller - the original TIC chiller, a drop-in chiller Ph# (714) 557-2826 1/6 Horsepower -1 year warranty – Immersed Coil Type (Cooling coil is placed in water)– While this unit is very durable and has been the standard in the past, the chillers below are now generally preferred. No tubing or pump is needed for this chiller. A pump will be needed for the UV sterilizer—use what is recommended for the UV flow rate.

2. Arctica Titanium Chiller– a nearly silent, a flow-through from Marine Depot 1/4 Horsepower - 2 year warranty – flow through type (water is cooled when it is pumped through the cooling chamber) –This unit is UL listed- and purported to be the most quiet of all comparable chillers, which is of great importance to teachers. This chiller MUST be used with insulation, or it will wear out too quickly. This unit requires a separate pump, such as the Mag Drive Water Pump.

3. Polar Bear Chiller —least expensive and available through an NYC DOE vendor – BE Cooling, 4451 Cleveland Avenue, Stevensville, MI 49127. Price in 2007 was $320 plus $6.25 for shipping

4. Polar Bear Chiller – Professional grade Via Aqua FloThru ¼ HP Chiller Model CC25 with built in electronic controller from AquaStealth. While not as quiet as the Artica, it is significantly less expensive. This unit requires a separate pump, such as the Mag Drive Water Pump. Its dimensions are 14.4"x12"x10.2" and tubing is included.

5. Prime Tower Chiller -- an efficient flow-through available from That Fish Place. Fairly quiet flow-through chiller. With insulation, this chiller comes on only a few times an hour. It can be purchased from That Fish Place.

Notes about the pump:

Once you have selected a chiller, determine which size pump you use. Each flow-through chiller requires a certain range of gallons or water per hour. Please ask your chiller source the recommended pump capacity and power for the chiller you chose.

Section II. Tank Set Up

Locate a suitable place in the classroom for the tank setup. It should be away for direct sunlight, as sunlight will increase the water temperature putting a greater strain on the chiller. Additionally, it will promote the growth of algae increasing the tank cleaning time. A lab-type counter or bench is preferred. The surface must be stable and capable of supporting a tank, 55 gallons of water, and gravel (approximately 500 lbs).

Making the Lava Stone Bioboard

Lava stone (the purplish kind you find bagged at Lowe's or Home Depot) makes an outstanding "home" for the bacteria necessary to convert ammonia into harmless compounds. It's large surface area due to the fissures and cracks provide ample area for the bacteria to grow.

1. After obtaining the lava stone, rinse it well to remove the dust and other loose material and let it dry thoroughly (usually a day in the sun). While at Lowe's or Home Depot, also obtain a 12" x 12" piece of 1/4" Plexiglas. Make sure that the piece of Plexiglas will fit in your tank on one of the ends. Otherwise, have it cut to fit.
2. Using Aquarium Sealant (found in most pet stores), glue enough pieces of Lava Stone to the Plexiglas to cover as much of the Plexiglas as possible.
3. Let cure for 48 hours.
4. Install in tank by placing it against the end wall opposite your filter outflow tube with a slight lean and position some gravel to hold in place. By putting it at the other end of the tank from the filter outflow tube, the lava stone will receive a constant flow of water thereby remaining productive.
5. Do not remove the Plexiglas sheet until you break the tank down for the year. Any debris that may accumulate on the bioboard during the year may be suctioned off when you are cleaning the tank.

If you choose, you don't have to make the bioboard. You can simply scatter about 3 cups of rinsed lava stone on top of the gravel.

NOTE: Do not use any of the 100% silicon sealants found at any home improvement store. While they may say they are 100% pure silicon, they may contain anti-fungal compounds that are guaranteed to kill your fish. It's worth the couple extra dollars to use sealant especially made for aquariums.

Making an Egg Basket

While using a commercially available egg basket is fine, you may find that their overall size and shape is both too small and too cumbersome when it comes time to remove diseased eggs. An alternative egg basket can be made from a plastic office style "In Box". Depending on the bottom configuration, you might have to adhere some nylon window screening, using aquarium sealant, to the bottom so the fry do not fall through. Some of the advantages to this type of basket are that the eggs have more room so they are not touching each other thereby reducing the possibility of contamination if an egg becomes diseased; easier access to diseased eggs with less potential movement of the "good" eggs; better water flow around the eggs to promote better hatching rates; and another chance for the students to start getting involved with the tank by making a

"home" for the eggs. If space permits, it would be fine to install two of the baskets in your tank. This is one case where more is better.

The basket can be attached to the tank in any manner that will work for you – sometimes something as simple as bent large paperclips will do the trick – as long as the eggs themselves are at least 4" beneath the surface

Starting the Tank Set Up

Position the tank on **foam board** (cut to fit the bottom of the tank with about ½" overhang on all sides). Carefully add the rinsed gravel (enough to cover the tank bottom, but do not pour it in) and lava stone bioboard at this time. Fill tank about half full of clean water. Clean buckets are best used for this purpose. Using a hose from the sink is not recommended unless you can ensure it is properly attached. Otherwise, use clean buckets to move the water from the tap to your tank. Tap water can be used for the initial setup, as there will be no fish put into the tank within the next 24 hours. But later, when changing water in the tank, it must be "aged" to allow the chlorine to dissipate unless you are using well water. Chlorine will naturally dissipate within 24 hours. If tap water must be used in an emergency, de-chlorinator should be added as directed.

Locate and remove **Sterilizer (UVS)** from package. Place UV lamp (bulb) in canister. Consult directions in package. The UV hangs on the outside of the tank, cord up. The direction of the intake and outtake ports may need to be changed depending on where the chiller is located. We will hook up the vinyl tubing in a later step.

Now, install the pre-filter on the water pump intake opening. There are extra parts with the pump that are not necessary and can set aside and saved or given back to the tank set up person. There will be a hose bard fitting provided with the pump for connecting the vinyl tubing. This is a hose barb on one end and a threaded connection that screws into the top of the pump. The vinyl tubing is then pushed down onto this hose barb and a stainless steel clamp is used to secure the hose to the fitting. This tubing will need to be cut to fit from the pump to the intake port on the chiller. Place **water pump** inside tank on the bottom. Use suction cup feet provided with pump to secure it to the bottom.

Chiller connections. The chiller should be positioned as close to the tank as possible to minimize any strain on the water pump. Find the best location for the chiller, one where it can be easily accessed for maintenance and temperature adjustments, but located out of the way of the tank (off to one side or below the tank works best).

The vinyl hose from the **water pump** outtake is then connected to the chiller intake port. The vinyl tubing pushes down onto the port inlets, lubricating the inlet barb helps (saliva works best). Push the tubing all the way onto the port and make sure it is well seated. Next, connect a separate length of tubing from the chiller outtake port to the **UVS** intake. It's best to lay the UVS on a table when connecting the tubing. The UVS canister has locknuts that operate similar to the chiller port barbs. Push vinyl tubing onto UVS barbs and screw the locknut counter clockwise to lock down the tubing.
For Aqua chillers you will need to attach the "elbow" barbs to the intake ports. The "IN" port is on the back left when facing the chiller. Attach tubing using SS clamps as necessary.

The last section of tubing returns the water to the tank. This section is attached to the outtake port of the UVS and then run directly into the tank. Use enough hose, about a 3-4 foot length, so it hangs across the back of the tank and can be tied down to the center support. The outflow tube should extend about 2" below the surface of the water.

Tighten all the tube connections. Install and tighten the hose clamps to prevent any of the tubes coming off accidentally.

Air Pump connection:
Place the small air pump behind the tank. Attach tubing from air pump then use scissors to cut line and add the check valve. This will prevent water from returning to the air pump in the event of a power outage. Run the tubing from check valve to air stone. Air stone is very fragile and should be removed from package with knife or scissors. Let air stone remain submerged for 10 minutes before plugging in air pump. This will allow the stone to become saturated and provide even airflow. After 10 minutes, plug in air pump and verify airflow to stone.

Now fill the tank with water to within 3 inches of the top of the tank.

Water Filter:
The dual compartment water filter hangs on the outside of the tank; if you are using a Fluval filter, it can sit next to the tank or on the floor within close proximity of the tank. The filter should be located on the other end from the chiller and UVS. This way, there is a constant water flow across the tank and bioboard. Remove the filter components from their plastic bags and rinse them under running water. Place them in the filter compartments as directed in the manufacturer's instructions. Install intake and outflow tubes as per the manufacture's instructions. Install the pre-filter on the slotted part of the intake tube. The water filter must be primed by pouring water into the compartments before plugging in the filter. Watch as the water column rises up the intake dip tube and into the filter compartments. If the water is not rising up the tube, prime the filter with more water.

Plug in the chiller and air pump.

YOUR TANK IS NOW READY!!!!

Section III. "Decorating" Your Tank

Now for the great debate on how your tank should look. In nature, trout live in streams that have rocks, plants, and sunken tree branches. Why not make your tank resemble nature? Besides being helpful to the health of the tank (which we discuss in a moment), it can provide your students with a look at the real habitat of trout – not a sterile looking tank.

We have already put gravel in the bottom of the tank to resemble the streambed, so let's complete the picture.

Plants

While the water returning from the filter/chiller and air stone provides some opportunity to re-oxygenate the water, plants are submerged oxygenaters. Additionally, they are another biological filtering agent. The easiest way to introduce plants into your tank is to fill a clean 4" tall clay pot with pea gravel and insert the plant directly into the gravel. Two pots of plants are sufficient. Recommended aquatic plants are:

Anacharis can be found in most pet stores of pond supply places. It is an inexpensive plant and easy to obtain.

Hornwort is more expensive and difficult to find, but you get lucky.

If you buy the plants from a pet store, make sure the plants are in a "Plant Only" tank to reduce the possibility of introducing a disease from aquarium fish into your tank.

Driftwood

The introduction of driftwood into a tank will add a more natural look to your tank as well as introduce yet another biological home for bacteria. However, you can't just pick up a piece of wood and put it in your tank. Find an interesting piece of bark less wood, not too large or too small, from a stream and boil it for about 1 hour to kill any bacteria. Let it air dry in the sun for a couple of days. It will probably float initially when you put it in the tank so use some aquarium sealant to adhere it to a rock and let it cure for 48 hours before you put it in the tank.

Please understand that, while the introduction of plants and driftwood will very slightly increase the tank cleaning time, the value of your students seeing trout in a "native" habitat greatly outweighs the additional time to clean around the plants and wood.

Section IV. Getting Ready for Your Eggs

During the summer, the Regional TIC coordinator will gather the information on number of tanks and type of trout eggs requested from all the chapter TIC coordinators. She/he will then coordinate with Paul Bugas, VGIF, which hatchery locations will provide the eggs and develop a preliminary delivery date and pick-up point for each school. When the school year begins, the chapter TIC coordinator will notify each teacher the details of their egg pickup date and location.

For the school year 2008/2009, Brown and Brook trout eggs and food will both be available between September 24th and October 8th. A definite pickup date at the VGIF office in Verona will be established by September 19th.

The area coverage for egg distribution for this year will be as follows:

The Verona office of VGIF (517 Lee Highway, Verona) will handle the distribution of brook and brown trout eggs and food for the area of Central and Northern Virginia defined as all locations NORTH of Route 460. This will include Lynchburg across the state to Petersburg. IT DOES NOT INCLUDE ROANOKE.

For TIC programs in Roanoke and south, you will need to coordinate a pickup date with Brian Beers, manager of the Paint Bank hatchery. If you are so inclined, a possible hatchery tour could be arranged if you want to make a field trip with your students. If you choose, you can also arrange egg pickup with either the Wytheville or Marion hatcheries

30 Days Before Eggs Are To Be Picked Up

1. Assemble all parts for aquarium setup (see suggested equipment list) and fill the tank with water.
2. Turn on the filter.
3. Make the egg baskets if you are not using commercially purchased baskets.

1 Week Before Eggs Are To Be Picked Up

1. Turn on the chiller, setting the temperature to register around 50 degrees.
2. Test the water parameters and adjust pH to close to neutral (7.0). If it needs adjusting to reach 7.0, use either baking soda to lower it or crushed coral to raise it. (see Water Testing in the next section for more detailed information)

1 Day Before Eggs Are To Be Picked Up

1. Turn UV light on.
2. Verify water temperature down to 50-52°F (10-11°C) – rely on the digital thermometer.
3. Position the egg baskets in the tank. Make sure that the baskets are at the opposite end from the filter. There should not be a strong direct flow of water on the eggs.
4. The air stone should be placed near the egg baskets, but not underneath them.

Section V. Trout Care

With the trout in place, keeping the tank system clean and keeping the tank bacterial colonies happy are the most important jobs. That means regular water changes, weekly or more often, using aged tap water (at least 48 hours) or well water. If there is slime on the walls of the tank, clean it off with a sponge on a long handle. You can also agitate any precipitate and allow the filter to take in the debris. With a cleaner tank, your trout will have a much higher chance of survival.

The nitrifying bacteria in the tank change trout waste (ammonia) into nitrites and then further into nitrates. While ammonia and nitrites are fairly toxic to the fish, nitrates are not very toxic at all. The nitrifying bacteria are surface dwellers. They live on all the surfaces of the tank and equipment, and especially on all faces of the gravel, lava stone, and wood.

Cleaning/Water Changes:
Water changes should be done with fresh clean water, no chlorination. "Aging" your water in jugs or buckets for at least two days will allow the chlorine to dissipate (well water does not need to be aged). First, clean the sides of the tank as described above. To save time and energy, do a water change at the same time you clean the gravel and bottom of the tank. Prime and use the Gravel Vacuum according the manufacturer's instructions. Make sure you have a large enough discharge bucket – a 5 gallon plastic bucket should suffice. Clean one half of the tank at the beginning of the week and the other half at the end of the week. Cleaning the tank twice a week will be more than sufficient. As you clean the aquarium using the gravel cleaner, you will be removing about 5 gallons of water. When you have finished cleaning the gravel, add new water to the level it was before cleaning. Add the water slowly, trying not to create a disturbance. Additionally, wring out the chiller and filter pre-filters once a week to remove the surface crud and waste. Make sure you use aged or well water that contains no chlorine.

Imbalances in pH or ammonia excesses indicate that water changes should be increased. If fish behave strangely or start dying in large numbers, poor water quality is often the root of the problem. If an emergency water change is needed, no more than one third of the water should be changed and it should be chilled to the correct temperature before addition.

The removal of dead fish is also important. Many fish start to get lethargic, or have problems swimming. Eventually, they simply float around the tank. These fish are sick, and they will never get better. One dead fish body, if left too long, can spread the disease to the other fish causing damage to the whole population.

Daily Check List:

1. Keep an eye on tank temperatures; an increase in temperature might indicate a chiller problem.
2. Feed trout per the chart in Section VIII.
3. Check and remove any dead fish or debris from the tank.

4. Test the water parameters (Ammonia, pH, Nitrites, and Nitrides) and record the readings in a log.
5. Ensure that water is flowing from the chiller and the filter and that the bubbler is still working.

Weekly Check List:

1. Clean the gravel (you will be performing water change at the same time) on both halves and wipe down all sides of the tank – usually Tuesday and Fridays are good days.
2. Remove and clean the pre-filters by squeezing them out in a bucket containing aged or well water.
3. Check all hose connections and tighten if any are loose.

Bi-Weekly Check List:

1. Rinse out the filter components using aged or well water once the fry are free swimming and eating.
2. Remove dust and lint from the fins of the coolant tubing (those black thin metal slats on the side of the chiller). This can be accomplished using a small vacuum cleaner, dusting cloth or soft bristle plastic dust brush.

Water Testing: *Use Kit provided with set-up*

The test kit provided has solutions for testing for ammonia, nitrate, nitrite, and **pH**. While testing for all four is a good practice, the two key tests are for **pH** and Ammonia. All test results should be kept in a log on a daily basis for review as well as providing "real" data for the students to graph.

pH: You should strive for a pH reading of about 7.0. If the water is too acidic (below 6.5), usually adding a total of ½ cup of rinsed coral chips in a 55 gallon tank will raise and maintain a pH of about 7.0 depending on the existing water chemistry. Aquarium hobbyists have used coral chips for many years in lieu of chemicals that are on the market. As with anything that alters the chemistry of aquarium water, it must be done in slow steps in order not to adversely affect the fish. Divide the ½ cup of chips into 3 equal portions, spreading a portion every 3 or 4 days across the bottom of the tank over a 2 to 3 week period. If at the end of the 3rd week, if the pH is still lower than required, add another 1/2 cup of rinsed coral chips over another 2 to 3 week period. Coral chips can be found in most per stores.

Using coral chips exclusively instead of gravel will result in a pH off the measurement scale and will be harmful to the development of the fish.

If the water is too basic (above 7.5) add very small amount of baking soda, pre-dissolved in a cup of tank water. Recheck after 10 minutes.

DO NOT ATTEMPT TO MOVE THE pH level more than .1 or .2 IN A DAY.

Ammonia: Major water changes will be needed if the ammonia loads become consistently too high for the biological filtration to handle. This usually occurs when the fish are over fed or there are too many fish in the tank. If the problem is frequent, some fish may need to be removed to reduce the daily levels or the number of weekly water changes increased to 3 or 4 a week. Re-dose the tank with BioZyme to add additional bacteria to convert ammonia into harmless compounds.

A Note About Enthusiastic Help:
Every year, many schools enlist the assistance of security and maintenance staff to feed the fish on the weekends and holidays. These well meaning helpers, often become great fans of the fish, and are soon spending their break periods watching...and yes...feeding the fish. People with different schedules, feed the fish unaware that others are doing the same. You might not want to just warn these fans about over-feeding, but have a sheet of paper near the tank so they can track how often the fish have been fed.

CRISIS NOTES—READ BEFORE TROUT TRAGEDY OCCURS

- Always have buckets waiting with tank-ready water (dechlorinated by sitting 48+ hours or well water). If you come in and all fish are lethargic – **do a 20% WATER CHANGE**.

- If you come in and all fish are unmoving at the bottom of the tank – **do a 20% WATER CHANGE**.

- If you come in and your fish don't respond to food – **do a 20% WATER CHANGE**.

- During the first few weeks, initial ammonia spikes from overfeeding are likely. Water changes (removal of ammonia) are the only solution.

- It is also good to "boost" your tank with Stress Zyme as often as once a week.

- If you change your filter media, only change one section at a time. This allows the bacteria from the remaining section to colonize the new media.

Other Helpful Notes

- All water in tank must remain extremely clean. Everyone **must** rinse hands of all contaminates including lotions, soap, etc, before working with tank.
- Foam board around the tank on the back and sides will keep it insulated better and prolong the life of the chiller. Foam board can be cut to fit sides and back and attached with duct tape. A front piece can be cut and placed on the front glass of the tank at night, then removed each day for viewing.
- If chiller runs continuously, contact your TIC coordinator, as it may need more refrigerant.

- It is better to have slightly hungry fish than to over-feed the tank and have too much waste.
- Have about 6 – 8 frozen jugs of water on hand. In the event of a power outage float one or two of these at a time in the tank to keep temperature down. All labels and glue should be removed from jugs before use.

Section VI. Egg Stages

Getting Eggs

- When you pick up your eggs from VGIF, they will be in a terry cloth bag. Make sure you bring an empty water bottle so it can be filled with tank water. That way you can pour some cold, fresh water onto the eggs during the trip home keeping the eggs nice and moist. Your cooler should have a tray to transport the eggs that is deep enough to hold the eggs and the ice blocks wrapped in cloth as well as additional ice under the try to maintain a low temperature. Put some crumpled paper or foam over the ice packs under the tray to minimize any jostling or sliding around, which can hurt the eggs.
- The eggs will need time to acclimate to the tank. Let the tray (without the ice pack) you transported the eggs in float in the tank for about 30 minutes, adding approximately a ½ cup of your tank water every 10 minutes before removing the eggs from the terry cloth bag and pouring the eggs into the hatching basket.

Green eggs—(they spend about four weeks at this stage**)**

MAKE SURE THE UVS is ON

- Movement during delivery of the eggs can weaken the outer layer of the shell. This can create weak spots or broken areas. These spots are vulnerable to fungal infection.
- Any eggs with white spots MUST be picked out. A turkey baster will work well for this. The white spots are a fungus that spreads REALLY fast. Pick out spotted eggs twice a day if possible—especially check last thing on Friday afternoon.
- The outer egg shell must remain translucent. Uniform cloudiness can be okay, it might be just the trout development.
- An egg with any opaque spots (or fully opaque) will not develop.

Classes in some states start here, at the eyed egg stage.
Eyed eggs are identifiable by their characteristic dark spots—each trout's two eyes.

Eyed eggs—(they spend about two weeks at this stage)

- Movement during delivery of the eggs can weaken the outer layer of the shell. This can create weak spots or broken areas. These spots are vulnerable to fungal infection.
- Any eggs with white spots MUST be picked out. White spots are a fungus that spreads REALLY fast. Pick out spotted eggs twice a day if possible—especially check last thing on Friday afternoon.
- The outer shell must remain translucent. Uniform cloudiness can be okay, it might be just the trout development.
- An egg with any opaque spots (or fully opaque) will not develop.

Hatching—(no more than 2-3 days from first egg to last)

- The eggs will not all hatch at exactly the same time. The eggs will hatch over about a 2-3 day period from the first egg hatching.
- Some eggs will not hatch properly and should be picked out after a couple of days.

- Alevin may not come all the way out of the egg.
- Any leftover eggs must be removed (or at least isolated—these likely will not hatch).
- The leftover shells float to the top of the tank or in the basket.
- Fish enzymes will break down these shells and create a foam—this is normal. You can scrub the sides of the tank to loosen this foam.

Now is the time to add Biozyme:

***Important* Unplug the UV Sterilizer (UVS) before adding Biozyme.**

You probably are already familiar with the nitrogen cycle and the importance of biological filtration. Basically it is necessary to "get the fish pee out of the pool before anyone gets sick." The nitrobacter & nitrosomona species that are part of this cycle are the primary bacteria responsible for the consumption of excess ammonia that will be produced from the fish waste. While we talk about the bacteria colony and it's growth, you will not be able to see them

The container of Biozyme will either be in a powder or liquid form. It contains the bacteria needed to help start the process of bacterial growth in your filtration system. Follow the directions on the package for the amount to use for use for your tank size.

1. Turn off **water filter** and the UVS, but leave the chiller on.
2. Open the water filter and add the biozyme directly into the filter compartments. Pre mixing the suggested amount in a cup of tank water is helpful – if using the powder form.
3. Close the filter and turn it back on – **leave the UVS off for a week**.

Once the eggs develop into fry and they begin to consume food, the nitrogen cycle will begin due to the waste being produced. The bacteria will continue to increase grow on its own until the colony is sufficient to process the ammonia load. At that point the bacteria will maintain a fairly constant.

You may want to add an additional dose about 3 weeks after the first dose to make sure the bacteria are firmly established and ready to take on the task of converting ammonia into harmless chemicals. Follow the above steps again, including turning off the UVS for a week.

The nitrobacter & nitrosomona species are surface dwelling bacteria, but until they are established on a surface they can be found free floating in the water and are thereby subject to be killed by the UVS.

Section VII. Fry Stages

Just after hatching

- During this alevin phase you may see a jelly-like fungal growth. Check for this around the inside tank surfaces. Also check for this growth on the surfaces of the hatching basket. If you find this, wipe or scrape the surfaces with a sponge or other tool.
- Loosening this growth will send it through the sterilization and filtration system.

Alevin (sac-fry)—(1-3 weeks)

- The length of time at this stage depends on the water temperature. In warmer water, fry develop faster.
- A digital thermometer is the most reliable method of check in-tank temperature as the Chiller consoles are notoriously inaccurate. Check your thermometer daily.
- Look for your odd trout (two-head, three-head, etc.). This is a good lesson in survival of the fittest—these odd trout don't usually survive until release.
- Look at heart development, etc.
- Alevins can survive in a Petri dish under a microscope or hand lens short times if you want to let your class observe the Alevins more closely.

Swim-up stage— (one week or less)

- As yolk sacs disappear, some trout will start swimming around looking for food. These trout must have food available for them immediately when they are hungry.
- When you see the first one swim up in hatching basket box, feed them! To feed, put a small pinch of food near the swimming fish (in basket or otherwise).
- Start by spreading a miniscule amount of size 0 food near any swimming trout. Turn off the filter system for a few minutes when you are feeding the trout for the first couple of times. Not having a strong current will make the food more visible and more likely the trout will begin to feed. **MAKE SURE YOU TURN THE FILTER BACK ON!!!!!!**
- Now is a good time to "boost" your tank's nitrifying bacteria with another infusion of BioZyme as described in Section VI.
- You can add Stress Zyme to your tank as often as once a week.
- Once all fry are swimming up and have been eating, it is time for the next step.
- Unhook the basket and lower it gently to the bottom of the tank.
- Strong, adventurous fish will swim out. The more timid, weaker fish will hide for a few more days, until they are stronger.

Fry stage—(6-8 weeks)

- Feeding less more often is a better method for feeding. Use the feeding chart in Section VIII to determine the feeding amounts.
- Some trout never learn to feed, and will die. These non-feeding fish are called "pinheads"—big heads, little bodies. These trout should be removed, as they will not develop.

- Every TIC classroom sees a mortality spike with the pinheads—it is VERY normal.
- Continued leftovers mean that you are overfeeding your fish. Overfeeding can cause problems with ammonia levels. If in doubt, feed less until you are fairly certain the fish are eating everything you are feeding them.

Parr stage

Parr—(the rest of the time)

- Look for parr marks on the trout.
- Vacuum the bottom of the tank twice a week using the gravel cleaner doing one half of the tank each time.
- Always keep track of your water chemistry. If any levels seem too high, do a big water change (20% or more). Be careful to watch the temperature as you do this. Don't let the tank temperature fluctuate more than 5 degrees or so. In an emergency, clean water is more important than temperature stability, though.
- Cannibalism can occur—the big fish do eat the little fish. If cannibalism is becoming an issue, then feed more often, so as to assuage hunger.
- Be sure to clean more often and do water changes, if you are feeding more often.

Section VIII. Feeding Chart

Trout should be given small amounts of food. Overfeeding the fish can pollute the tank environment. Give only one pinch of food at any time, and remove all the extra food particles. Divide the total daily amount and feed a portion 2-3 times per day. The trout will seem "hungry" all the time; remember that they are wild animals, and their instinct is to eat any food presented to them, no matter how often. These trout can survive over a weekend without any food, but during vacations it is best for someone to check on the tank, conduct water changes, and provide a small amount of food on a regular basis if you are not using a weekend feeder.

First feedings: With the fish still in hatch box, feed them very little food.

	Food Weight in Grams				
# of Fish	**50**	**100**	**200**	**300**	**400**
Out of Hatch Box	0.09	0.17	0.34	0.51	0.68
Fish = approx 1"	0.34	.0.68	1.36	2.04	2.72
Fish = approx. 1 ½"	0.85	1.70	3.40	5.10	6.80
Fish = approx 2 ¼"	2.73	5.45	10.90	16.35	21.80
	Food Weight in Ozs.				
# of Fish	**50**	**100**	**200**	**300**	**400**
Out of Hatch Box	0.003	0.005	0.01	0.015	0.02
Fish = approx 1"	0.015	0.025	0.05	0.075	0.1
Fish = approx. 1 ½"	0.03	0.06	0.12	0.18	0.24
Fish = approx 2 ¼"	0.10	0.19	0.38	0.57	0.76

Some of you may use a weekend feeder to feed your trout over weekends, holidays, or vacations. Follow the directions for loading the food into the system and setting the food dispensing time. Test the system to make sure it is dispensing the correct amount of food. You may have to adjust the dispenser depending on the model you have. However, put only **1 / 2** the amount of daily food into each day's slot. This way, you reduce the possibility f uneaten food polluting the tank.

Section IX. Vacation Notes – If Not Using Weekend Feeder

Prepping for short vacations (3- or 4-day weekends)

- Feed less on Friday.
- Do your water change as normal.
- They will be fine.

Prepping for mid-length vacations (7-10 days)

- Trout are wild animals that can survive leaner times. They do not need to be fed or visited during a 10-day vacation.
- Continue with the normal feeding cycle in the days leading up to vacation.
- If anything feed a little less, so as to minimize ammonia discharge during holidays.
- Do a nice BIG water change on the day you are leaving. If you can, do one that morning and one that afternoon. Otherwise, just do a big one! Be careful to watch the temperature as you do this. Don't let the tank temperature fluctuate more than 5 degrees or so.

Prepping for LONG vacation (11+ days)

- Same prep as above.
- Plan to come in once to feed, if possible, about halfway through.
- If you can't come in, don't worry. Trout are wild animals that can survive the lean times.

Section X. Crisis Mode

What if I come in and many of the trout have died? What do I do?

- Remove healthy fish first by putting them into in a reserve water bucket with the emergency ice blocks, no matter its temperature.
- Put a battery-operated aerator or tank's air stone in the bucket.
- Add Stress Zyme to the bucket—follow package instructions.
- Remove as much water from the tank as possible (80%).
- Leave pump and filter intake covered.
- Clean tank with clean scrub sponge and gravel cleaner. Remove as much crud as possible.
- Refill tank with any water available (if using chlorinated tap, use a declorinating product).
- Cool water with ice or freeze packs.
- Drain the filter, clean the filter media and replace at least one charcoal filter.
- Add BioZyme, Stress Zyme, Tap Safe, etc. if on hand, or as soon as possible.
- Replace fish in tank.
- The next day, add more Stress Zyme.

What do I do if my chiller stops working?

Using 1 or two of the frozen jugs of water on hand, float in the tank to maintain the temperature. Replace as necessary until your replacement chiller arrives. All labels and glue should be removed from jugs before use.

Obtaining an Emergency Replacement Chiller Procedure

Dr. David Jones of Martinsville has graciously offered to maintain a supply of chillers in the event an unexpected chiller failure. He is willing to overnight a chapter a chiller in order to keep the tank operating properly.

If you experience a chiller failure, call Dr. Jones at one of the following numbers:

Cell: 276-634-8488 Office: 276-638-8888

When you talk to him, you will need to provide him with:

1. Your name, address, phone number, and chapter name; and
2. The shipping address where you want the chiller sent.

You will also have to get the address where to send the check for the cost of the shipping and the replacement chiller.

The chapter will be responsible paying for the cost of shipping this replacement chiller to the school as well as the cost of a new chiller. Dr. Jones has indicated that the chapter may take up to a year to repay him, by check, for the cost of the chiller and shipping.

Section XI. Trout Release and Transporting Techniques

The materials you will need are:

1. Sturdy cooler or bucket (clean cat litter buckets work well) with a loose-fitting lid.
2. Ice made with dechlorinated water -- or -- ice in a Ziploc bag or 2-liter bottle with labels removed.
3. Battery-powered air stone – if travel time is over 45 minutes.

Instructions:

1. Fill cooler or bucket half full with water from tank (be sure you can lift the cooler). The reason for filling only half way is that air introduction of air into the water is more important than the depth of the water. The slight jostling of the water in the bucket/cooler will keep adding oxygen to the water.
2. Transfer trout fingerlings to cooler or bucket using a small net.
3. Add ice to water -- but monitor the temperature, do not allow to dip too low.
4. Insert and start air stone – if used.

Hints:

1. Make sure the trout aren't in the bucket or cooler longer than they have to be.
2. Make sure to have enough water, but not so much that the cooler can't be carried.
3. Make sure the lid is on tight enough so that your fingerlings don't splash out, but don't seal them in and cut off their air supply.

NOTE: Whenever releasing fish into ANY body of water, you must have state approval to do so. If released into the wrong body of water, our small fingerlings can permanently alter an ecosystem. Please coordinate with your TIC coordinator for more information.

Once you've arrived at the stream or second tank, it is important to slowly acclimate your fingerlings to their new environment. Monitoring the temperature of your cooler or bucket, slowly add water from their new stream/tank, one or two cupfuls at a time every 10 minutes. The goal is to gently change the temperature and water chemistry of your cooler or bucket water to near the temperature and parameters of the new water, allowing the temperature to change no more than a few degrees every ten minutes. Once the bucket/cooler temperature is within one or two degrees of the stream/tank temperature, remove the fingerlings to their release container. To release the trout, lower their container into the stream/tank and gently tip it to let them out.

Section XII. End of Year Cleanup

At the end of the TIC season, it is important to clean your aquarium set-up in order to ensure a successful next year. If you take a few minutes to make sure everything is clean, your equipment will have a much longer life. Here are a few pointers for cleaning the various components of your chilled aquarium set-up:

Aquarium Tank

1. Turn off the electrical pumps, chillers, filters, etc. Empty the tank almost all the way, by your usual method--many people like to use the gravel cleaner to do this work. Then remove the gravel, wood, and plants.
2. Finish emptying the tank and disconnect the tubing.
3. Using a solution of 1 part Chlorine bleach (Clorox – unscented) and 10 parts water, wipe down the interior and exterior of the tank. You can also use a 1part white vinegar to 5 part water solution. A soft sponge (dedicated to this use only) can be used to scrub hard to remove scale and algae growth. For stubborn scale/algae, you can scrape them off carefully with a straight edged safety razor.
4. You can use the same solution from above for cleaning out the tubing (clean tubes using long brushes you can buy at any pet shop).
5. Rinse the tank to remove any chlorine/vinegar and wipe dry with clean cloth, or let air-dry.
6. Wash and dry the gravel and wood by laying out on a cloth or towel in the sun or a ventilated area. The gravel can also be sterilized with the Clorox/vinegar solution, but they also MUST be rinsed and completely dried. Do not use either solution on the wood
7. Put the gravel and wood inside the tank and store it in a safe place covering the top with any dust-proof covering.

Aquarium Chiller

Drop-in style chiller (Glacier)

1. Using a bleach or vinegar solution and a dedicated sponge, you can wipe off the stainless steel Freon tubing.
2. For hard-to-remove plaque, a small PLASTIC scrub brush can be used. NEVER USE A WIRE BRUSH ON THESE TUBES.
3. Remove dust and lint from the fins of the coolant tubing (those black thin slats on the side of the chiller). This can be accomplished using a small vacuum cleaner, dusting cloth or soft bristle plastic dust brush. Your chiller will run more efficiently if you clean the lint and dust from this side of it.

Flow-through style chiller (Arctica Titanium, AquaChill, Via Aqua, Polar Bear)

1. Rinse pre-filter sponge on pump thoroughly with water, and let air-dry.
2. Tip chiller and drain. Using pump or faucet hose, flush chiller with clean tap water in each outlet, to ensure any dirt is washed out of the cooling tank. Then tip further to ensure it is fully drained.

3. Remove dust and lint from all vents on the chiller, using a small vacuum cleaner, dusting cloth, or soft bristle plastic dust brush

Filter

1. Take apart your filter and scrub out the plastic parts with your 1:10 bleach solution or 1:5 vinegar solution.
2. Thoroughly rinse out all filter media (filter sponges, charcoal, pre-filter, etc.) with regular water, and dry them in the sun or a well ventilated area. Scrub the ceramic cylinders until free of all debris. For most filters, it is suggested that you buy new filter cartridges for the following year. You can also use this year's filters that you rinsed out.
3. Thoroughly air-dry entire filter apparatus.
4. When all components are dry, re-assemble the filter and store inside the tank.

Section XIII. Q and A's

Are leaks a problem? How can I prevent leaks?
Once a chiller system is assembled, it is unlikely that a leak will develop. However, physical contact with the system could damage connections, particularly tugging on tubes. For this reason, students should not touch chiller hardware without supervision. A serious leak will pump the entire contents of the tank onto the ground within a very short time.

What should I do if my chiller system starts to leak?
If there is a leak in any external part such as the tubes for the chiller, turn off and unplug all electric tank systems. A large volume of water may be contained in the chiller and chiller tubes, so it might help stop a leak if the tubes are removed from the tank and placed in a 5 gallon bucket. It is important that the leak be fixed as soon as possible so that the chiller can continue to keep the water cool. Float some frozen tank water or ice in a zip lock bag in the tank to maintain the temperature while you are fixing the leak.

Can I fix leaks on my own?
The assembly of the chiller system is straightforward, so fixing it is quite possible without assistance. Simply unscrew the connection, and make sure that it is not cracked or damaged in anyway. Next, reassemble the leaking connection carefully. You can use a tool to tighten any connection, but do not force any plastic parts as they will crack under excessive strain.

What happens if there is a power failure? How much time do I have?
It is important that the fish have a stable a water temperature as possible. Short downtimes, of an hour or two at a time, probably will not harm the fish or change tank temperatures by any great amount. However, lost power during the night or over a weekend (or worse still, a long vacation) will likely be fatal to the fish.

What should I do if the power must be turned off?
All individuals such as custodians, who may turn the power on and off, should be informed that the trout system needs constant power. If there is no way to prevent it, for construction for example, it would be best to cycle the power. This means running the chiller for two hours on, then two off. This is better than simply letting the tank sit all day without power.

Can I keep eggs or fish in a household refrigerator?
Refrigerators are not an acceptable substitute for the tank environment. Because most refrigerators operate between 35 and 40 degrees, they are far colder than the tank.

What do I do with my eggs or fish in an emergency?
In an emergency, eggs can be preserved by placing the hatching basket in a container of water and putting that in a cooler in a cool dark place, with an ice pack and thermometer. Careful regulation in the amount of ice should make it possible to keep the eggs around 50 degrees. Do not add ice to the eggs directly; apply to the outside of the egg container.

Ice water may be dirty, and the rapid melting from immersion would cause sudden temperature changes that might do more harm than good.

With fish, particularly large fish, the only option in an emergency is to add ice to the tank. The best way to do this is to freeze large plastic containers of water, such as soda bottles with the labels removed, and add them to the tank. When creating these, do not fill them to the top as the ice that forms takes up more space than the liquid. Clean ice packs can also work, or sealed plastic bags of regular ice. It is possible to regulate temperature by adding or taking away ice in this way. Do not add regular tap water ice cubes directly to the tank unless there is no other option--this ice likely has chlorine in it, which can harm the fish. Some teachers create tank-water ice cubes, in anticipation of an emergency.

A 5 gallon bucket would be a good choice for holding fish in an emergency, if there is a problem with the tank.

It is best to prevent any such problems and carefully maintain the tank environment. The priority in an emergency is getting the tank environment back to normal, no emergency procedure can replace the stability of a working tank.

What should I do if there is a serious leak while I am away, and the tank is almost empty when I return?

If there is a serious leak, during the night or weekend, almost all of the tank water may be pumped out. It is unlikely for the tank system to fail on its own, but it is important to be ready in the event of such an accident. If the fish are in very shallow water, and the chiller is no longer working because the pump is running dry, it is important to carefully repair the tank system environment. First, you should find and fix the leak. Unplug the filter system. Next, add a declorinating solution to a container holding about 5 gallons of cold tap/well water (stir the tap water as you add a declorinating solution; for well water this step is not necessary). This should be enough to get the chiller working again; if it isn't, add another 5 gallons of cold declorinated/well water to the tank. Add this water slowly, and try to make this water around the same temperature as the tank water (which might be warmer by now). Make sure the air stone is working and putting bubbles into the water and that the UVS system is on.

Once there is enough water for the chiller to run, you should let the tank reach 50 degrees again. Open the filter and pour all the water out of it and rinse the filter media. Because there was no water circulation, the filter will be full of dead bacteria that will kill the fish.

At this point, use a declorinating solution to get as much tap water as possible (you don't need this solution if you are using well water) in every clean container you might have. Put your emergency ice packs into the containers to start lowering the temperature. Once the declorinated/well water has reached a temperature close to the tank's temperature, slowly add the water to the tank. If you can, it would be best to add only a few cups at a time, many times during the day. Continue to do this until the tank is about half full. Open the filter, refill it and add a dose of BioZyme, reconnect the filter system, and plug it in. Once the tank is half full, you can add the aged water a few gallons a day.

Continue to make new aged water as you use it until the tank is back up to normal levels. Then resume normal maintenance procedures including water changes.

The idea throughout this process is to make the changes for the trout as subtle as possible, once they're back at 50 degrees. Large swings in temperature and/or water quality can stress them out and increase mortality.

How can I inform custodians, or other teachers, about what to do if there is an emergency while I am away?
It is a good idea to give custodians some basic information about the requirements of your tank. For example, it is important that custodians know that your tank always needs electricity. It would be most helpful to place a sheet of paper (in a visible location) describing emergency procedures. This might include contact numbers, and basic advice on what to do to stabilize the tank if there is a chiller failure, leak, or power outage. You might want to prepare a frozen soda bottle of water to use in a chiller emergency, and then include the location of this ice and how to use it in your emergency procedure sheet. An example is below:

Tank Emergency Procedure:

In the event of a power outage, leak, or refrigeration system failure, or any other tank problem, please contact me:_____

Phone number:_____

If you cannot reach me, please try calling:

Contact:_____
Phone number:_____

Then,

In the event of a power outage: The trout in this tank need cold water to survive, and the chiller next to/under the tank maintains their temperature. If possible, the electricity to this tank should be turned on again. If the electricity must be off because of maintenance or construction for more than a few hours, please contact me as soon as possible. If I cannot be contacted in time, please place the frozen soda bottle of ice, located _____ _____, in the tank to help keep it cool. Even with the ice, the tank needs electricity as soon as possible.

In the event of a serious leak: A serious leak can be stopped by turning off all electrical parts of the tank system, or unplugging them. Any leaking tubes should be placed back in the tank or in a bucket. After all the water is cleaned up, the source of the leak can be fixed. This will probably be loose tubes or tubes which fell out of the tank. If there are more than 4 inches of water left in the tank, the fish can survive. Please do not add any water to the tank if this is the case. Lots of tap water, or water that is too warm, can kill the fish. If there is very little water in the tank, please add only enough cold tap water to let the pump work again. If the leak is fixed, please turn on all devices before you leave.

Do I need goldfish to start my nitrogen cycle? If I start late, should I use more goldfish?
At this time, it is no longer recommended that goldfish be used to help "break in" the tank system. All systems should be installed with additives such as Biozyme or Stress Zyme which help create a suitable water environment.

Can I mix species of trout?
No, the different trout species may not be compatible. The risk of cannibalism among young fish (under ½ year of age) is greatly increased with species mixing.

Why are so many of my eggs or fish dying?
Death is a natural part of fish development. Everyone should expect to lose eggs and fish. The exact survival rate is highly variable and based on many factors. A sudden spike in mortality can indicate a tank problem. It is also worth noting that there are two naturally high-mortality periods, first during the egg stage and then again when the trout first learn to feed. Some fish never learn to feed and simply starve.

What is a normal death rate?
Death rates are different from one stage to the next. With green eggs, a large percentage are expected to die. With eyed eggs, a higher survival rate is expected. The loss of most of your eyed eggs does suggest a problem. As the fish hatch, and age further, survival rates should improve. By the time fish are free swimming and have learned to eat, death should be an uncommon event. Losing many free swimming fish, above all else, is a sign that the tank environment is not healthy. As they grow, fish produce more waste, so cleaning and water changes may be needed more often.

Most of my fish died in the first month, is this common?
One of the most common times for massive fish death is in the first month. Because eggs and young fish are more easily stressed, there is a high risk for death as a result of fungus, changes in water quality, or large swings in temperature. While the UVS will help with any fungus issues, it is important that water changes and cleaning be practiced before the fish arrive, and that this process is maintained on schedule. Most catastrophic die offs seem to start with a missed cleaning day or weekend. By the time cleaning resumes, the damage may have already been done.

What do I do with dead fish or dead eggs?
It is very important that dead eggs, dead fish, and decaying waste matter (discarded food for example) are removed as soon as possible. This should be done at least once a day, and even more often during critical periods or as needed. This process alone is very important in keeping the remaining fish alive. Poor cleaning is very often the root cause of excessive fish death.

Why are my fish or eggs dying at an abnormally high rate?
Poor water quality, as a result of insufficient cleaning or water changes is among the most serious threats to fish health. It is essential that water changes of 10-20% per week (more as the trout get older and bigger) be maintained, with aged tap or well water. Other causes of fish death might be temperature fluctuations, lack of aeration, and chemical exposure. High ammonia concentrations can result in sudden fish death. Your daily water testing

will show if you are having continually high ammonia concentrations. Dealing with ammonia spikes is covered a little further on.

How sensitive are the fish to temperature changes?
For best results, the trout should be exposed to the most stable temperature possible, as close as possible to the ideal. Fish can handle small fluctuations of one or two degrees, but sudden changes of almost any scale will be stressful. Changes of 5 degrees or more are a serious threat to trout survival particularly if they are sudden.

How can I help keep a stable tank temperature?
It is important that the chiller always be on and set to the appropriate temperature. Also, because water changes introduce warmer water into the tank, please limit these changes to 10% of your tank volume at any one time. The use of insulation will help the chiller maintain a stable temperature, but may not be needed. Larger tanks will also help protect fish because they have more water to buffer any changes.

Why is the air stone needed?
Aeration of the tank is an important part of simulating a stream environment. The stream environment is not only cold, but also constantly moving and constantly mixed with air. Because of this, it is important that filters, air-stones, and the chiller pump all operate well. The pre filters on the chiller pump and the intake on the tank filter, as well as the surface of the air-stones should all be clean and free of debris.

Should students wash hands *before* touching tank water?
Students may wish to clean their hands before working in or around the tank **without using soap**. Simply use warm tap water for this, and for cleaning of other objects like nets and the bucket. This will help keep chemicals and dirt from getting into the tank. Moisturizers and other skincare products might also harm fish. It is very important that no soap enter the tank environment, because soap may harm or kill fish even in small concentrations.

Should students wash up *after* contact with tank water?
Yes. While tank water is not particularly hazardous to students, they should clean their hands with soap and warm water. Please do not use soap until all tank work is done.

Some of my hatched fish are not eating - Some of my fish are deformed. Is this normal?
Yes. During the growth process, some fish will die. Some fish may survive initially only to die later because they never begin to eat. Other fish will be deformed, and very often will also die as a result of this. This is a natural part of fish reproduction. It is not normal, however, for very many or most of the fish to die. If this is the case, there may be a problem with the tank environment.

My fish have hatched, what should I do with the eggs?
The discarded egg shells will decompose naturally in time. If they appear to be hosting fungal growth, they should be removed and disposed of. Just as with living eggs, they might turn opaque white, or may take on a fuzzy appearance. If this is the case, please remove them.

When should the trout be allowed out of the hatching basket?
It is generally agreed that trout should remain in the basket as long as possible, even after some start to jump out on their own. Once the trout are all able to swim freely, and are strong enough to navigate the currents of the tank, you can release them into the tank. After the trout have been actively feeding for a week or two, they should be nearly strong enough.

How do I let the trout out of the basket when it is time?
You can gently remove the basket from the sides of the tank and slowly lower it to the bottom of the tank. You can let the trout swim out from here. This allows some trout to remain in the protection of the basket for a few days. You may also gently tip the basket as well to remove them, but it is best to be as gentle as possible. Please make sure that the basket is empty before removing it from the tank. Using the pre-filters on the intake lines of the filter and chiller will ensure that small fish are not sucked into these units as a result of the powerful suction these tank components generate.

My alevin are very active, and are pushing other fish into the corners of the basket. What does this behavior suggest? Should I be feeding these fish more?
This type of activity is normal in trout. In this stage, young trout prefer dark corners. It may be helpful to put some screen material over the basket to reduce the amount of light these fish are exposed to. UV light can be harmful to eggs and alevin. Fish at this age do not need food at all. When beginning to feed, at the end of the alevin stage, please start with small amounts.

Trout are being sucked into the filter, how can I prevent this?
Using the pre-filters on the intake lines of the filter and chiller will ensure that small fish are not sucked into these units as a result of the powerful suction these tank components generate.

What is an ammonia spike? What can I do about it?
An ammonia spike is one example of a chemical imbalance in the tank environment. These are serious threats to fish health. The tank filter and its bacterial population help reduce problems like this, but they cannot work alone. The best way to prevent any chemical imbalances in the tank is to regularly clean the tank, and change the water. All debris such as food, waste, and dead fish should be removed as soon as possible. Water changes of 10-20% per week are required and should not be skipped. There is no replacement for regular cleaning and water changes.

Can I use ammonia removal grains to prevent ammonia spikes?
They may be used only in a dire emergency if a large water change did not reduce the ammonia. These chemicals tie up the ammonia in the water rendering it harmless to the fish. HOWEVER, by tying up the ammonia, it deprives your biological filter (the “good” bacteria) of the food it needs to live and grow. So in the long run, while you have reduced your ammonia, you are killing off your long-term ammonia reducer (your biological filter).

My tank is coated with a green slime. What is this? What should I do?
Green films or slime may indicate algal growth. This will not necessarily hurt your trout,

and some teachers leave it growing. Many, however, choose to remove algal growth. It can be mechanically cleaned by using an aquarium (or soap free) sponge or similar tool. Also, to prevent further algal growth, it is best to limit the amount of light entering the tank. The use of foam or paper to cover the sides of the tank will help. The tank should never be in direct sunlight at any time. This may also indicate that the UV sterilizer is not functioning properly. Please be sure to change the bulb every year. Even if an older bulb produces blue light, it may not be creating UV light anymore.

I am using the same tank system I had last year, what do I need to do to make it ready this year?
At the beginning of each year, to prepare for the next set of trout, you should clean all parts of the tank system with warm water. Please do not use soap on any part of the tank. You should also replace any disposable filter parts, and install a new UV bulb. See our End-of-Year Cleanup Section XI for more information.

The water in my tank is cloudy. What should I do?
Cloudy water probably indicates an excess in decaying matter. This may be from dead fish, leftover food, or a problem with the filtration. Carefully conducting regular water changes, as well as cleaning the tank of all solid material, is the best way to fight this. Make sure the filter is functioning properly, and that water is flowing out of it. Clean filter components if needed with aged or well water, but do not use soap or any chemical cleaners. Carbon filter packs should be replaced every year. If fish are not eating all provided food, you may reduce the amount given until they are able to eat it all. Excess food after 10 minutes should be removed and discarded.

How should I conduct water changes? What is the right amount of water to change?
Water changes are an important part of tank maintenance. Improper water changes can cause fish stress or even death. It is best to change about 10-20% of tank volume every week with tap water aged for more than 48 hours (so that the chlorine in the water has had time to dissipate) or well water.

Using the gravel vacuum is an efficient way to clean both the tank and remove water at the same time. Twice a week cleaning will keep the tank clean as well as generate a 10%-20% water change.

What happens to the fish next?
The fish will be released into a watershed stream or river. Students can participate in the transportation of fish to their new habitat as well as the release process. It is hard to determine the survival rates for released trout, but full grown fish have been recovered and genetically linked to trout raised in the classroom. However, in general, TIC is not a stocking program, but rather an educational program. The true value of raising and releasing trout lies in the process.

Hardware assembly FAQ -- also see our Basic Set Up page

How tight should plastic parts be?
Plastic parts need to be tightened by hand. They should be as tight as possible without risking damage.

Is it safe to use metal tools on plastic parts?
The use of metal tools is OK when great care is taken. It is more important that parts be screwed in place in the proper position; no amount of force can replace good alignment.

What tool should I use to tighten the worm gear clamps?
Some ring clamps come with thumb screws that allow tightening without tools. Others only require a screw driver. These should be tight, but should not be forced. It is possible that plastic parts could be broken with too much force.

Does it matter where I put the chiller?
Yes, the location of the chiller (above or below the tank) may alter the water pressure and flow rate in the system. While the pump can handle just about any arrangement, placing the chiller on the floor below an elevated tank will slightly reduce water flow and pressure. It is more important that tubes be free of kinks or excessive bends, so adding length to relax tubing is fine. The best place to put the chiller is directly below or to one side of the tank. It is best to put the chiller as close to level with the tank, but it is not required.

My tap water is discolored, is this ok?
All water will have some color, most often a faint green or white color. Tap water that is not acceptable might appear very cloudy or may have a strong chemical smell. If this is the case, an alternate source of water should be considered.

How do I know if my water is safe for trout?
Most tap water will be acceptable for use in this tank system. After a break in period of at least one week, there will be plenty of time for chlorine to dissipate, and for particulate matter to be filtered out. Unless your water appears to be totally unacceptable, it is probably safe for trout. The break-in period is an important part of this, so being safe after a week does not mean that water directly from the tap would be safe for fish.

How should I assemble the hatching basket?
The hatching basket is designed to protect very young fish from physical harm. The plastic frame should be secure, and free of sharp edges or scrap plastic. The net is supposed to be placed loosely around the outside of the plastic frame. The net should be loose because this helps make the edges less prone to damage fish which become stuck. To avoid this problem entirely, some teachers prefer to place the net inside the frame and then secure it at each corner with needle and thread. Ensure that the net will not fall off, and is free from holes or damage.

Should the net be on the inside or outside of the hatching basket?
While the manufacturer designed this net to be placed around the outside of the plastic frame, it can be improved by placing the net on the inside. This makes for an even safer environment for the young fish. Monofilament or twist ties can help secure the net to the inside. The net can be loose, but should not float up as this could let the eggs fall out of the basket.

What tools are needed for tank installation?
The only tools needed for tank installation are a screwdriver, knife or pair of scissors, and

pliers to tighten any connections if needed. You may also need a clean 5 gallon bucket to assist in filling the tank and water changes. This can be purchased at any hardware store. Please rinse the bucket first and then do not use this bucket for anything other than tank water.

Do I need to age tank water before first filling the system?
No, the break in period will age the water before fish are introduced.

The tubing is very hard to fit over the plastic tank parts, what should I do?
If tubing doesn't fit over parts, it might help to dip the end of the tub in very hot water. This will momentarily soften the plastic allowing you to slide the tubing over the part.

Also, tubing can be carefully stretched by heating the ends, and then inserting a rigid object like a pair of scissors into the end. This applies pressure to the end and stretches it a small amount. Excessive force can break the tube end.

Tight tubing generally will fit, but it might require some time and patience.

Should I get a lid for my tank?
Yes, it is better to cover the tank with some material which can prevent objects from falling in, and provide the reduced light levels that fish prefer. Foam, screen, and plastic have all been used as lid materials with success. Purchased lids for the tank can also work, but because many of these include lights, it is important that the light feature not be used.

Does my tank need insulation?
Many tank systems have worked without insulation. However, insulation will provide a darker, more stable environment for the fish. Insulation will reduce the amount of work needed to maintain the water temperature, saving electricity and limiting the amount of time the chiller will be operational. In addition, insulation will reduce condensation which could pose a problem in the summer.

What kind of insulation can I use?
There are many materials which can help insulate the tank. The most popular is foam sheet material, available at any home repair - industrial hardware store. Two layers of bubble wrap, the shipping material, also would make a good insulator. For best results, cover the bottom of the tank as well. Many other materials can work including plastic, wood, or cardboard.

Where do I position the air stone?
The air stone aeration system produces a large volume of bubbles. These bubbles can interfere with the filter operation by filling the motor with air and causing it to “air lock” and fail. For this reason, there should be at least 4 inches between the air stone and the filter.

I Ran out of Food. What do I do? Contact Richard Landreth (see Contact section) and food will be sent to you.

Section XIV. Teaching Aids

Here are some teaching aids that will help you energize your students about TIC. While they are fun, they also help teach about trout.

Trout Coloring Features:

- The lateral line is often marked by color.
- Most trout have small spots.
- Many trout never lose their parr marks—the dark, oval-shaped splotches along their bodies that can be a form of camouflage.
- Coloring of a trout often matches their environment to some degree.
- Males and females within a species can have different colors.
- Colors can change over the lifetime of a trout, usually becoming more distinct and vivid as they age.
- Trout colors become even more vivid at spawning time.

Trout Picture Resources:

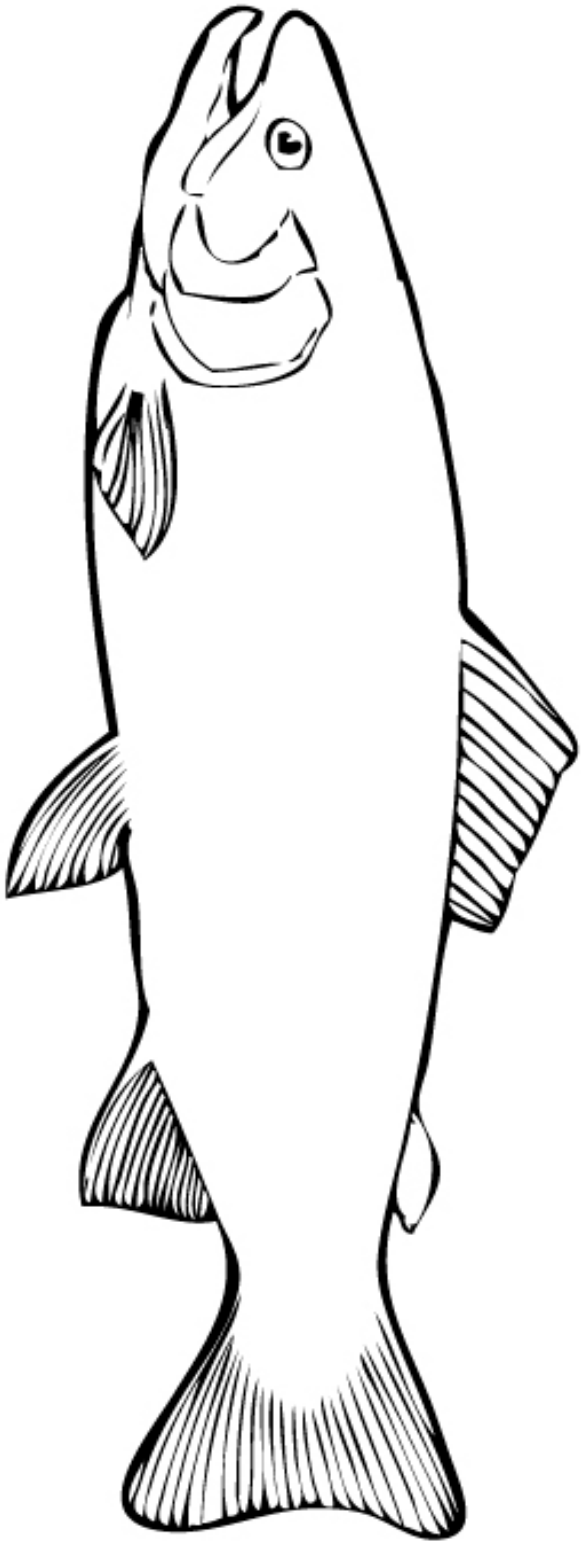
Behnke, Robert J. *Trout and Salmon of North America.* Illustrated by Joseph R. Tomelleri. New York: The Free Press, 2002.

Prosek, James. *Go Fish: A Fishing Journal.* New York: Stewart, Tabori & Chang, 2000.

_____. *Trout: An Illustrated History.* New York: Alfred A. Knopf, 1997.

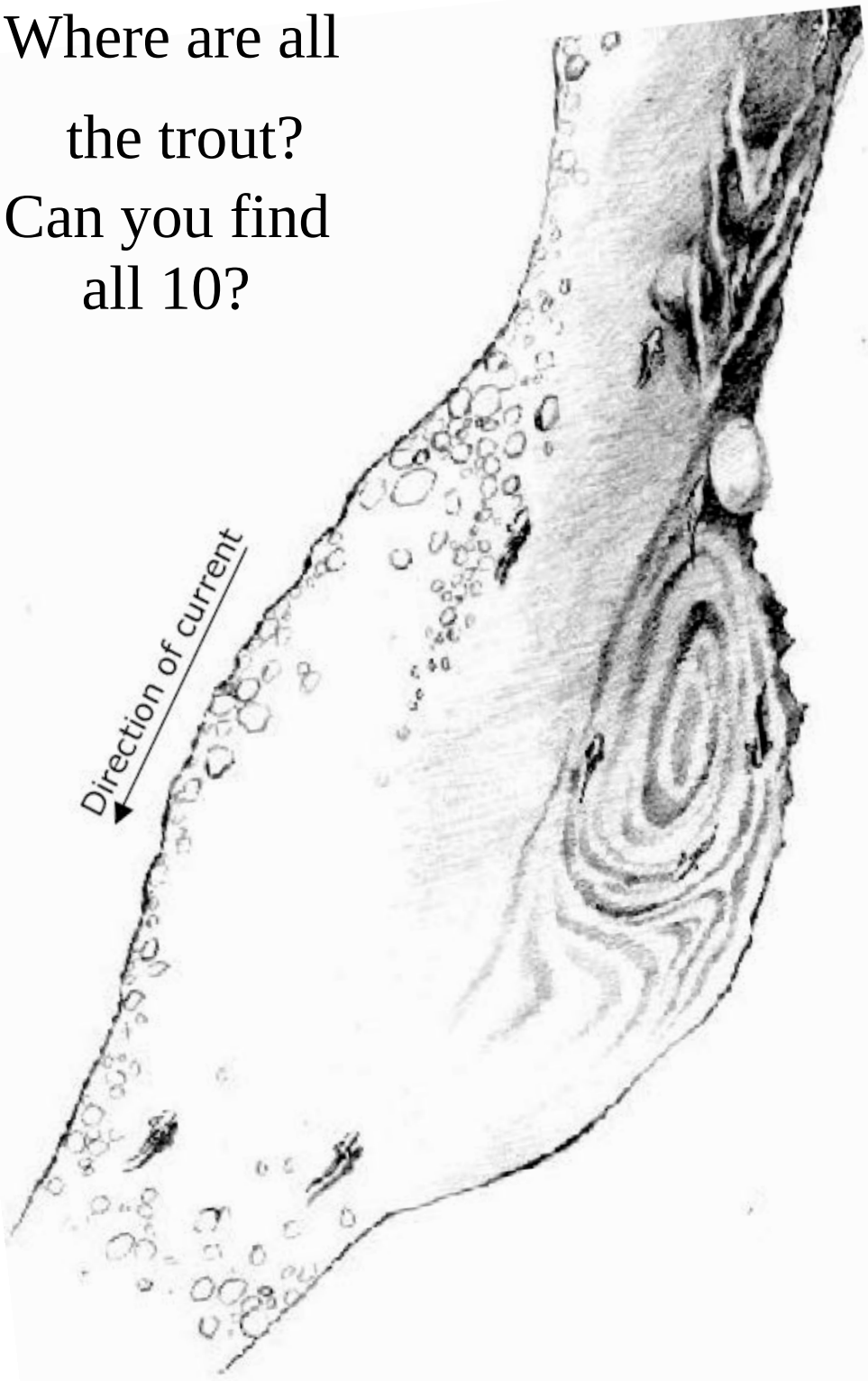
_____. *Trout of the World.* New York: Stewart, Tabori & Chang, 2003.

James Prosek's website is www.troutsite.com.

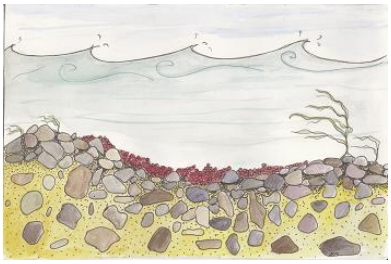


Color A Trout

Where are all the trout? Can you find all 10?

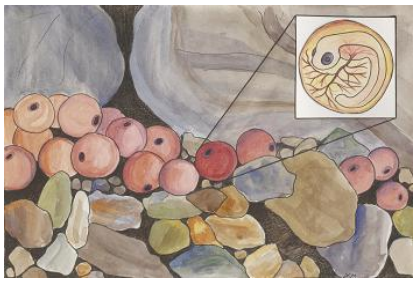


ONCE I WAS A BABY TROUT



1. First I was a GREEN EGG sitting in my redd.

2. Then I was an EYED EGG, my eyes were on my head.

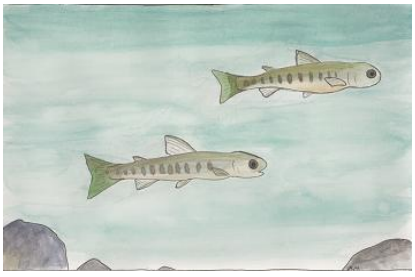


3. Then I started HATCHING; the egg shell left my back.

4. Then I was an ALEVIN with a big yolk sac.

5. Then I had to USE YOLK; I watched my belly shrink.

6. Then I was a LITTLE FRY—I wanted food, I think.



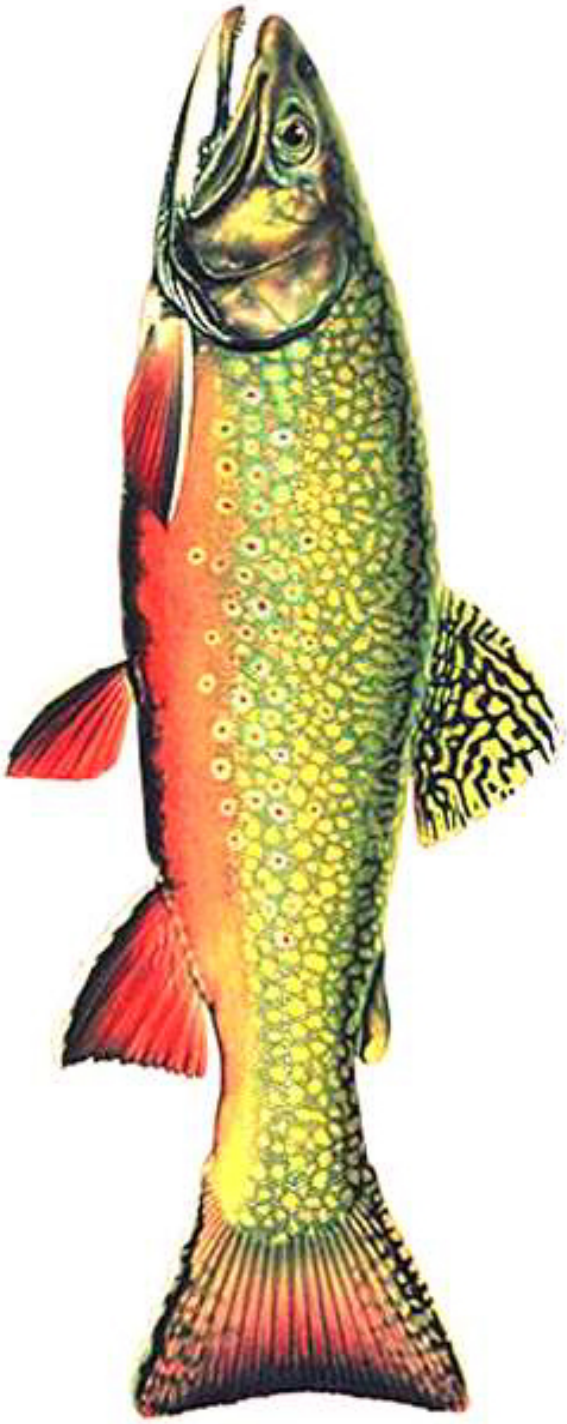
7. So I looked for BUGS TO EAT and I swam around.

8. Soon I had my PARR MARKS, so I couldn't be found.

The following images can be printed to show your students what their trout will look like when fully grown

Brown Trout

Brook Trout



Section XV. Potential National Funding Sources

TOSHIBA AMERICA FOUNDATION GRANTS

Applications for grants under $5,000 are accepted year-round. Check the Web site for grades K-6 and 7-12 application rules. Deadline for grants over $5,000: February 1st or August 1st The Toshiba America Foundation encourages teacher-led, K-12 classroom-based programs, projects, and activities that have the potential to improve classroom experiences in science, mathematics, and technology.

CAPTAIN PLANET FOUNDATION

The mission of the Captain Planet Foundation (CPF) is to support hands-on environmental projects for youth in grades K-12. Our objective is to encourage innovative activities that empower children around the world to work individually and collectively as environmental stewards. Through ongoing education, we believe that children can play a vital role in preserving our precious natural resources for future generations.

BEST BUY SUPPORT FOR INTERACTIVE TECHNOLOGY

The Best Buy (http://www.BestBuy.com/) te@ch program recognizes creative uses of interactive technology in K-12 classrooms. The purpose of te@ch is to reward schools for successful interactive programs they have launched using available technology. This program has deadlines; check the website to find them. To apply, educators must first register as an applicant and identify a Best Buy store within a fifty-mile radius of the school.

TOYOTA TAPESTRY GRANTS FOR TEACHERS

Open to K-12 teachers of science residing in the United States or U.S. territories or possessions. All middle and high school science teachers and elementary teachers who teach some science in the classroom are eligible. This program has deadlines; check the website to find them. Proposals must describe a project including its potential impact on students, and a budget up to $10,000 (up to $2,500 for mini-grants). Environmental Education is one of their three target categories.

DONORS CHOOSE

If you are a public school teacher, DonorsChoose invites you to submit a project proposal for materials or experiences that would help your students learn. Please note that teachers do not receive any monies. If a donor funds your proposal, DonorsChoose will purchase and deliver what you requested. We currently serve all public schools in Alabama, Chicago, Indiana, Los Angeles, Louisiana, Mississippi, New York City, North Carolina, the San Francisco Bay Area (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano and Sonoma counties), South Carolina, and Texas.

KIDS IN NEED TEACHER GRANTS

Kids In Need Teacher Grants provide K-12 educators with funding to provide innovative learning opportunities for their students. The SHOPA Kids In Need Foundation helps to engage students in the learning process by supporting our most creative and important educational resource - our nation's teachers. Businesses work through KINF to sponsor classrooms.

OUTDOOR CLASSROOM GRANT PROGRAM

Lowe's Charitable and Educational Foundation, International Paper and *National Geographic Explorer!* Magazine have teamed up to create an outdoor classroom grant program (TIC can be framed with stream study and release trips). The program focus is to engage students in hands-on natural science experiences and allow enrichment across the core curriculum. All K-12 public schools in the US are welcome to apply.

TARGET FIELD TRIP GRANTS

Education professionals who are employed by an accredited K-12 public, private or charter school in the United States that maintain a 501(c)(3) or a 509(a)(1) tax exempt status can apply for up to $1,000 for a class field trip. Educators, teachers, principals, paraprofessionals or classified staff of these institutions must be willing and able to plan and execute a field trip that will provide a demonstrable learning experience for students.

Section XVI. TIC Resources (very incomplete)

Here is a listing of TIC Coordinators and Teachers who have been in the TIC program for at least 1 year available to assist you if you are having problems with your TIC Program:

Trout Unlimited Chapter Coordinators

Name	Phone Number	E-Mail	Location
Richard Landreth	540-885-4209	landrethcats@aol.com	Staunton
Mark Zimmerman	540-722-4914	mbzimmerman@comcast.net	Winchester
Brian Williams	276-634-2592	bwilliams @danriver.org	Collinsville
Karl Miller	540-989-6549	knj_miller@msn.com	Roanoke
James Hutton		jamhut21@hotmail.com	Roanoke
Chris Mullens	304-425-7275	ccmullens@suddenlink.net	Princeton, WV
Angelo Biviano	540-808-8436	abiviano@vt.edu	Floyd
Urbie Nash	540-943-4202	urbienash@yahoo.com	Waynesboro
Jeff Peake		jpeake@rockingham.k12.va.us	Rockingham County
Doug			Stuarts Draft

Teachers currently in the TIC program

Name	Phone #	E-Mail	Location
Barbara Lester	276-963-5765		Roanoke
Angie Clem	540-879-2535	aclem@rockingham.k12.va.us	Dayton
Donna Barber	540-828-6081	dbarber@rockingham.k12.va.us	Bridgewater
Jeff Peake	540-438-1965	jpeake@rockingham.k12.va.us	Harrisonburg
Kirsten Redifer	540-828-2008	kredifer@rockingham.k12.va.us	Bridgewater
Thomas Harrison	540-298-1228	tharrison@rockingham.k12.va.us	Elkton
Dick Vipperman		dickvipp@aol.com	Roanole
Marilee Weikel	540-772-7570	mweikel@rcs.k12.va.us	Roanoke
Mary Lupsha	540-772-7570	lupslexmax@yahoo.com	Roanoke
Amanda Whitesell		awhitesell@waynesboro.k12.va.us	Waynesboro
Bobbi Poats		bpoats@augusta.k12.va.us	Staunton
Courtney Rodgers		rodgersc@augusta.k12.va.us	Fishersville
Jane Cox		jecox@augusta.k12.va.us	Fort Defiance
Jo-el Nelson		jnelson@augusta.k12.va.us	Staunton
Linda Harper-Herron		lherron@waynesboro.k12.va.us	Waynesboro
Luanne Leonard		lleonard@augusta.k12.va.us	Staunton
Randy Wingfield		rwingfie@waynesboro.k12.va.us	Waynesboro
Roxie Megginson		rmegginson@augusta.k12.va.us	Stuarts Draft
Chuck Way		wayfront@earthlink.net	Washington
Delinda Hendricks		dhendricks@pagecounty.k12.va.us	Luray
Denise Martin		denise.martin@comalisd.org	New Braunfels
Donna Hicks		dhicks@henry.k12.va.us	Collinsville
Karen Gauriloff		kgaurilo@loudoun.k12.va.us	
Katherine Anderson		kanderso@henry.k12.va.us	Martinsville
Laura Turton	276-638-1022	lturton@henry.k12.va.us	Martinsville

Lisa Bowman	lisa.bowman@frco.k12.va.us	Henry
Lisa Pluska	se-g5671@patrickcounty.org	Stuart
Ric Gauriloff	fgaurilo@loudoun.k12.va.us	Aldie
Sally Moore	sally.moore@frco.k12.va.us	Henry
Sheree Gillespie	Sheree_Gillespie@rockbridge.k12.va.us	Buena Vista
Tammy Wood	tamwood@swva.net	Meadows of Dan

Section XVII. Letter of Understanding

Letter of Understanding

Date: _____

This letter of Understanding is between the _____ Chapter of the Virginia Council of Trout Council and _____(Teacher) of the _____ school district.

In exchange for participating in the Trout In The Classroom program (Program), the above chapter will provide, at no cost, all the necessary items needed (see Tank Set Up section) to establish and maintain the Program in the above named teacher's classroom. In exchange, the Teacher acknowledges that the provided equipment is to be used exclusively for Program. If the above named teacher elects not to continue participating in the Program, all the equipment, less the supplies needed to test the water chemistry, will be returned to the _____ chapter.

The _____ Chapter has the discretion to allow the equipment to be used to raise other fish until 30 days before the Program will commence.

Agreed to by:

_____ _____

Teacher _____ Chapter

Virginia Council of Trout Unlimited

Section XVIII. Sample Grant

Dear Staunton Augusta County Chapter of the Izaac Walton League

My name is XXXXXXX and I am a XXXXXXXXX at XXXXXXXXXX School in XXXXXXX County. One of my goals as a 7th grade Life Science teacher is to capture student interest in the outdoors; which I believe many students have lost. In order to achieve this goal I am trying to implement the Trout in the Classroom Program from Trout Unlimited. This program will entail having a 55 gallon freshwater tank set up in the classroom. It will be equipped with the proper gear to incubate brook, rainbow, or brown trout eggs and raise the fry to maturity. In the spring, with the cooperation of the Department of Game and Inland Fisheries, students will release the trout in a nearby stream, as well as, perform on site water quality and macroinvertebrate tests.

I envision using Trout in the Classroom to touch on subjects cross the curriculum. In science, students will learn about habitats, ecosystems, and watersheds. This also provides students a Meaningful Watershed Educational Experience (MWEE) as intended by the Chesapeake Bay Educational Program and the Virginia Standards of Learning. Students will use math concepts such as graphing, measurement, and computation. Students will incorporate Language Arts, by learning new vocabulary, writing about their observations in their science journals, and create essays centered on conservation issues. In order to connect to Social Studies, students will learn about the different topography of Virginia and the popular land uses throughout the Commonwealth. Through this study, students can address the shrinking native trout waters throughout the state and the land uses that contribute to this habitat degradation.

Unfortunately, Trout Unlimited does not provide funding for this program, and teachers are left to seek out funding on their own. The total cost of the project is around $1,000 dollars. The most vital part of the Trout in the Classroom system is the chiller, which costs around $500 dollars. Without the chiller, the trout cannot survive. I am asking if your chapter would be willing to donate the funds necessary to purchase this chiller. However, any funding that you can provide will be helpful. Thank you for considering this request in order for students to make a connection with their community, recreational facilities, rivers/streams, and to learn how their actions in the Shenandoah Valley can impact their future.

This sample grant proposal was graciously provided by Courtney Rodgers, a Middle School Teacher at Wilson Middle School in Augusta County, who has participated in the TIC program for two years. She was successful in obtaining her grant.