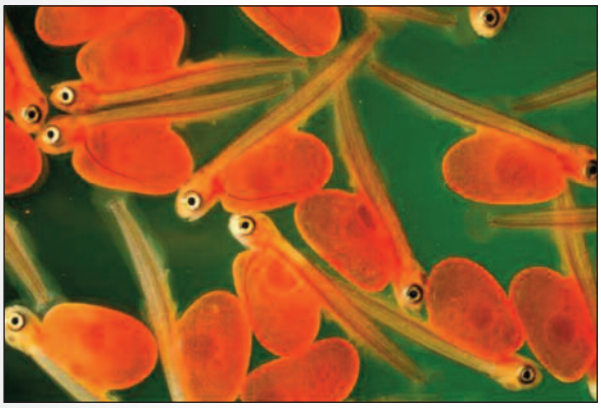
Fish Eggs to Fry Program



Volunteer Guide

OREGON FISH AND WILDLIFE
Fish Eggs to Fry
SALMON TROUT ENHANCEMENT PROGRAM

Fish Eggs to Fry Program Overview

The Fish Eggs to Fry Program is an integral part of the Oregon Department of Fish and Wildlife's Salmon Trout Enhancement Program (STEP). Hundreds of schools throughout Oregon participate in the program every year, introducing thousands of students not only to the biology and life history of trout, salmon and steelhead but also to a broad range of environmental science and stewardship concepts. The great strength of the program is the way it opens doors to teaching a variety of subjects using a range of lessons and techniques both in the classroom and in the field while offering many opportunities to involve and harness the talents and expertise of other members of the community.

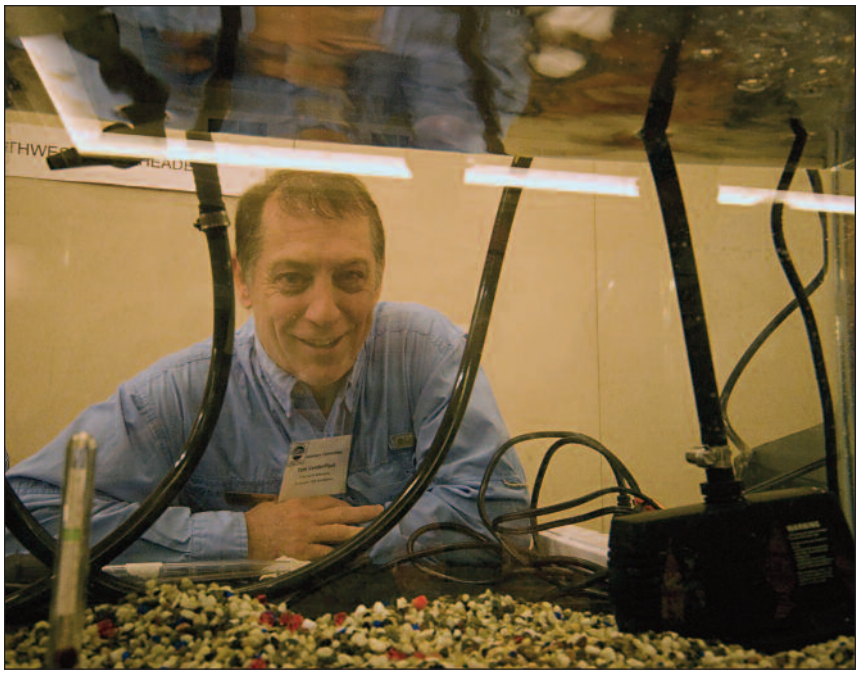
Raising fish in the classroom is not difficult, but does require advance planning, preparation and equipment. The process begins when a teacher or school district contacts the regional STEP biologist and expresses interest in participating in the Fish Eggs to Fry Program. The biologist will provide information on the technical details of setting up an aquarium, as well as helping procure equipment and initiate the process for procuring trout or salmon eggs to be incubated.

Regular care and monitoring of the aquarium system, water temperature and quality, and eggs are necessary to successfully hatch as many fish as possible. Pumps, chiller unit and other aquarium components are monitored daily to make sure they are working.

Depending on their ages, the students can perform many if not most of these tasks. During this incubation period, teachers implement lessons based on the Fish Eggs to Fry Program. These lessons can be as varied as creative writing, statistics, graphing, biology, and art projects.

During the period when the eggs are being incubated and the small fish are being raised, volunteers may come to the classroom to give presentations to the students on fish, conservation, fishing and a variety of other related subjects. Field trips are also conducted to give students an opportunity to experience hands-on activities and lessons involving fish, aquatic ecosystems and fishing.

When the time comes to release the fish, the class field trip to put them in a local stream or water body offers additional educational opportunities for the students as well as a chance to see the fish they have raised from eggs set free into the environment in which they have evolved.



More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:
http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Volunteering for Fish Eggs to Fry

Benefits to volunteers for being in the program

There are many benefits for individuals and organizations to volunteer their time and expertise in the classroom Fish Eggs to Fry Program. These include creating and strengthening ties among schools, volunteer organizations and the Oregon Department of Fish and Wildlife, publicity and public relations benefits within the community, and the opportunity to leverage involvement in the program to develop new funding opportunities and to integrate participating schools into a variety of additional programs focusing on aquatic and angling education.

How volunteers can assist the Fish Eggs to Fry Program

There are many ways that individual volunteers and organizations can participate in the Fish Eggs to Fry Program. Teachers that are participating in the program but are supporting themselves are considered volunteers for the purposes of this manual. Some of these tasks include:

- *Assisting the STEP biologist in picking up eggs for the classroom*
- *Delivering eggs to the classroom*
- *Helping the teacher set up and/or maintain the classroom aquarium*
- *Training the teacher in how to operate and care for the aquarium and eggs*
- *Presenting educational talks to the class about incubating fish eggs and raising fry*
- *Assisting with release of the fry and associated streamside teaching lessons*
- *Introducing and presenting other related topics such as angling and habitat monitoring*
- *Leading field trips*

Becoming an Eggs to Fry Program volunteer

Becoming involved as a volunteer for STEP and the Fish Eggs to Fry Program is easy. Contact your local ODFW regional STEP biologist, who will get you started with the process. That process includes filling out some simple forms agreeing to abide by the volunteer code of conduct. In some cases, local staff may have you fill out the ODFW Volunteer Application, which asks for basic information about the applicant including skills, interest, what they want to volunteer to do, and when and where they are available for volunteering.

Your STEP biologist will make sure you have the information you need to help with the Fish Eggs to Fry Program, which may include training, providing various educational materials or putting you in touch with local groups or clubs already involved in the program.

ODFW volunteer policies and code of conduct

ODFW volunteers agree to abide by a Volunteer Code of Conduct and follow all applicable policies. This includes:

- *Obey all federal, state and local laws, and state ethics laws.*
- *Refrain from using exclusive information gained for their own personal advantage.*
- *Be respectful and courteous to everyone they encounter as a volunteer.*
- *Do not use or borrow ODFW equipment and supplies for personal use without permission.*
- *Adhere to a drug and alcohol free workplace policy.*
- *Maintain a valid drivers license and good driving record.*
- *Maintain a professional demeanor while volunteering.*

The entire code of conduct will be provided when you sign up to be an ODFW Fish Eggs to Fry Program volunteer.

Protocols for entering schools

Procedures and protocols for entering schools may vary by individual school or school district. Typically, after volunteers have arranged a date and time to come to a classroom to set up an aquarium system, deliver eggs or to make a presentation, the teacher will provide the administration office with the volunteers' names, time of arrival and purpose of their visit. Upon arriving at the school, the volunteers will need to sign in and then follow the school's established visitor protocols.

In some school districts volunteers may be required to submit to a background check (even if you have undergone one for ODFW). Other things to consider while visiting the school environment is to avoid being alone with children, such as in restrooms, or transporting children on your own.

More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:
http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Preplanning for the Season

Establishing contact with school districts and teachers

Because STEP and the Fish Eggs to Fry Program have been around for so long, many school districts and teachers are regular participants in the classroom aquarium program or are aware of it. Typically, school districts or teachers will contact their local STEP biologist to sign up for the program for the current or upcoming school year. The classroom Fish Eggs to Fry Program can be used at just about any grade level, however, most participating classrooms are in grades four through six.

Teachers new to the program

The first step to becoming involved is to contact the regional STEP biologist. The STEP biologist will send the teacher or school information about the program including the *Fish Eggs to Fry* manual, *An Educator's Resource Guide for Hatching Salmon and Trout in the Classroom* and any information specific to your region.

The STEP biologist may do individual or group training and help procure a classroom aquarium and get it up and running. The STEP biologist will also be able to connect teachers with volunteers who can help.

Volunteers

Volunteer groups and fishing clubs may also be heavily involved in setting up and coordinating the Fish Eggs to Fry Program directly with teachers, especially if there are a large number of classrooms or schools involved. Volunteers may also be involved in training teachers on the process of incubating the fish eggs and caring for fry, and sometimes participate in teaching lessons in the classroom and on field trips.

While there may be some variation depending on the STEP district, the basic procedure for initiating each season's classroom aquarium program includes:

- *Contacting teachers who are regular participants in the Fish Eggs to Fry Program to determine if they intend to continue to participate. Letters or e-mail are usually the most efficient methods for contacting teachers.*
- *New teachers who have expressed interest in participating are also contacted.*
- *Keeping a spreadsheet of participating teachers names, schools, addresses and e-mails is an efficient way to keep track of teachers and classrooms involved in the program.*
- *Typically, teachers are contacted in the fall and spring, however some districts will have eggs available several times each year. Fall eggs are usually salmon while spring eggs are generally steelhead or trout.*
- *Once teachers have responded, confirm that each participating classroom has an aquarium, chilling device and other equipment available. New classrooms will need to be provided with an aquarium set up. To maximize efficiency, aquarium equipment can be transferred from previously involved classrooms that have decided not to participate to new classrooms.*
- *Determining which teachers need training and assistance with setting up their classroom aquarium.*
- *Have teachers fill out an egg request form.*

Coordination with STEP biologists

STEP biologists may often take the lead in getting a school or teacher started in the program. The area where volunteers and volunteer groups most often coordinate directly with their STEP biologist involves procuring fish eggs and delivering them to the classrooms. Volunteers may also coordinate with the STEP biologist on presenting educational programs, especially when incorporating the Aquatic and Angler Education Program with the Fish Eggs to Fry Program, and on field trips.

There may be limited funding and staff or volunteer time to support additional classrooms that want to be involved in the program. In some cases, that means wait lists have been established. While the local biologist may have equipment on hand, or funds to purchase or repair equipment, it is typically limited. For this reason, it is important for volunteers and teachers to contact and work with the local STEP biologist well in advance of the start in the program so the best course of action can be determined. Teachers may also purchase their own equipment.

Fish Egg Delivery Dates by STEP District

STEP District	Approx. Egg Delivery Dates	Fish Species
North Willamette	Mid to Late October Late October Late January	Spring Chinook Rainbow Trout Rainbow trout
Mid-Willmette	Mid to Late October Late January	Spring Chinook Rainbow Trout
South Willamette	Early to Mid-October Late January (on occasion)	Spring Chinook Rainbow Trout
North Coast	Mid-October through November Early January Early January February/March	Spring Chinook Fall Chinook Rainbow Trout Steelhead
Mid-Coast Newport/Lincoln City Florence	 Feb/March and April/May Early April	 Steelhead Steelhead
Umpqua	Late April to Early May	Steelhead
Coos, Coquille, Tenmile	Early to Mid-January Mid-February to Mid-March	Fall Chinook Steelhead
Lower Rogue	Mid-March to Early April	Steelhead
Upper Rogue	Mid to Late October	Spring Chinook
Eastern Oregon Eastern and Central Klamath, Lakeview Prineville, Bend Central Oregon NE Oregon	 October January March April April	 Rainbow Trout Rainbow Trout Steelhead Rainbow Trout Steelhead

More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:
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Selecting an Aquarium System

There are three basic aquarium systems used in the Fish Eggs to Fry Program. They are:

Standard Aquarium with chiller

While aquariums ranging from six to 20 gallons can be used to incubate eggs, the preferred size is 10 gallons, which will adequately accommodate up to 200 salmon eggs or 300 trout eggs. Glass aquariums are the most common, but when available acrylic is favored to reduce the chance of breakage and injuries in a classroom situation.

A chiller is utilized to cool the water as it is the most efficient way to maintain the proper water temperature in the aquarium for tanks at least 10 gallons in size, which are best coupled with 1/10 to 1/13 horsepower models.

Standard Aquarium chilled with ice

This system also utilizes a 10-gallon tank, but the water is chilled to the proper temperature range by using bottles or plastic bags of frozen water placed inside the tank. This method is less expensive, but more labor intensive than using a chiller or wine cooler, and requires some experimentation to determine the best size containers to use and how often they need to be replaced to maintain the proper temperature. However, this can be an effective way to more actively engage students in the incubation and fish-rearing process. It is important to note that this method usually requires changing ice over weekends and holidays to avoid having the water temperature rise too high and losing eggs or fish.

Aquarium/Wine Cooler

A third option is a small aquarium — usually 3 to 6 gallons, placed inside a wine cooler with a glass front. This is a simple and easily set up system but provides less visibility for students to observe eggs and fry, and the smaller tank size requires more frequent water changes.

Other aquarium system components and accessories include:

- *Pump and hoses to maintain oxygen levels and water quality*
- *Filter to keep water clean*
- *Gravel (optional) to provide a more natural setting*
- *Aquarium cover (optional), useful for keeping bright lights and movement off fish to avoid alarming them, and to help keep the water clean*
- *Turkey baster for removing dead eggs and fry*
- *Aquarium net for removing egg shells and other contaminants*
- *ODFW Record Forms*
- *Water test kits for monitoring pH and oxygen levels*
- *Thermometer, stick or handheld, to ensure water is maintained at the desired temperature*

Setting up the aquarium

There are several types of aquarium set-ups used in the Fish Eggs to Fry Program, but the basic process includes:

- *Gather all aquarium system components.*
- *Using a hose, attach the pump to the chiller inlet.*
- *Attach another hose between the pump aerator and the chiller outlet.*
- *Place nylon stocking over pump intake to prevent fish from being sucked into pump.*
- *Place the aerator and pump in the tank.*
- *Place the thermometer in the tank.*
- *Fill tank with clean, chemical free water.*
- *Plug in pump and prime the filter.*
- *Turn on chiller and set for desired water temperature (49 to 54 degrees F.).*
- *Monitor water temperature with thermometer and adjust chiller settings as necessary.*

Getting the incubation equipment ready to receive eggs

Prior to receiving the eggs, it will be necessary to do an inventory of the aquarium and related equipment to ensure that all the components are there. It is especially important that all previously used equipment be thoroughly washed before a new batch of eggs is incubated. This includes the aquarium, filters, tubing, chillers, thermometers, buckets, egg pickers and any other equipment that comes into contact with aquarium water.

It is also advisable to fill the aquarium with water and let it sit for a few days to ensure it does not leak, and then drain it. The aquarium should then be filled 3 to 7 days prior to receiving the eggs to allow the water to reach the proper temperature and allow the chlorine to evaporate.

More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:
http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Receiving the Eggs

Coordinating with STEP Biologists on drop-off date and time

Getting the fish eggs from the hatchery into the classroom aquariums is a multi-step process. The first step involves the STEP biologist ordering the required number of eggs to supply all participating classrooms based on the Egg Request Forms that teachers filled out when signing up for the program. The maximum number of eggs provided per classroom is 500, although 50 to 200 are generally plenty depending on the size of the aquarium used. Whether they are trout, salmon or steelhead depends on availability and the region of the state. The eggs are procured from an ODFW fish hatchery so advance notice is recommended for classrooms wanting to participate to ensure enough eggs are available.

The STEP biologists will keep in touch with the hatchery and about 1 to 3 weeks or so before the eggs are ready for delivery the biologist will notify, typically through e-mail, their teachers and volunteers of the anticipated delivery date. The eggs are ready to go into the classroom aquariums when they have developed enough that you can see the fish' eyes through the egg membrane (eyed stage).

Once the exact date and time of egg pick-up from the hatchery is determined, volunteers need to be notified of when and where to meet the STEP biologist to transfer the eggs. This location is typically at the local ODFW office.

On the appointed day, the STEP biologist will go to the hatchery that is providing the eggs. The eggs will be transported in a cooler with the eggs wrapped in moist cloth or burlap to keep them cool and prevent them from drying out while they are being transported. Volunteers should bring a small cooler or other insulated container to transport their eggs to the classroom.

Once all the volunteers have been issued their eggs and their destination assignments, the eggs are ready to be delivered to the classrooms.

Determining class delivery schedule and coordinating with teachers

If a fishing club or other volunteer group is coordinating with the classrooms, a volunteer needs to be designated as 'coordinator' who will communicate with the STEP biologist, let the teachers know via e-mail that the eggs will be delivered soon, and obtain commitments from other volunteers to help with egg delivery. It will also be necessary to assign each volunteer to specific schools and classrooms. If enough volunteers are available, delivering the eggs to classrooms in pairs is ideal.

In addition, volunteers who will be offering a presentation to the class after they deliver the eggs should confirm at this time that they have all the materials they need including scripts for talks, Power Point presentations or videos, and that the teacher will have any needed multi-media equipment available when they arrive.

This is also a good time to remind teachers that they need to get their aquarium units up and running at least a few days before the eggs are delivered. It is vital that the aquariums be functioning properly and the water is at the correct temperature when the eggs are delivered. If any teachers are having difficulty with their units, a volunteer can arrange to visit the classroom to troubleshoot problems or replace defective equipment.

Once the STEP biologist has determined the egg pick up date, the 'volunteer coordinator' needs to contact the teachers to confirm that the classroom will be ready to accept eggs on that day and to agree on a delivery time.

More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:
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Delivering the Eggs

There are several components involved in delivering the eggs to the classroom. These include signing in upon arrival at the school and physically bringing the eggs to the classroom, making a presentation to the students, putting the eggs into the aquarium, and confirming the teacher understands the tasks involved in raising and caring for the fish. You will also want to establish with the teacher before you arrive how much time is available for the egg delivery and presentation, and pace your visit to stay on schedule.

Volunteers will also be provided paperwork by the STEP biologist to be given to the teacher before you leave, including a transport permit that allows the fry to be taken to the release site and the number of temperature units the eggs has accumulated at the hatchery so that their approximate hatch date can be calculated.

Arriving in the Classroom

Upon arrival at the school at the designated time, volunteers need to follow the established protocol for entry into the school. This usually involves reporting to the office, signing in, and waiting for an escort to the classroom. Volunteers need to remember to sign out before they leave, as well.

The eggs should be wrapped in wet cloth and transported inside a small cooler or other insulated container.

Engaging the Students

Because volunteers are there to support teachers and the STEP biologist, delivering eggs to the classroom offers an excellent opportunity to engage the class and get the students interested and excited about raising their own trout or salmon.

After being introduced to the class, but before the eggs are put into the tank, volunteers typically make a presentation explaining the Fish Eggs to Fry Program, how the students will be involved in raising and eventually releasing the fish, and some basic fish biology and life history concepts.

Your STEP biologist may already have a Fish Eggs to Fry classroom presentation script, or volunteers may want to prepare their own presentation with input from the STEP biologist.

Some general ideas for classroom presentation content and concepts include:

- *Volunteers introduce themselves and tell what group they are with.*
- *Tell the kids they are here to deliver eggs to their incubator.*
- *Explain that the eggs are from a hatchery and describe a little about how eggs are raised to the eyed stage, when they are ready for the classroom.*
- *Talk about the kind of habitat trout and salmon need in the wild and the differences and similarities between the fishes' natural environment and the environment in the aquarium, especially emphasizing the importance of clean, cold, oxygenated water and a healthy environment.*
- *Give an overview of the trout/salmon spawning process, what phases of that process will take place in the aquarium, and where the eggs and sac fry get their food.*
- *Present the Eggs to Fry Power Point on the salmonid life cycle.*
- *Describe the differences between trout and salmon, and the different kinds of trout and salmon that live in Oregon.*
- *Discuss the kinds of things that make for healthy trout and salmon habitat.*
- *Discuss predators and other threats salmon and trout face and how they protect themselves.*
- *Describe the process of incubating the eggs, raising them to fry stage, releasing them into a nearby pond or stream, and how the students will help.*

Often, the best way to engage the students in this discussion is to introduce the various subjects of your presentation in the form of questions to the class, which helps promote their active involvement and generates more interest.

Make sure you walk around the class and give all the students a close-up view of the eggs as you make your presentation. This is a good time to talk about how the eggs can survive out of water because they are being kept moist, and how fish are able to breath underwater.

Depositing the Eggs into the Tank

Eggs can be deposited into the tank after the presentation is completed, or as the talk is being given. It is important that the temperature of the eggs be within ten degrees of the aquarium water when they are put into the tank to avoid a potentially lethal shock if difference is too great. To release the eggs into the tank, hold the eggs, still in the wet cloth, in your open hand, palm up. Gently lower your hand into the water enough to immerse the eggs, letting them drop into the water. Be sure to distribute the eggs as evenly as possible throughout the tank. The eggs will slowly sink to the bottom. They will be fine wherever they land and it is not necessary or desirable to attempt to move them around once they are on the bottom of the tank. You will also note that the eggs will move around on the bottom of the tank, settling into the gravel and sometimes clumping together.

Understanding Temperature Units

Before leaving, it is a good idea to confirm that the teacher understands Temperature Units and how it relates to the release date for the fry. Teachers will also need to know how many Temperature Units the eggs have already accumulated at the hatchery. This information is contained in the paperwork that is included with the eggs.

Temperature Units are vital to understand because they help predict when the eggs will hatch and when the fry will need to be released into the wild. This date is important to know so the teacher can make arrangements for a class field trip on the projected release day.

A Temperature Unit (TU) is 1 degree Fahrenheit above 32 degrees over a 24-hour period. Temperature units build up over time and, depending on the species of trout or salmon being raised, will hatch when a certain number of TUs have accumulated

Daily temperature readings are used to calculate and keep track of temperature units so the approximate release date of the fry can be determined.

ODFW has developed an easy to use "Fish Egg to Fry Release and Hatch Date Estimator" as a Microsoft Excel file that will estimate hatch and release dates for rainbow trout, steelhead, and kokanee, coho and Chinook salmon. It may be downloaded from the ODFW STEP Education Resources web page at the link below.

More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:
http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Aquarium Maintenance

Successfully hatching the fish eggs depends on properly maintaining the aquarium and the aquatic environment inside the aquarium. This involves daily record keeping, checking aquarium systems, regular cleaning and, when necessary, troubleshooting. These tasks, which are normally performed by teachers and students, are relatively simple. Sometimes a few students are chosen to perform these tasks, but more often all students in the classroom are given the opportunity to help with egg and fry care.

ODFW Record Forms

Each classroom will need a supply of Daily Progress Report forms and Report of Operations form. These may be obtained from the local STEP biologist. The Daily Progress Report is an ongoing record of egg and fry mortality, water temperatures and Temperature Units while the Report of Operations form provides final statistics including total egg and fry mortality, hatch date, numbers of fry released, date of release and release location. These records must be turned in to the STEP biologist at the end of each season. This task is completed by the teacher.

Aquarium Care

Daily and Periodic Tasks

- *Fry are not to be fed. They will feed off their egg sacs.*
- *Do a daily inspection of the aquarium, tank, pumps and other components to ensure they are functioning properly and there are no leaks.*
- *Each day, at the same time, read the in-tank thermometer and record the water temperature on the Daily Progress Record form.*
- *Calculate each day's Temperature Units and record that on the Daily Progress Record.*
- *Check for dead eggs or fry. These must be removed right away or as they decompose they will contaminate the tank with ammonia, which is toxic to fish. Use a turkey baster to remove dead eggs and fry. Dead eggs can be identified by their chalky white appearance.*
- *Record all egg and fry mortalities on the Daily Progress Record.*
- *After the eggs hatch, remove eggshells with the aquarium net or else they will contaminate the water with ammonia as they deteriorate.*
- *Record observations and comments on Daily Progress Record form, such as when eggs hatch or fry emerge.*
- *Water will be gradually lost from the tank through evaporation. Replace the lost water periodically with un-chlorinated water chilled to the same temperature as the tank water. Take care to not to disturb the eggs while pouring.*
- *Periodically clean the aerator and chiller filters as necessary.*
- *Check dissolved oxygen and pH levels periodically.*

Maintaining Water Quality in the Aquarium

Occasionally, foam may begin to appear on the surface of the water inside the aquarium. This indicates that ammonia may be building up in the water and if left to accumulate will kill all the eggs or fry. If this occurs, bail out one-half of the tank water, being careful not to disturb the eggs or fry. Replace it with clean, non-chlorinated water. Make sure the water is the same temperature as the water in the tank. Wait a day. If the foam reappears, repeat the procedure and wait another day. Repeat the procedure until the foam does not re-form. This usually occurs during the period when the eggs are hatching, which is caused by the release of embryonic fluid from the eggs. After the eggs hatch it is beneficial to change or clean the nylon over the pump and any other filters to remove the shells and organic build up. Remove the nylon inside out in order to retain the loose shell fragments. Cloudy tank water may also indicate the same condition. Treat as described above.

More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:
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Connecting with the Classroom

Once the aquarium has been set up and the eggs placed in the tank to incubate, the degree to which volunteers remain involved will vary. Some teachers will welcome active participation by volunteers that may include training teachers and students to maintain their incubator units and making presentations to the class on various subjects related to fish and the aquatic environment. Other teachers may prefer to incubate the eggs and conduct related lessons on their own without any additional volunteer assistance. Volunteers should discuss in advance with teachers to determine how much assistance they would like.

Making Classroom Connections

If the teacher expresses interest in having volunteers come into the classroom to make presentations or help with other lessons and activities, there are number of ways to be involved including multi-media presentations, interactive games and assisting on or leading field trips.

Salmon Life Cycle Video

A 5½-minute salmon life cycle video is available for volunteers to present in classrooms. It covers salmon life history beginning with spawning, through the return of the adult fish to the streams where they were born to spawn themselves.

Power Point Presentations

There are also four Power Point presentations available for use by volunteers and teachers. These presentations include:

- *Salmonid life cycle*
- *Habitat, water quality and quantity*
- *Species, territories and identification*
- *Conservation and the importance of salmon to our culture and economy*

The presentations can be used to expand on the students' aquarium egg incubation experience by introducing them to such concepts as the importance of a healthy environment, the different kinds of salmon, and how salmon and the habitat that sustains them are important to people, along with our responsibility to take care of our environment.

Stream Scene

Stream Scene is a manual that facilitates learning from the larger perspective of watershed systems including upland, riparian, and aquatic areas and the aquatic life they support. It is broken into short, easy topics that can be used to teach one lesson or spread across an entire school year. It also includes field based activities. Field equipment for water quality, stream habitat, and aquatic life investigations may be available for loan through the local STEP biologist

Interactive Games

While there are a number of interactive games and other activities that may be used to teach students about salmon and other environmental subjects, "Hooks and Ladders" is one that is most commonly employed in Fish Eggs to Fry classrooms.

Hooks and Ladders uses role playing to help students understand the salmon and trout life cycle, how salmon and steelhead migrate, understand the challenges the fish face in trying to survive and how those concepts can be applied to other kinds of animal populations.

Other fish-related interactive games and activities include:

- *Scales and Tales – Fact sheets illustrate various aspects of the Pacific salmon life cycle.*
- *Salmon Language – A crossword puzzle that teaches salmon-related terminology.*
- *Coming Home – Students create an advertising campaign encouraging salmon to come to a new stream after identifying issues affecting them in a watershed.*
- *Natural Survival Pyramid – Students create a pyramid that shows the number of salmon that survive each of their life history phases.*
- *What Can a Curve Say? –Students analyze graphs to learn how trout production is affected by environmental conditions.*
- *Macroinvertebrate Mayhem – Students play a game of tag to simulate environmental factors that effect macroinvertebrates.*

More details on these and other educational and lesson ideas will be found in *An Educator's Resource Guide for Hatching Salmon and Trout in the Classroom* available from your STEP biologist or on the STEP website.

Field Trips

Field trips are a natural extension of the classroom Fish Eggs to Fry learning experience where, if the teacher is interested, volunteers can lend their assistance and expertise. A field trip to a local stream can include a variety of activities that students can actively participate in including:

- *Testing water quality*
- *Identifying macroinvertebrates*
- *Discussing what makes good fish habitat*
- *Watch spawning salmon (depending on season and location)*
- *Visiting a local fish hatchery*

Integrating Fish Eggs to Fry with the Aquatic and Angler Education Program

The ODFW Aquatic and Angler Education Program offers a wide range of educational and fun experiences for both children and adults that can be integrated into the Fish Eggs to Fry Program. It includes family fishing events and instruction, fish camps for kids, and a program taught by both volunteers and STEP biologists that introduces aquatic ecology and recreational angling to youth.

The statewide program includes four areas of instruction:

- *Basic Fishing Skills*
- *Aquatic Conservation and Stewardship*
- *Ethical Conduct and Responsibilities*
- *Water Safety*

More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:

http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Releasing the Fry

The Release Site

Once the egg sac has been absorbed the fry are said to have 'buttoned-up'and are ready to be released. Fry may button up over a period of several days, however, they do not need to be fed and will survive while the others catch up. Calculating the approximate release data using the Fish Eggs to Fry Release and Hatch Date Estimator or by manual calculation will permit the teacher to make field trip arrangements in advance.

The fish must be released at the approved release site described on the Transportation/Release Site permit that was included with the egg request paperwork. If the site is a new or unfamiliar location it is advisable to make a pre-release reconnaissance trip. Things to make note of include:

- *Distance from school. Can the class walk or must transportation be arranged?*
- *What is access to the site like? Are there trails? How close is it to the road or parking area?*
- *Will students need boots or other gear?*
- *Note potential safety considerations such as rough ground, steep banks or areas of deep, fast water.*
- *Assess habitat conditions of the stream. Where are the good places to release the fry and where are the bad places? Shallow water areas without strong currents that also include vegetation along the bank are the best locations.*

Transferring Fry from the Aquarium

The first step in the release process is to transfer the fry from the aquarium into a container for transport to the release site. Allow about an hour to transfer all the fry from the tank into containers for transport. To begin, remove some water from the aquarium to draw down the water level enough to make the fish easier to capture with the aquarium net.

Buckets, plastic bottles or other waterproof containers are fine for transporting the fish. Make sure they are covered so the fry don't splash out. The water in which the fish are transported should be the same temperature as the water in the aquarium. For short trips to the release site the fry should be fine. However, if the weather is warm you may want to put ice cubes in the water to help keep it cool. The fry can also be placed in sealable plastic bags and transported to the release site in a cooler. Once fish are in a container, they are using up available oxygen and temperatures will increase, both of which cause stress to the fish. Transfering fish to containers should be done as quickly and close to the release time as possible.

Releasing the Fry

At the release location, look for shallower areas with slower moving water, and vegetation along the banks. These are the best areas to release the fry. Stay away from deep water where larger, predatory fish may lurk or fast water that will sweep the small fry away.

Release the fish from the bucket, or divide them up into small plastic bottles so that each student may release fry on their own. It's best if the water in the stream and bucket are of similar temperatures to avoid shocking the fish when they are released. Check both with a thermometer and either add water from the stream into the bucket or put the bucket into the stream until the water temperatures are close.

When releasing the fish into the stream, slowly lower the rim of the bottle or bucket into the water and let the

fish swim out. Don't release all the fish in one location — spread them up and downstream over as much distance as the amount of appropriate habitat will allow, or along the shoreline of still water bodies.

Because of the costs and logistics, especially when the designated release site is a long distance from the school, some teachers may opt to release the fish themselves without incorporating a class field trip.

Release Site Teaching Ideas

Because releasing the fry requires they be put into areas of the stream that offer good habitat, this experience presents an excellent opportunity for the students to investigate and learn about a trout or salmon's natural habitat.

For example, before releasing the fish, the teacher or volunteer might ask the students to assess the habitat at the release site, challenging them to identify good habitat for the fry, bad habitat for the fry, and explain why. Other aspects of habitat to investigate could include:

- *Comparing stream/lake/pond habitat with the aquarium habitat. What were the needs of the fish in the aquarium and what are their needs now? How is the stream, lake or pond providing those needs?*
- *Identify the different habitat components of the stream, lake or pond such as rocks, in-stream logs and stumps, overhanging banks and riparian vegetation. How do the fish use that habitat?*
- *Are there habitat limitations here like eroded banks or lack of vegetation? How can the habitat be fixed to make it a better place for fish and other aquatic creatures to live?*
- *What will the fry eat now that they are in the natural environment?*
- *If the fry are salmon or steelhead, will they stay in this stream for a while? How long before they go to the ocean?*

Other possible activities include stream surveys, measuring water temperature and stream flow, and identifying macroinvertebrates, insects and riparian vegetation.

More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:
http://www.dfw.state.or.us/fish/STEP/resources-education.asp

End of the Season Tasks

Cleaning and Storing the Aquarium Incubator Unit

Once the fish have been released it is time to clean and store the aquarium and the other components of the incubation unit. It is vital that everything be thoroughly cleaned, otherwise there is a risk of contaminating fish eggs the next time the unit is used. The teacher usually performs these tasks, however volunteers may also assist if requested.

- *Remove pumps, filters and other items from aquarium.*
- *Empty water from aquarium.*
- *Rinse tank thoroughly — a mild detergent can be used.*
- *Wipe aquarium with a cloth and set aside to dry.*
- *Thoroughly rinse and drain hoses and chiller.*
- *Place pump and hose in fresh water and run water through pump, chiller and hoses to flush all old water out.*
- *Drain water out of chiller and place on side to dry.*

You can also use a weak bleach cleaning solution at a ratio of 1.5 teaspoons of bleach to one gallon of water (1:400 ratio) to flush out the tank, tubes, pumps and chiller. *If you use bleach or detergent to clean the tank and equipment be sure that you rinse everything out thoroughly.*

Once all the equipment and gravel is completely dry, store it in the designated location until it is time for the next Fish Eggs to Fry season to begin.

Reporting

Within 15 days of releasing the fry, a completed Report of Operations and a copy of your Daily Progress Record needs to be turned in to your STEP biologist. The teacher completes this task.

More information on Fish Eggs to Fry and STEP education resources are found on the ODFW website:
http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Links to Additional Resources

ODFW Headquarters
Salem
(503) 947-6000
http://www.dfw.state.or.us

ODFW STEP Districts
North Coast STEP
Tillamook
(503) 842-2741

Mid Coast STEP
Newport
(541) 265-8306

Tenmile, Coos, and Coquille STEP
Charleston
(541) 888-5515

Umpqua STEP
Roseburg
(541) 440-3353

Lower Rogue STEP
Gold Beach
(541) 247-7605

Upper Rogue STEP
Central Point
(541) 826-8774

Lower Willamette STEP
Clackamas
(971) 673-6034

Mid Willamette STEP
Corvallis
(541) 757-4186 x251

Upper Willamette STEP
Springfield
(541) 726-3515

Eastern Oregon STEP
Bend
(541) 388-6363

Salmon Trout Enhancement Program

http://www.dfw.state.or.us/fish/STEP/index.asp

Aquatic and Angler Education Program

http://www.dfw.state.or.us/education/angling/index.asp

Fish Eggs to Fry Program

http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Fish Eggs to Fry Manual

http://www.dfw.state.or.us/fish/STEP/docs/eggs_to_fry.pdf

An Educator's Resource Guide for Hatching Salmon and Trout in the Classroom

http://www.dfw.state.or.us/fish/STEP/docs/edu_guide.pdf

The Stream Scene

http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Fish Eggs to Fry Release and Hatch Date Estimator

http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Aquarium Set-up and Maintenance Videos

Classroom Aquarium Type 1

http://www.youtube.com/watch?v=Kep0qEgAfqk&feature=youtu.be

Classroom Aquarium Type 2

http://www.youtube.com/watch?v=-GW8D6JsghQ&feature=youtu.be

Classroom Aquarium Type 3

http://www.youtube.com/watch?v=4luwrszj9tA&feature=youtu.be

Aquarium Care and Maintenance

http://www.youtube.com/watch?v=XCTIkNgP-c8&feature=youtu.be

Power Point Presentations

http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Fish Eggs to Fry Forms

http://www.dfw.state.or.us/fish/STEP/resources-education.asp

Program Videos

Eggs to Fry Program Overview

http://www.youtube.com/watch?v=8dCe5G7NOpw&feature=youtu.be

Classroom Egg Delivery

http://www.youtube.com/watch?v=eHHTcmrzG-A&feature=youtu.be

Classroom Fry Release

http://www.youtube.com/watch?v=SI-3U__Lw1U&feature=youtu.be

Salmon Life Cycle

http://www.youtube.com/watch?v=EqmGSexPaEk

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