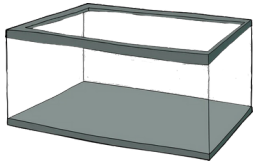


Fish Friends

TEACHER GUIDE

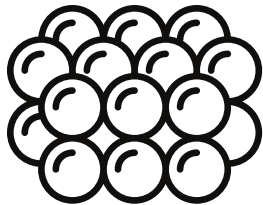
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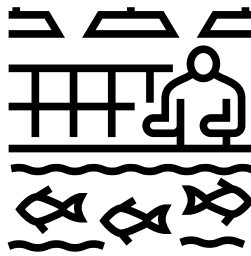
Tank Set Up



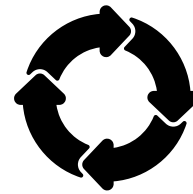
Habitat



Getting Redd-y



Mactaquac
Biodiversity
Facility



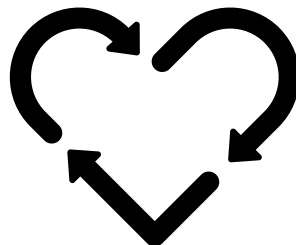
Salmon
Lifecycle



Adaptation



Freshwater



Sustainability



Migration



Stewardship

Fish Friends

INTRODUCTION

Developed in the mid 1990s by the Atlantic Salmon Federation (ASF), the program is designed to be a long-term conservation program aimed at educating the next generation of environmental stewards. The New Brunswick Salmon Council (NBSC) took the lead role in delivering the Fish Friends program in New Brunswick in 2011. The NBSC continues to focus on maintaining the sustainability of the program by including new schools and re-involving schools that once participated.

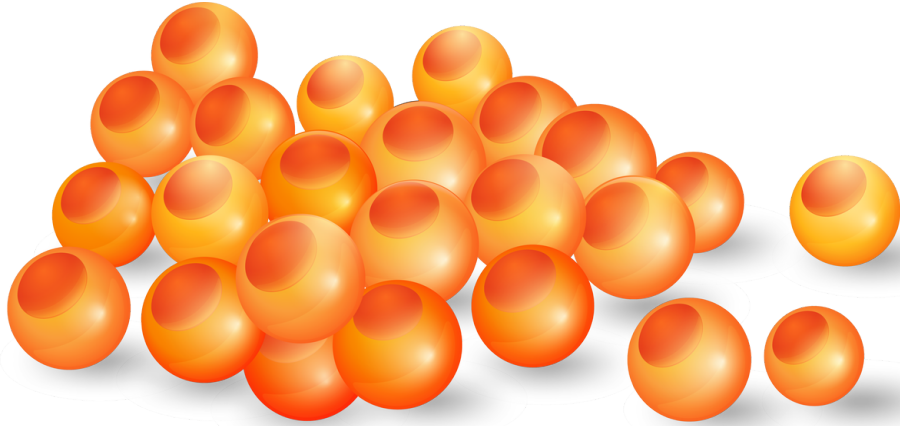
Students will carry the knowledge gained with them as they venture into nature, into further studies, and eventually into society as young adults. Learning about wild Atlantic salmon and other fish species in our rivers and seas is fundamental to caring for them. Effective public education and opportunities for hands-on learning are vital to making the right decisions on the balance between use of land, water and air and the health of living things and their environment. Students will likely use the insights they gain from the varied and entertaining activities of Fish Friends throughout their lives. Carefully crafted lessons allow students to appreciate the sensitivity of fish to environmental degradation and the importance of our recreational fisheries to society. It is essential that we persuade tomorrow's adults to care enough never to poach, pollute waters or destroy habitat.

A core mandate of the Hammond River Angling Association (HRAA) is education, both through conservation and community interaction, particularly regarding Atlantic salmon conservation. The HRAA has been involved in the Fish Friends program since the beginning. We believe that the Fish Friends program is an extremely valuable program for our future environmental leaders, which is why we have updated the original curriculum. The goal is to redesign the program to compliment the new learning styles of children while pivoting to include an online format. We have added add educational videos to accompany each lesson to our website, as well as all activity sheets for educators to choose from, making the program more inclusive to classrooms that may not have Fish Friends tanks, homeschool learners, and curious public members.

We hope you enjoy the revamped Fish Friends Program!

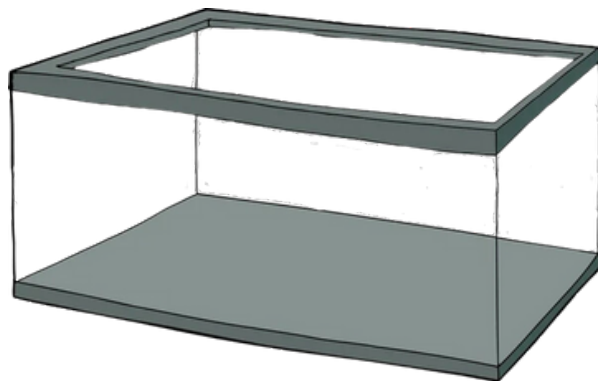
Sarah Blenis, Melissa Crilley & Sophie Hebert- HRAA Staff 2023

Fish Friends ❖



Lesson 1

Setting Up Your Fish Friends Tank



Fish Friends

Lesson 1 Tank Set Up

Supplies Needed:

- 1 Tank
- 1 Chiller Unit
- 6 Sheets of Styrofoam (bottom, top, and 4 sides)
- 1 Power Filter
- 1 Foam filter, 1 charcoal insert/carbon insert
- 1 piece of nylon or mesh + elastic band
- Small rocks
- 1 small net to scoop out any deceased eggs/fish



Set Up Instructions:

- 1) Thoroughly clean and sterilize the aquarium, rocks, filter, coil, etc.
- 2) Set the tank on a very sturdy table. Remember that the tank full of water weighs several hundred pounds.
- 3) Make sure that when you're choosing your location to set up your tank that it is not near heaters or heat sources- this can impact the water temperature.
- 4) Set the tank on a base of insulating Styrofoam. It must be insulated on all sides. Insulating on all sides provides two benefits: it stabilizes water temperature and prevents the chiller from working too hard and provides darkness for the eggs which is very important at this stage of development.
- 5) Check the chiller air intake screen to make sure it is clean. When clogged with dust, this can overwork the chiller making it difficult to maintain temperatures. If necessary, clean the air intake screen with a vacuum cleaner.
- 6) Ensure that the chiller is properly supported such that it is not hanging by the coil, which puts weight on the glass side of the tank.
- 7) Gently place the rocks on the bottom of the tank.
- 8) Add enough water into the tank to cover the coil (fill tank with water approximately 3-5 inches below the top of the tank).
- 9) Add your foam filter on the bottom of the power filter tank, then your activated charcoal and carbon filters on top.
- 10) Add nylon pantyhose or fine mesh on the water intake of the power filter with an elastic band to prevent the fry from getting pulled into the filter unit.
- 11) Set the power filter into the tank and plug it in. You will need to prime the power filter pump by pouring water into the top of the power filter.
- 12) Plug in the chiller unit and set the temperature at 4°C.
- 13) Let the system run for a week in preparation for the delivery of the eggs- if any issues arise, please reach out to the HRAA.

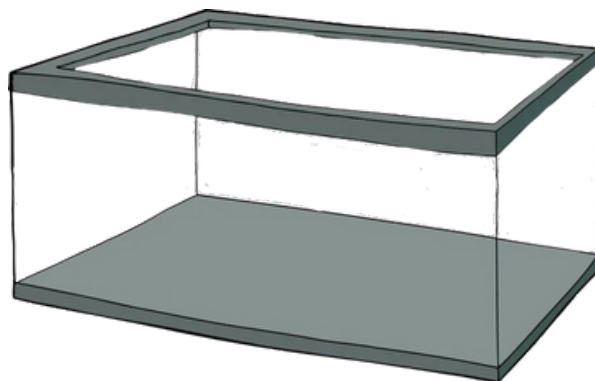
Fish Friends

LESSON 1 ACTIVITY SUMMARY

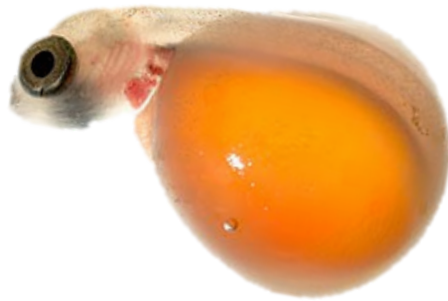
Check out the video on how to set up your Fish Friends Tank! We have tried to make this as easy to follow as possible, but if you have any issues during your tank set up, please reach out to us at info@hrra.ca with your questions.

This is a great opportunity to watch this video with your class and have them assist you in setting it up! Students will learn about why we use filters, what temperature the eggs should be kept at, why the rocks are important, and why we cover the tank in Styrofoam.

Class Activity: Design your own tank cover! Lots of schools' Styrofoam covers are old and dingy- why don't you get a piece of paper the same size as the Styrofoam on the front of your tank and create a unique design? Once your class is finished with the design and you have it attached to your tank, send a picture to us so we can see all of the neat creations you came up with! Don't have any Styrofoam for your tank? Let us know, and we can help you out!



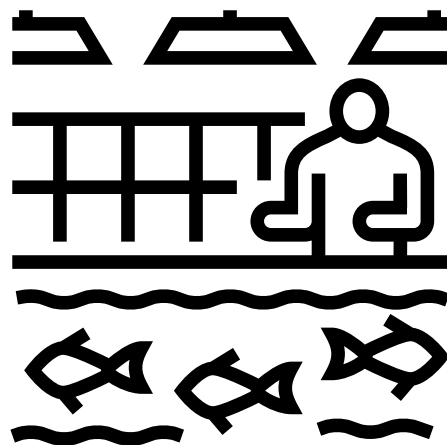
Fish Friends

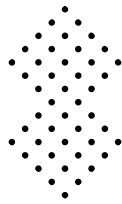


Lesson 2

Mactaquac

Biodiversity Facility





Objectives:

The students will be introduced to the concept of habitat by first examining their own world, where they live, play and go to school. They then design a research task to determine the diversity of living things that share their habitat. They will apply their understanding of the concept of habitat in future lessons.

Lesson Overview:

Our habitat is our home, the geographic location where we live and where our needs are met. Our habitat is also a community because we share it with other living things. Most living things can tolerate changes in their habitat, but to survive, their needs must continue to be met. A habitat is the natural abode or locality of an animal, plant, or person. It also includes all features of the environment in a given locality. Frequently, the terms “habitat” and “environment” are used primarily for physical features such as topography, water supplies, and climate, but the terms are not confined to physical features, for vegetation and other animals also form major components of any given habitat or environment.

The Mactaquac Biodiversity Facility was built shortly after the construction of the Mactaquac Dam in 1968. The site is 5.3 hectares large, that’s the size of almost 10 football fields! The main salmon hatchery uses up to 70 million liters of well and river water every day to rear over 2 million eggs and up to one million fish of various life stages. This facility raises salmon from eggs all the way to full grown adults. While they are growing, fish are held in troughs. To ensure the fish are healthy, workers at the facility need to check on the salmon’s health regularly to see any changes or if there is anything out of the ordinary. The fish are retrieved using a basket called a braille that is controlled with hoists to move the passageway which you can handle the fish individually. Information is gathered, for examples if they are male or female, whether they are a grilse or a salmon and collecting a tissue sample and a scale sample for aging.

The facility is located on the Wolastoq River, also known as the Saint John River. This river has been known for the special relationship between it and the people around it. The Wolastoq is a beautiful place that First Nations have inhabited for millennia. The Wolastoqiyik knew their homeland inside and out. First Nations people took what they needed from the land and gave thanks to the creator with medicine for everything that they took. The river provided an abundance of food, materials and medicines. Because of the way they lived, they had minimal environmental impact on the land. The river helps them to develop and sustain these communities as a separate and unique nation. Today, there are approximately 4,000 Wolastoqiyik living in the six communities within the region.

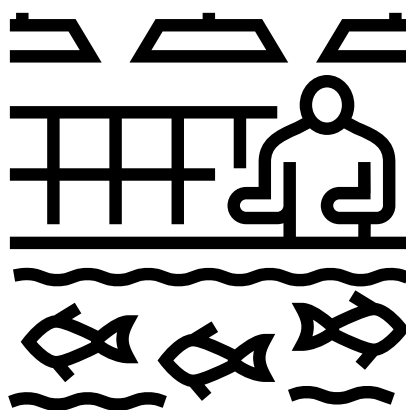
Fish Friends

LESSON 2 ACTIVITY SUMMARY

The students will be introduced to the concept of habitat by first examining their own world, where they live, play and go to school. They then design a research task to determine the diversity of living things that share their habitat. They will apply their understanding of the concept of habitat in future lessons. The students will also learn about where their Fish Friends eggs came from- the Mactaquac Biodiversity Facility!

Class Activities:

1. My Home Activity Sheet - Kindergarten - Grade 5. Beginning principals on the concept of “habitat”, where students draw their own house, and then create riddles on different types of habitat!
2. My Habitat Activity Sheet - Grades 3 - 5. A writing assignment in which students will expand on the concepts of habitat to examine the world around them.
3. What I Know About Salmon Activity Sheet - Grades 3 - 5. This is a writing assignment to see how much students already know about Atlantic salmon! By the end of the unit, educators can see how much students have learned over the course of Fish Friends!
4. If I Were A Salmon Activity Sheet- Grades 3 - 5. A writing assignment designed to inspire imaginations! Students will write about what it would be like to be an Atlantic salmon, incorporating key words from a word box.



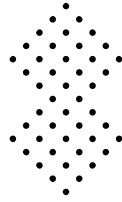
Fish Friends



Lesson 3

Habitat





Objectives:

In this lesson, the students will apply their understanding of habitat from the previous lesson to the habitat of a fish. Through a reading activity, they will reflect on how the needs of fish are met. They are encouraged to make comparisons with their own needs and habitat.

Lesson Overview:

The environment in which fish live is quite different from ours, but they have the same basic needs as humans: oxygen, food, shelter, water and ways to eliminate waste. In order for fish to survive, their needs must be met in a habitat that is shared with many other living things. The preferred habitat of fish varies depending on many factors. The young of some fish, like salmon and trout, prefer shallow streams with clean gravel bottoms. In later stages, they travel to deeper rivers with shaded, protected pools. Other species like bass, catfish and eels prefer the deeper, murky waters of ponds and lakes.

A fish's habitat must meet these needs in the same way that our habitat meets our needs. The main difference in the fish's habitat is obvious, it's made of water. Fish do not breathe air in the same way we do. They breathe by taking water into their mouths where it passes over their gills and absorbs oxygen through the water. This means that the oxygen must be dissolved in the water. It also means that the fish is very vulnerable to drought and pollution.

The decline of fisheries for salmon coincided with the coming of the Industrial Revolution at the end of the eighteenth century. The revolution radically affected the economic structure of society around the world. The revolution caused an explosion of economic activity which resulted in an increase in population and the growth of towns and cities. The thinking behind the Industrial Revolution was that an increase in material wealth was good, regardless of its effect on the environment. Thus, in North America, particularly in New England, the best rivers were affected. They were polluted, dammed, and eventually ruined by the detrimental effects of industrial growth.

History has revealed a change in attitude regarding natural resources. Today, we want to be very careful to ensure that our actions are not harming the wildlife around us, especially the freshwater species. Freshwater habitats are already limited so its super important that we take care of them and keep the fish healthy.

Fish Friends

LESSON 3 ACTIVITY SUMMARY

In this lesson, the students will apply their understanding of habitat from the previous lesson to the habitat of a fish. Through a reading activity, they will reflect on how the needs of fish are met. They are encouraged to make comparisons with their own needs and habitat.

Class Activities:

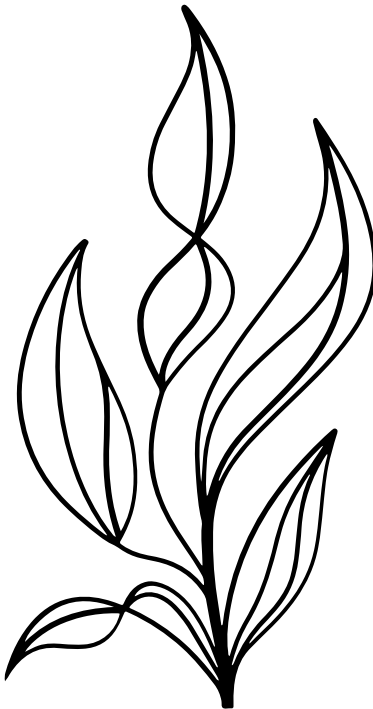
1. A Day In The Life of a Salmon Activity Sheet - Kindergarten - Grade 5. Teachers can read the story aloud to the class and have all students participate in what they think happens next in the story. For older grades, students can write out the rest of their story.
2. Habitat Activity Sheet - Kindergarten - Grade 5. For younger grades, students can draw what they think their home habitat is like, and what a salmon habitat is like. For older grades, students can use the free space to write the comparison between their own habitats and that of salmon!
3. Aquatic Habitat Activity Sheet - Kindergarten - Grade 5. For younger grades, students can draw the interactions between the 4 items and their habitats. For older grades, they can write the interactions between the 4 items and their habitats.
4. Environment Words Activity Sheet - Kindergarten - Grade 5. Students are challenged to make as many words as possible out of the word 'environment'. For an added bonus, set a timer and see how many words they can come up with in a short time!

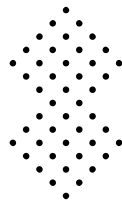


Fish Friends



Lesson 4 Life in Freshwater





Objectives:

In this lesson, the students begin to examine biodiversity and its importance to survival of a habitat. They first describe the variety of organisms living in freshwater and then examine some of the interactions among them.

Lesson Overview:

Most habitats contain a great variety of living things- we call this biodiversity. Plants and animals of different species, sizes and shapes along with microscopic organisms are commonly found together, sharing the same habitat and interacting with each other in complex relationships.

Diversity is important for the survival of living things in any habitat. In the absence of diversity, the loss of one or two key species can result in the collapse of all life in the habitat. Life in a local habitat that has been struck down by a passing storm can spring back quickly because enough diversity still exists. Something resembling the original state of the environment will be restored.

Every habitat, from the Brazilian rain forest to the Antarctic Bay, has a unique combination of living things. Each kind of plant and animal living there is linked to only a small part of the other species. Eliminate one species, and another increases in number to take its place. Eliminate many species, and the local habitat starts to visibly decay.

All of these interactions between species form an “ecosystem”. The term “ecosystem” describes a system in which there are living organisms, non-living components, and a primary source of energy. The sun is the “engine” driving the rest of the system. How big is an ecosystem? The entire planet is sometimes referred to as an ecosystem; this ecosystem is termed the global ecosystem or biosphere. Ecosystems with simple interactions are usually more vulnerable to drastic change than are ecosystems with complex interactions.

Why do we need so many different kinds of plants and animals? What if a few of them do become extinct? The answer lies in complex ecological principles. There may be no immediate catastrophe if a certain species does disappear, but the system is thereby changed from its natural state and is more vulnerable to ecological instability. By conserving diverse habitats, we help to ensure a more natural, more complex, and more stable environment for plants and animals.

Fish Friends

LESSON 4 ACTIVITY SUMMARY

In this lesson, the students begin to examine biodiversity and its importance to survival of a habitat. They first describe the variety of organisms living in freshwater and then examine some of the interactions among them. A new concept is introduced in this unit, “biodiversity”, as biodiversity is important for the survival of living things in any habitat. In the absence of diversity, the loss of one or two key species can result in the collapse of all life in the habitat.

Class Activities:

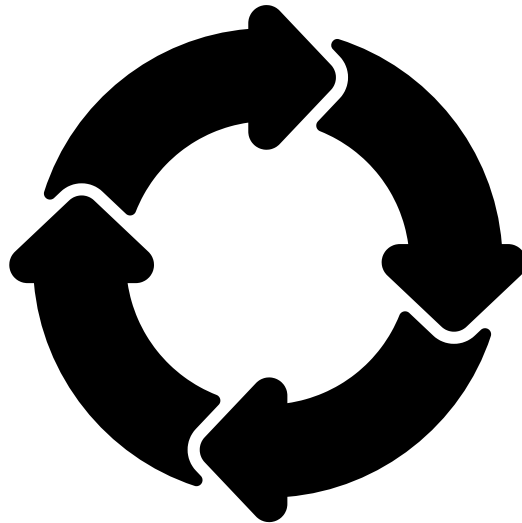
1. Diversity Activity Sheet - Kindergarten - Grade 5. For younger grades, teachers can ask students to name as many aquatic insects, types of fish etc and fill the sheet in as a class. For older grades, the students can write their answers into the sheets themselves.
2. Freshwater Activity Sheet - Kindergarten - Grade 5. Younger grades can color in the images, and older grades can fill in the missing blanks. This will be a great introduction to the water cycle!
3. Freshwater vs Saltwater Activity Sheet - Kindergarten - Grade 5. Students will identify the pictures. Are they lakes, oceans, rivers, streams, or ponds.
4. What I Know About Rivers Activity Sheet - Kindergarten - Grade 5. Students are encouraged to write all that they know about rivers. This would make an excellent group activity, and then share the findings with the rest of the class!
5. My Life As a Salmon Activity Sheet- Grades 3 - 5. A writing exercise, in which students are encouraged to use their imagination to talk about what their life would be like from birth, their travels, and different stages of their life- if they were a salmon! This is a great opportunity to build on story writing skills!

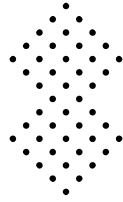


Fish Friends



Lesson 5 Lifecycle of an Atlantic Salmon





Lesson Overview:

All living things change over time. They grow and develop as they advance through the various stages of their life cycle. In some species there are distinct differences in appearance and habitat at different stages. Survival of the species depends on meeting basic life needs at all stages. We are going to take a look at the life cycle of the Atlantic Salmon.

Adult salmon enter many rivers in the Atlantic region during the months between May and October. The salmon that survive the journey up the river arrive at a suitable place to lay their eggs. They spawn in freshwater anywhere from just above the influence of the saltwater to the extreme limits of the freshwater. They must contain a gravel bottom with many small and medium-sized stones. The salmon wait until late October or early November when water temperatures drop to about 5°C and the daylight hours grow short. The female salmon lays approximately 1500-1600 eggs per kilogram of her weight. Of those eggs, under ideal conditions as in fish hatcheries, 85% normally hatch. In the wild, even fewer can be expected to survive.

The eggs develop slowly in the redd over the winter. From mid-April to mid-May, as the water temperature begins to rise, hatching occurs. The small fish, about two centimeters long, is called an alevin. They feed on the yolk of the egg from which they have hatched. When this yolk is nearly gone, the tiny salmon wriggles its way up through the gravel out into the stream. Now it will feed on microscopic materials. Until the young fish is five to eight centimeters long, it is referred to as a fry. Later on, fry are called fingerlings because the little salmon is then about the length of a finger. As the fingerling grows longer than about eight centimeters, marks appear on its sides and it is then called a parr.

The parr is identified by its dark back and lighter belly, with nine to eleven vertical bars, called parr marks, along the sides of the fish. A single red dot occurs between each pair of parr marks. These markings camouflage the parr while it lives among the rocks and weeds of the river. The parr stage continues until it becomes approximately 12 to 24 centimeters in length, when it is called a smolt. This can take from one to seven years, depending on environmental conditions. Smolts are silver in color to protect it during its life at sea. During May and June, the smolt can sometimes be seen at the mouth of the river. Then they disappear into the sea where they consume a great quantity of food, which causes tremendous growth. After one year at sea, the salmon may weight up to three kilograms; after two years, as large as 8 – 10 kilos; in five years, up to 20 kilos.

Fish Friends

LESSON 5 ACTIVITY SUMMARY

All living things change over time. They grow and develop as they advance through the various stages of their life cycle. In some species there are distinct differences in appearance and habitat at different stages. Survival of the species depends on meeting basic life needs at all stages. We are going to take a look at the life cycle of the Atlantic Salmon!

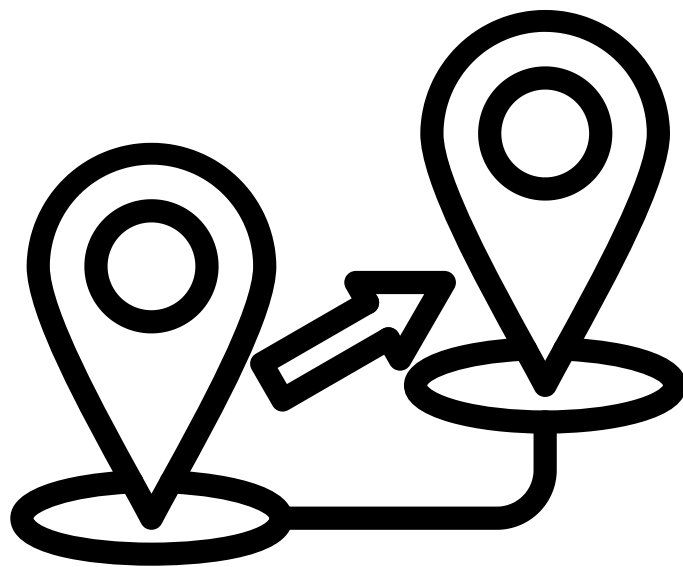
Class Activities:

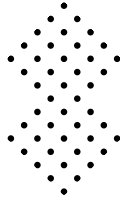
1. Lifecycle Cut & Paste Activity Sheet - Kindergarten - Grade 5. This is a great introduction to the lifecycle through images of the various stages within the lifecycle, and the students can then put them in order!
2. Lifecycle Size Sequencing Activity Sheets - Kindergarten - Grade 5. Print off multiple copies and cut out the squares. This can be a great group exercise where students have to put the eggs, fry, smolt, and adult salmon into size sequencing, from smallest to biggest in each life stage! Make it a timed game, and the fastest group wins!
3. Lifecycle Trace the Letters Activity Sheet - Kindergarten - Grade 5. This will help young writers learn to print the various life stages of the Atlantic salmon.
4. Lifecycle Activity Sheet - Grades 3 - 5. Students will have to cut out the squares, read the descriptions, and put the lifecycle in the right order! Great as a group exercise, especially with a time limit!
5. Salmon Anatomy Activity Sheet - Grades 3 - 5. Students will have to cut out the key words, and then put them on to an adult salmon, highlighting the different body parts of the fish!
6. Lifecycle Needs and Threats - Grades 3 - 5. This is a writing exercise where students will have to assess the needs and threats of each life stage of the Atlantic salmon.
7. My Life As An Atlantic Salmon - Grades 3 - 5. A creative writing assignment, where students will imagine what it is like to actually be a salmon! This is a great way to introduce the concepts of creative writing, from forming a great beginning, middle, and summary conclusion!

Fish Friends



Lesson 6 Migration





Objectives:

Through a combination of a guided imagery activity and a mapping activity, students will trace the migration of a fish from its home river to the ocean and back to the river.

Lesson Overview:

Another type of change occurs when fish migrate from one habitat to another. Migration may be stimulated by a change in climate or season, or by life cycle changes. Therefore, in order to survive, migrating species must be able to meet their basic life needs in more than one habitat.

The Atlantic salmon has been referred to as the classic anadromous fish which means it migrates from the sea (saltwater) into the rivers (freshwater) to spawn. It's well known that most salmon travel great distances as part of their life cycle. In Canada, spawning runs of Atlantic salmon normally enter the rivers between May and November, although some runs begin as early as March or April. Some salmon return to freshwater after only one year at sea. Others return after two years. Salmon generally enter the river when the water is high. While some salmon may spawn within a mile of the sea, others travel several hundred miles before reaching their preferred spawning place.

They return to the same river where they were born. The salmon faces many natural hazards including shallow water, strong currents, waterfalls, beaver dams and rapids. After entering the river, salmon stop feeding. They often lose their luster and become very thin. Although adult fish enter rivers from early spring to late fall, actual spawning usually occurs in October and November. As the male salmon approaches maturity prior to spawning, physical changes occur. Its head becomes elongated, and its lower jaw is enlarged and forms a pronounced hook at its tip.

Much is still to be learned of marine feeding areas and migration routes. It appears that certain salmon from New Brunswick rivers may not venture beyond the waters of the Bay of Fundy. Others travel long distances in search of food, many to the coastal waters of West Greenland. It is only recently that scientists have gained detailed knowledge of the food of salmon in the sea. It has been found that smolt and larger salmon are voracious eaters and will feed on anything they find within their range. Herring, capelin, gaspereau, small mackerel, smelt, and shrimp, squid and amphipods are taken when the opportunity arises. Salmon are known to wander at sea, but after one or more years at sea, the surviving salmon return to spawn in the river in which they were born.

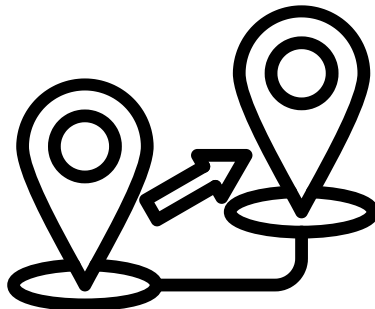
Fish Friends

LESSON 6 ACTIVITY SUMMARY

Another type of change occurs when fish migrate from one habitat to another. Migration may be stimulated by a change in climate or season, or by life cycle changes. Therefore, in order to survive, migrating species must be able to meet their basic life needs in more than one habitat. Through a combination of a guided imagery activity and a mapping activity, students will trace the migration of a fish from its home river to the ocean and back to the river.

Class Activities:

1. Migration Activity Sheet - Grades 3 - 5. Students will read about the migration patterns of Atlantic salmon and lamprey eels. They will then trace out the migratory routes of both species, and using the key, they will measure the distance of the migration. This is a great introduction to mapping and spatial awareness!
2. Amazing Migration Activity Sheet - Grades 3 - 5. Students will fill in the blanks and learn all about the migratory behaviors of Atlantic salmon!
3. Salmon Count Activity Sheet - Kindergarten - Grade 3. Students will count the number of eggs, alevin, fry, and adults they see on the page and enter their count into the boxes on the bottom!
4. Migration Verb or Noun - Grades 3- 5. Students are provided with a list of words and must place them in the correct box if the words are either verb or nouns. Of course, they are all salmon-related words, too!

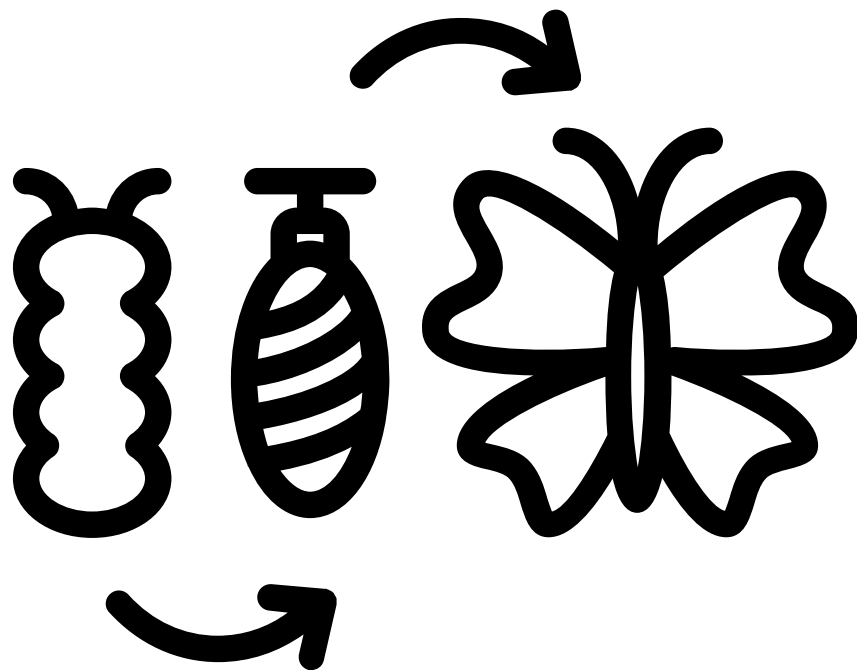


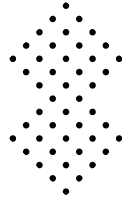
Fish Friends



Lesson 7

Adaptations





Lesson Overview:

Living things survive because they have characteristics which are suitable for their habitat. These characteristics are called adaptations and enable living things to meet their basic needs. Adaptations are passed from one generation to another through genetic material. When habitats change, living things will survive only if suitable adaptations exist or develop. If not, the organisms will not be able to meet their needs. If the changes in habitat are drastic and rapid, there may not be sufficient time for adaptations to occur naturally and be passed to the next generation.

There are over 19,000 species of fish. Fish have lived successfully in the waters of our planet for over 400 million years. The members of this widespread and diverse group include the 10-meter-long basking shark and the 2.5-centimeter-long sea horse. There are fish even bigger and smaller than these. There are eyeless fish that live in caves, flying (gliding) fish, and fish that walk on land. Fish are found in the highest mountain lakes and the deepest ocean trenches. There are transparent fish living in the Antarctic and rainbow-colored fish living in the tropics.

Fish have many adaptations that make them suitable for their environment and contribute greatly to their survival. The streamlined torpedo shape of the fish allows it to swim through the water with little drag or resistance at bursts of speed up to 20 kilometers per hour, although its cruising speed is much less than this. Paired fins like pectoral fins in the front and pelvic fins in the rear, allow the fish to move up or down, left or right, and help to stabilize the fish. The pectoral fins are also used for propulsion at slow speeds. The unpaired fins like the dorsal fin, adipose fin, anal fin, and the tail keep the fish stable and prevent rolling in the water. An internal swim bladder filled with gas helps the fish to control its depth in the water.

On the outside, most fish are covered with scales embedded in a skin or epidermis that secretes a slippery mucus. This further reduces drag and allows the fish to swim as quick as possible while providing physical protection. Many fish have large well-developed eyes that help them to avoid predators and capture prey. The nostrils are not used for breathing, but for sense of smell; they can detect low concentrations of odor. Another sensory structure known as the lateral line system runs along both sides of the body and the head. The lateral line contains special sense organs that detect vibrations and movements in the water.

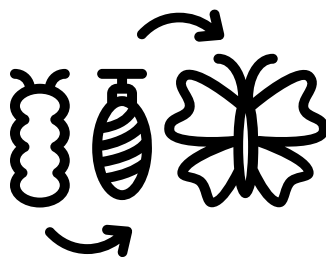
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LESSON 7 ACTIVITY SUMMARY

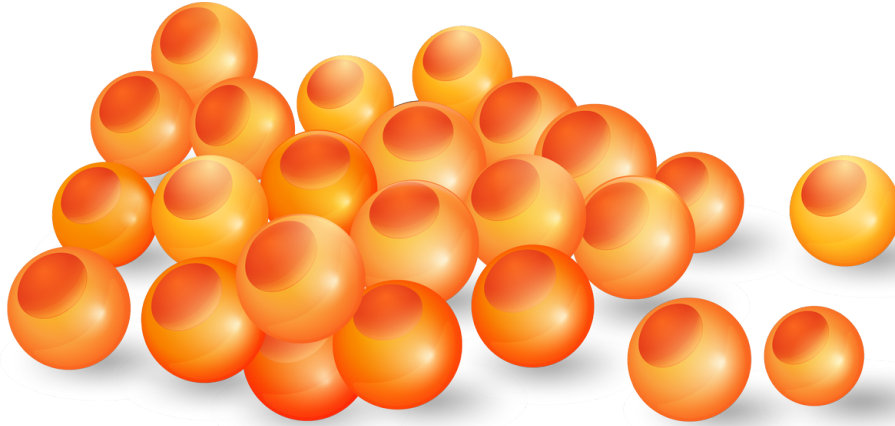
Living things survive because they have characteristics which are suitable for their habitat. These characteristics are called adaptations and enable living things to meet their basic needs. Adaptations are passed from one generation to another through genetic material. When habitats change, living things will survive only if suitable adaptations exist or develop. Students first examine camouflage as an example of how some organisms have adapted to their environment. They then apply their understanding of adaptation in an activity which examines beaks and feet as examples of adaptations.

Class Activities:

1. Adaptation Activity Sheet - Grades 3 - 5. Students will have to fill in the blanks on the different anatomy of a fish and how it pertains to the fish's adaptation. They will also complete the "beaks and feet" activity and be challenged to explain why these differences cater to different adaptations!
2. Energy Adaptation Activity Sheet - Grades 3 - 5. This is a great group exercise in which students will have to choose 2 different salmon life stages and determine the adaptations that occur and what the fish gets its energy from, and what it uses its energy for!
3. Salmon Addition and Subtraction - Kindergarten - Grade 3. As adaptation occurs, populations can increase and decrease, and this is a great chance to incorporate addition and subtraction!
4. Salmon Addition and Subtraction - Grades 3 - 5. More advanced addition and subtraction equations!



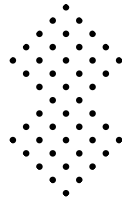
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Lesson 8

Getting Redd-y!





Objectives:

The students will create models to demonstrate how salmon build redds to protect their eggs from fast currents and predators. Students will determine how successful salmon redds are in protecting the eggs when compared to bare eggs.

Lesson Overview:

The role of humans in the environment has changed drastically, especially in industrialized nations. Originally we followed the same rules as other living things, competing for food and shelter, predator of some, prey for others. In more recent years, however, our relationship with the environment has changed and consequently our role has changed. We have isolated ourselves from the rules that govern natural ecosystems. We have changed our habitat and in doing so we have changed the habitats of other living things. These changes are not without consequences. We must now take responsible action not only for our own survival but for that of other living things that share our planet.

When you first got your salmon eggs and placed them in your tank, chances are, your tank did not have any gravel. Is this similar to how it would be in the wild? No- in the wild, salmon eggs would be in gravel, in something that is called a Redd. When the salmon have completed their ocean migration, they begin to make their way back to the same rivers where they were born to spawn. Once they get back into the river, they begin to look for suitable spots to lay their eggs. Atlantic salmon are very specific when it comes to where they want to lay their eggs! Atlantic salmon will not lay their eggs in mud, or on aquatic plants, or on bedrock, or in very deep water- they will only lay their eggs in gravel!

Salmon will find beautiful gravel to make their nest, which is called a redd. The word redd is Scottish, meaning to “make clean or tidy”. Salmon use their tail to kick up rocks, creating a pit in the streambed and allowing the current to deposit the displaced rock in a pile just downstream. When they use their tail like this, they are removing the algae and scum off rocks, which makes them look bright and clean. Redds are usually 1-2 meters in diameter and roughly rounded. Once the pit has been made into the gravel, the female salmon will lay their eggs and they will be fertilized by the male. Then the salmon will cover the eggs with more gravel. Redds are usually found at the tail of pools on the upstream side of riffles, with relatively high-water speeds, and water depths of 15-70cm. Remember what we learned about dissolved oxygen? Well eggs need oxygen too! That is why eggs are laid in gravel, not mud. Gravel lets the oxygen access the eggs, and the flowing water keeps the eggs well oxygenated.

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LESSON 8 ACTIVITY SUMMARY

The students will create models to demonstrate how salmon build redds to protect their eggs from fast currents and predators. Students will determine how successful salmon redds are in protecting the eggs when compared to bare eggs.

Class Activities:

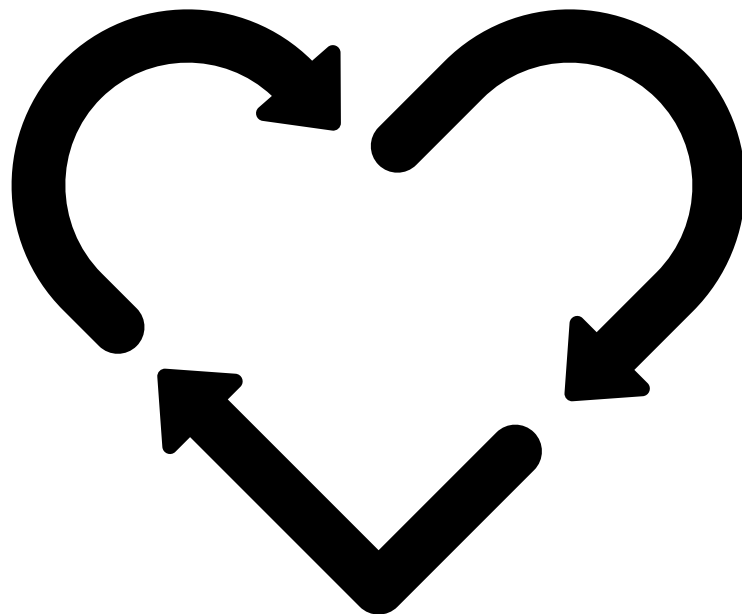
1. Redd Activity Sheet - Kindergarten - Grade 5. This is a hands-on activity, requiring a few material items, and a demonstration is also included in Lesson 8 video!
2. What Time Will The Eggs Hatch Activity Sheet - Grades 3 - 5. Students will have to learn to tell time in this activity!
3. Color The Eggs Activity Sheet - Kindergarten - Grade 3. A nice coloring sheet that will have students coloring salmon eggs different colors!
4. Salmon Can, Have, and Are Activity Sheet - Grades 3 - 5. A writing exercise that will encourage students to list out what they think salmon can do, what salmon have, and what salmon are! This is a great opportunity to compare class answers at the end of the exercise!
5. Salmon Singular or Plural Activity Sheet - Grades 3 - 5. Students will have to determine if the words in the word box are singular or plural, and of course- they are all salmon-related words!
6. Salmon Facts Activity Sheet - Grades 3 - 5. This would make a great individual or group exercise, in which students will read the sentences and fill in the blanks from a word box!

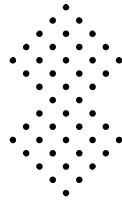


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Lesson 9 Sustainability





Objectives:

The students are introduced to the concept of sustainability within their own community. They examine how the people who live there meet their basic needs today and in the future. They will build on these fundamental principles of sustainability in later lessons.

Lesson Overview:

Sustainable development, or sustainability, involves a holistic examination of the impact of our actions on the environment. Sustainability is more than environmental conservation; it also has economic and humanitarian dimensions. For a sustainable future, all dimensions of sustainability must be addressed.

In earlier lessons, the students learned that food, water, air (oxygen), shelter and elimination of waste are basic needs. Most people in North America spend money to meet their basic needs. We have to buy food and pay rent or purchase a house. Many people are employed in industries and businesses that are directly or indirectly related to supplying our basic needs. For example, buying food creates jobs for farmers, truck drivers, factory workers, and grocery store employees. In turn, these jobs provide an income so that people can buy food.

Many of our activities today will make it difficult for future generations to meet their basic life needs. If we continue to pollute our land and water today, it may be impossible to obtain food tomorrow. When we remove large amounts of forests, we are removing the major building materials for homes in the future. When we destroy countless habitats, we are destroying many species of living things that share our planet. All these activities threaten our water and air quality.

When we think of sustainability, we can't forget about sustainable fishing! Wild fish stocks are often used as an indicator of the health of freshwater environments, and anglers are a source of critical information which is analyzed by fisheries scientists. Anglers spend money on many items including special clothing and footwear, food, accommodations, travel and fishing equipment. Jobs are created in providing all of these goods and services. Some people are also employed as guides for the anglers. But remember: catch and release is a great way to be sustainable, and only take what you need if you do plan on keeping fish! Overall, the recreational fishery is an important source of economic activity in the Atlantic region.

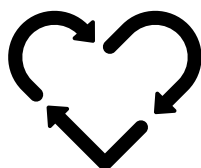
Fish Friends

LESSON 9 ACTIVITY SUMMARY

Sustainable development, or sustainability, involves a holistic examination of the impact of our actions on the environment. Sustainability is more than environmental conservation; it also has economic and humanitarian dimensions. For a sustainable future, all dimensions of sustainability must be addressed. The students are introduced to the concept of sustainability within their own community. They examine how the people who live there meet their basic needs today and in the future. They will build on these fundamental principles of sustainability in later lessons.

Class Activities:

1. Balancing Act Activity Sheet- Grade 3 - Grade 5. Students will imagine Earth is a ball sitting on a stool with three legs. One leg is the environment, one is the economy, and one is people. If the three legs are not balanced, the 'Earth' will roll off the stool, and some living things may not survive the fall, and they will have to answer some questions!
2. Only The Strong Survive Activity Sheet - Kindergarten - Grade 5. This is a math-based activity sheet. For younger grades, the teacher can present the scenario in front of the class and assist with the mathematics. For older grades, students should be able to do the math, either individually or in groups.
3. Overfishing Activity Sheet - Grade 3 - Grade 5. A crossword puzzle focusing on overfishing and how that behavior is not sustainable!
4. Environment Unscramble Activity Sheet - Grade 3 - Grade 5. Students will have to unscramble the words on the page- all of the words tie in with the theme of sustainability. Making this a race to see who can finish first is bound to be a fun time!

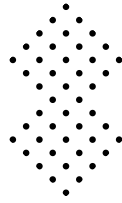


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Lesson 10 Stewardship





Objectives:

Through two activities, the students are challenged to apply their understanding of the concepts developed in the unit. In one, they are presented with a series of difficult situations and are asked to suggest what action they would take. In the second activity, students assume the roles of various community members in addressing a development proposal which has been presented to their town council.

Lesson Overview:

To make informed decisions about our environment, we must be knowledgeable about the various dimensions of sustainability and be prepared to participate in the decision-making process. Stewardship is an ethical value that embodies the responsible planning and management of resources. The concepts of stewardship can be applied to the environment and nature, economics, health, property, information, theology, and cultural resources.

Stewardship over the river may include the addition of extra juvenile fish, the closure of a river to sport fishing, or the restriction of commercial fishing to increase salmon numbers over time. The patrolling of a heavily poached river or the clean-up of a polluted river can also result in the enhancement of fish numbers. River protection and fishery closure can play a vital role in the success of an enhancement project.

Habitat improvement is also a type of enhancement. Natural obstructions such as waterfalls or beaver dams and barriers such as power dams, poorly constructed culverts, and log jams can make a water system inaccessible to migrating fish. Replacing poorly constructed culverts, building fishways, removing wooden barriers, or blasting a waterfall to change its shape can allow new access for sea run fish in an unused river system or tributary. To assure success, some restoration projects incorporate the release of hatchery-reared juvenile salmon or trout to rivers or lakes. These projects are used in situations where previously unused habitat is being made accessible to migrating fish; and where over-fishing and pollution have reduced wild fish stocks to virtual elimination. If you have a Fish Friends tank in your classroom, you are doing your part to help be salmon stewards!

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LESSON 10 ACTIVITY SUMMARY

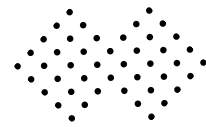
To make informed decisions about our environment, we must be knowledgeable about the various dimensions of sustainability and be prepared to participate in the decision-making process. Stewardship is an ethical value that embodies the responsible planning and management of resources. The concepts of stewardship can be applied to the environment and nature, economics, health, property, information, theology, and cultural resources.

Class Activities:

1. I Can Help The Earth Activity Sheet - Kindergarten - Grade 5. Students are encouraged to either write or draw the different ways they can become environmental stewards and help keep the natural world clean and healthy!
2. Sort the Trash Activity - Kindergarten - Grade 3. Students will cut out the items, and determine if they are recyclable, compostable, or garbage!
3. Stewardship Activity - Grades 3 - 5. Students are presented with 4 different environmental dilemmas that they need to solve. This would be a great group task, or you could take this activity one step further and turn the dilemmas into a debate!
4. Stop Overfishing Activity - Grades 3 - 5. Students will draft a letter to their fishing authority to persuade them to stop overfishing. Again, this exercise could be turned into a debate!



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CONCLUSION

This program could not have been possible without the help from many sources. Thank you to our funder, the New Brunswick Wildlife Trust Fund for the generous sponsorship to update this program. We would also like to thank the DFO Mactaquac Biodiversity Facility for providing the Salmon eggs for the Fish Friends Program.

Our largest, and most sincere, thanks go to the New Brunswick Salmon Council. Without your continued support, the Fish Friends program would have met its untimely demise decades ago. We commend you for your dedication and passion to keeping this program running, and we are hopeful that our efforts within this updated curriculum will support the longevity of the program and help it to keep going for decades to come.

We wanted to extend a thank you to all participating teachers, both previous and current. This program could not be delivered without your cooperation, and we thank you for that. It has been a joy coming into your classrooms, and witnessing firsthand the enjoyment and excitement from educators and students alike when we deliver your salmon eggs!

As always, if you have any questions, concerns, or need help with your Fish Friends curriculum or equipment, our HRAA staff are here for you!

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