

Are You Fish Friendly?

FISH FRIENDLY: STORIES FOR LEARNING

This section of the Ravine Education Program curriculum guide focuses on stewardship of the ravine habitats and other natural areas. These entertaining articles provide students with:

- Examples of people and places that protect these natural areas
- Critical thinking reflection questions
- Stewardship opportunities.

They include **six stories** designed for student reading with extension activities:



Our Ravines



Orchestrating a Solution



Working with Nature



Hatching Trout



A Love for Fish



You Can Help!

SUPPLEMENTING ACTIVITIES

Instructors may choose to use the Fish Friendly stories independently or in conjunction with activities from the previous three sections. Suggestions are indicated below:

FISH FRIENDLY STORIES	WATERSHEDS	STREAM QUALITY	RAVINE AND NEARSHORE AQUATIC LIFE
Our Ravines			
Orchestrating a Solution			
Working with Nature			
Hatching Trout			
A Love for Fish			
You Can Help!			

Standard alignments are available for each story in the Appendices, beginning on page 125.



Are You Fish Friendly?

Our Ravines

From the Mouths of the Highland Park Ravines

WHERE: Highland Park, IL

We are the ravines of Highland Park. Although our streams start in different places, we are connected because we all flow into Lake Michigan. We are special because unlike most of Illinois, which is very flat, we are made up of steep slopes that are unique to this area of the North Shore. We are home to plants and animals that you can't find elsewhere. It's important for us to stay clean so that these plants and animals can continue to use us for their habitat.



WHAT ARE RAVINES?

We are steep valleys worn down by running water. Over time we get deeper and larger as water continues to flow through us. This is called stream-cutting erosion. Our connection to Lake Michigan is what makes us such a unique ecosystem.

About 10,000 years ago, the last glaciers retreated away from this region, carving out the bottom of what we now call the Great Lakes. Across the North Shore, these glaciers left a moraine, or a giant pile of rock, clay, and sand. Over thousands of years rainwater flowed naturally over this moraine, slowly creating the ravines between Winnetka, IL and Kenosha, WI.

Sometimes we are flowing with water, like after a storm, and sometimes there is just a trickle of water passing through. Every drop of water that lands on the ground east of Green Bay Road in Highland Park ends up in our streams. That drop of water, whether it fell as rain or came from a sprinkler in a lawn, travels down to our streams and sometimes carries other things with it as it flows. Water can bring chemicals from lawns, salt from roads or soil down to the ravines. We are connected with everyone who lives in this area because we are part of the same watershed, or water community.



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FISH IN THE WATER?

Some fish like us because we provide a place for them to spawn each spring. They swim upstream from the lake and some build their nests in our waters because we can provide calmer waters and shelter for their young. These fish also love us because we provide shelter from predators like birds, raccoons, and bigger fish. We are very important to these fish because the ones that were born here will remember that stream and come back to reproduce every year.

One of our streams, which is named 7L, has recently been restored by people in the Highland Park community. They made a lot of changes to the stream and surrounding area that make us a better habitat for the fish that make their nests there. There are now at least five fish species that use us for their habitat - White suckers, Lake chub, Longnose dace, Sticklebacks and Rainbow trout.

Not only are we a fun place to explore and play, but we are also one of the most fish friendly places in Highland Park! As long as our community continues to be protected and taken care of, the unique plants and animals of our ecosystem will continue to thrive here. Come visit us and see who lives here!

CRITICAL THINKING

1. What is special about the connections between the ravines and Lake Michigan?

2. Brainstorm five possible sources of pollution that could impact the ravine ecosystems.

3. What are some of the ways that you can help protect the ravines?



Are You Fish Friendly?

Orchestrating a Solution

WHAT: Ravinia Festival South Parking Lot, Permeable Parking Lot

WHERE: Highland Park, IL

Have you ever visited the Ravinia Festival to see your favorite band? Did you notice how Fish Friendly the parking lots were? Probably not. It's difficult to tell at first glance, but the new parking lots are helping to protect local ravine habitat.

Before it was replaced, the gravel parking lot at Ravinia Festival would flood after rain storms. The gravel was so compact that it was *impervious*, so the water could not move through the parking lot. The parking lot flooded about 25 days every year. During these times, no one could use the parking lot, and it created *flashy outflow*, when there is more runoff after a storm. Flashy outflow flooded stormwater drains, which lead to Lake Michigan through a local ravine in Highland Park. This *flash flood* made it difficult for fish to live in the ravine.



BEFORE



AFTER



Are You Fish Friendly?

In 2009, the parking lot was replaced with over 27,000 square feet of permeable pavers and an underground water storage vault that holds nearly 250,000 gallons of stormwater. This storage vault acts like a giant rain barrel. Rain trickles through the parking lot and fills the water vault. The water is slowly pumped into the city's storm drain system, so flash floods are rare. In July of 2011, eight inches of rain fell on the parking lot in just 48 hours, and the parking lot never flooded. In fact, the project was so successful that Ravinia Festival has replaced another parking lot with the same system.



Photo credit: W.B. Olson

Next time you visit Ravinia Festival, take a closer look at the parking lot. There is a good chance that rain water is being stored beneath your feet. The slow release of this water into the stormwater system is friendly to the fish of Lake Michigan and the Highland Park Ravine systems.

CRITICAL THINKING

1. What do you think causes a flash flood?

2. What do you think is the difference between pervious and impervious surfaces? Which would be the most fish friendly?

3. How could we create more fish friendly surfaces in Highland Park?

Project information for this case study is available on the Landscape Architecture Foundation website: <http://www.lafoundation.org/research/landscape-performance-series/case-studies/case-study/393/> as of April 7, 2013. Before and after photos are courtesy of SmithGroupJJR.



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Working with Nature

WHO: Liz Ettelson
Natural Areas Program, Park District of Highland Park

WHERE: Highland Park, IL

Imagine working in an office with over 250 acres of prairie, woodlands, ravines and wetlands, all in your own backyard. Welcome to the world of Liz Ettelson, who works in the Natural Areas Program for the Park District of Highland Park. Ettelson's job description includes controlled burns on the lake bluffs and removing acres of invasive species like buckthorn and garlic mustard.

As a child growing up in this area, Ettelson loved to be outside and at the beach. Today she is inspired by the plants and animals with which we all share a community. "I want kids in Highland Park to see how great it is that this is in their own backyard."

Lately, Ettelson has been assisting with the restoration of fish habitat and testing water quality in the Park District's ravines. It all began as a hunch, with the only proof being stories from long time residents, but it was thought that fish might be able to live in those old ravines. Since Ravine 7L at Millard Park was restored as a part of the Great Lakes Restoration Initiative, Ettelson has been measuring stream flow, turbidity, temperature, pH, and other factors that determine whether or not fish can survive in the stream. This ravine is one of 11 in the Highland Park Ravine system.



Liz Ettelson measuring water quality in Ravine 7L



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This hard work is paying off. “Every time I see fish in the ravines it is so awesome,” Ettelson says. Five species of fish have been identified in Ravine 7L since restoration was completed. These species are Lake chub, White sucker, Stickleback, Longnose dace and Rainbow trout. “I never thought I could do this kind of work at home because we don’t have big natural areas like those out in Colorado and Montana, but there is so much that needs to be done here.”

CRITICAL THINKING

1. Name all the plants and animals that you know live in your community.

2. Ettelson’s job is to protect natural areas in Highland Park. Think of two actions that you can take as a Highland Park citizen to protect these areas.

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Working with Nature Extension: Get Involved!

INVASIVE SPECIES REMOVAL

Rid your home or school of invasive species! Garlic Mustard, Buckthorn, Japanese Knotweed, and Goutweed are among the invasive plants commonly found in or near Highland Park. To identify common woodland invasive species, visit: <http://www.inhs.illinois.edu/research/CAPS/docs/WoodlandWeedsfinal.pdf>

To learn more about invasive species remove efforts, visit the Northeastern Illinois Invasive Plants Partnership website: http://niipp.net/?page_id=1016

VOLUNTEERING

Are you interested in volunteering with the Natural Areas Program at the Park District of Highland Park? They need your help! If you are interested in helping to protect these unique areas, contact Liz Ettelson at eetelson@pdhp.org





Are You Fish Friendly?

Hatching Trout

WHO: Highland Park High School
A classroom hatchery for Rainbow trout

WHERE: Highland Park, IL

Do you have any pets at home? What about pets in your classroom? Classes around Highland Park are adopting pets that may surprise you: *Oncorhynchus mykiss*, more commonly known as the Rainbow trout. The latest group to raise trout is the students in Mr. and Mrs. Hill's Environmental Science classes at Highland Park High School.



Mr. Hill's trout aquarium

In October of 2012 Mr. and Mrs. Hill received 380 trout eggs and kept them in a 67 gallon aquarium in their classroom. Over the winter and spring, students in their environmental science classes watched as the eggs hatched into larval fish, which grew into fry.

HOW TO KEEP A PET TROUT

Keeping 380 pets is no easy task. "Nico Ugolini and Jeremy Solomon were the caretakers after the eggs hatched," Mr. Hill said. "They tested the water chemistry and other students helped feed the fish and changed their water regularly. Some volunteered to do this over weekends and holidays."

Having trout in the classroom brought science alive for students in Mr. Hill's and Mrs. Hill's classes. "They loved feeding the fish and learning about fish biology, conservation, water chemistry, and the sources and impacts of water pollution," Mr. Hill said. Students also learned a difficult lesson about density dependence, where limiting factors allow only a certain number of fish to survive in a habitat. "Students were all engaged in the fish themselves. They all certainly responded to the losses we had."



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RELEASE

In April 2013, after raising the fish for about five months, students released the trout into a ravine stream in Highland Park. After a release, the fry will hopefully live in the ravine until they are big enough and strong enough to survive in Lake Michigan. When you visit the ravines, look for Rainbow trout and other fish, like White suckers and Lake chubs. You might get lucky!

CRITICAL THINKING

1. Density dependence is caused by limiting factors in a habitat. What might have been some of the limitations for the trout in Highland Park High School's aquarium? (*Hint: think about what animals need to have a healthy habitat*)

2. If the Hills had three aquariums, would they be able to support more fish or less fish? Why?

Are You Fish Friendly?

Hatching Trout

Extension: In Your Classroom

EXPLORE HATCHERIES

In the United States, each state has a fish hatchery program. Illinois has three fish hatcheries, where fish are raised in large numbers and released into local lakes, rivers, and streams. Since 1984, the Illinois Hatchery System has released 500 million fish, including trout, salmon, bass, walleye, bluegill, and catfish. To read more about these hatcheries, visit: www.ifishillinois.org/programs/hatchery.html

To see a searchable database with specific stocking activities in the Great Lakes, visit: <http://www.glfc.org/fishstocking/exactsearch.htm>.

Also, the Michigan Department of Natural Resources offers a readable database for their release activities throughout the state of Michigan: <http://www.michigandnr.com/fishstock/>.

BRING TROUT TO YOUR CLASSROOM

To become involved in Trout in the Classroom, connect with your local Trout Unlimited Chapter. In Northern Illinois, the Gary Borger Chapter works with several classrooms, including the Hills'. Visit the Gary Borger Chapter website for contact information: <http://garyborger.tu.org/>.



Juvenile Rainbow trout

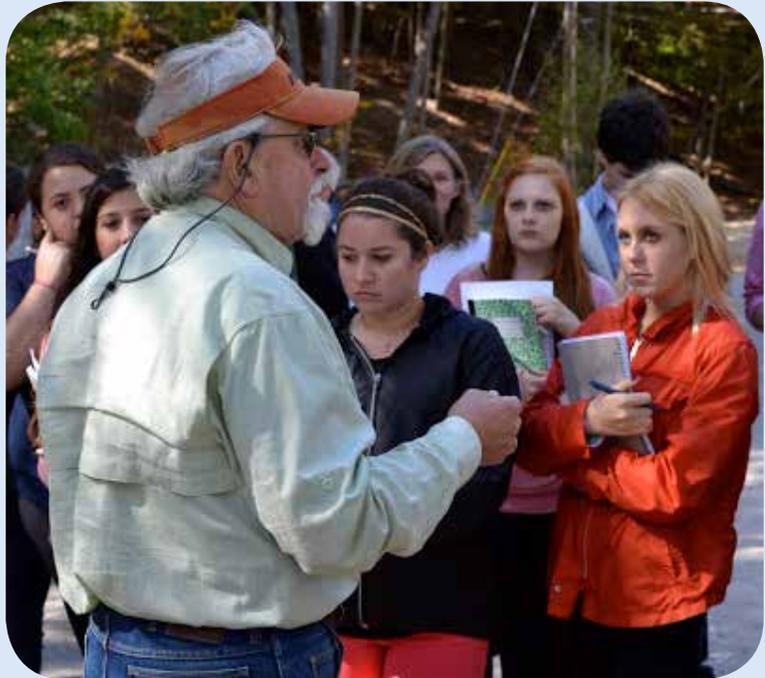


A Love for Fish

WHO: Mr. Jim Tingey
Fisher, retired teacher, artist

WHERE: Highland Park, IL

Jim Tingey received his first fishing pole when he was five years old – actually, he made the pole out of bamboo growing in his backyard. The goldfish in his neighbor’s pond captured his attention, and soon he had used his homemade pole to catch his first fish. When Tingey returned home to show off his catch, he received his first lesson in catch and release fishing. “My mom told me to take it back to the fish pond and put it back,” Tingey remembers. “Being a large goldfish, it made the trip back and still lived for many years, though it never swam in a vertical position – sort of at an angle.”



Jim Tingey teaching a class at Ravine 7L

An avid fish lover, in 2011 he fished in 13 states and caught fish from 36 different species. Nearly all of these fish were released back into their habitat. “I think catch-and-release promotes the opportunity to catch something, but not kill it, let it go back, and live,” he says. “Maybe it will be caught a second time, for fun, by another angler.”

Tingey has combined catch-and-release fishing with another lifelong hobby, painting. He encourages other fishers to practice catch-and-release when fishing. When they catch a trophy fish, he is there to help. If someone sends him a picture of a special catch, he paints the fish so that it can be remembered forever.



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When asked about how this helps fish populations, Tingey says that it has a small impact, but he adds that there are even more ways fishers can help fish. “The biggest issue with sport fishing is the type of lures used with massive barbed treble hooks that wreck a fish. Even though people put the fish back in the water, sometimes it is just a matter of time before it will die.”

Here are Tingey’s suggestions for protecting the fish you catch:

1. Use single hooks instead of treble hooks
2. Trim the barbs off your hooks so that the hook is easier to remove
3. When you let the fish go, don’t “throw it back”. Belly smackers are no fun when you are swimming, and they’re no fun for the fish when they are released.

Also, don’t forget that there is no fishing allowed in the Highland Park ravines!

CRITICAL THINKING

1. What are the benefits and draw backs of catch and release fishing?

2. How might releasing a giant trophy fish back into its natural habitat impact fish populations? (*Hint: think about the lifecycle of fish – do fish spawn when they are old or young?*)

3. Mr. Tingey combines his love for fish with his painting talent to help fishermen become better conservationists. Within your group, think of a way that you might use your special talents and hobbies to help others in your community become better conservationists.



Are You Fish Friendly?

You Can Help!

WHO: You

WHERE: Highland Park Ravines

WHAT TO BRING: Garbage bag, rubber gloves, empty water bottle



Visit a ravine that is close to your home with your parents. This might be in your backyard, down the street, or across town. The Park District of Highland Park invites you to visit Ravine 7L at Millard Park or Ravine 3L at Rosewood Beach. Bring a garbage bag and gloves to pick up trash and help keep the ravines clean for fish. If possible, fill a bottle with water from the ravine and bring it to class to discuss water quality.

QUESTIONS

1. Which ravine are you visiting? _____

2. When you visit the ravine, take notes on what you see.

3. What types of plants are growing?



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4. Did you observe any animals in the ravine, and where were they? Also, what evidence of animals did you observe? (Examples: tracks, scat, feathers, animal sounds, etc.)

5. Do you see water flowing through? Do you think fish might be living in the ravine today? Why or why not?

6. How would the ravines look different if you were here during another season? Would there be different plants and animals?

7. If you lived in this ravine, how would you fulfill your habitat needs? (food, water, shelter, space?)

8. List any garbage items you found in the ravine.

9. Did you collect a water sample to share with the class? Yes No



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10. In the space below, create a sketch of something unique that you observed at the ravine today.

GLOSSARY

Abiotic	The non-living components of an ecosystem.
Absorbent	Able to soak up liquid easily.
Acidic	A substance with more hydrogen ions (H ⁺) than hydroxide ions (OH ⁻). pH of an acidic substance is 6 or less.
Acre	A measurement of area equal to 43,560 square feet, or one football field without endzones.
Adaptation	Physical characteristics and/or behaviors that organisms have developed over time to survive in their ecosystem.
Adipose fin	A fleshy fin located near the tail of Rainbow trout.
Alkaline (basic)	A substance with more hydroxide ions (OH ⁻) than hydrogen ions (H ⁺). pH of an alkaline substance is 8 or more.
Anal Fin	A fin usually located near the vent, which assists with balance.
Aquatic	Growing or living in water.
Ballast water	The water that a ship takes on in order to stay stable while floating.
Basin	The total land area drained by a river or its branches.
Benthic	The bottom region of a water body.
Biodiversity	The variety of species living in a place.
Biotic	The living components of an ecosystem.
Bluff	An outcropping of rock, usually high above a river or lake system.
Carnivore	An organism that eats other animals.
Carrying capacity	The maximum population that a habitat can support.
Cartography	The study of maps and map making.
Caudal fin	Also called the tail fin, this fin propels the fish through the water.

GLOSSARY (continued)

Coastal	Area along water, near a stream, river, lake, or ocean.
Conservation	A coherent, consistent practice of wise and thoughtful decision-making and consumption of natural resources for present and future generations.
Consumer	An organism that eats other living things.
Cubic feet per second	A measurement of a liquid's flow rate. For example, if a bucket is filled with one cubic foot of water (7.5 gallons), and the bucket is emptied in 1 second, it is emptied at a rate of one cubic foot per second.
Cubic foot	A measurement of volume equal to 7.5 gallons.
Current	The continuous movement of water in a certain direction.
Dissolved Oxygen (DO)	The dissolved form of oxygen, which occurs in a liquid.
Dorsal fin	A fin located on the back of fish, which assists with balance and maneuverability.
Ecology	The study of ecosystems.
Ecosystem	A place where living and non-living things interact.
Ecotone	The transitional zone between ecosystems.
Erosion	To wear away by the action of water, wind, or glacial ice.
Food chain	A simplified section of a food web.
Food web	The natural flow of energy and matter through the living and non-living components of an ecosystem.
Gallon	A measurement of volume equal to four quarts, eight pints, or 128 fluid ounces.
Geographic Information System (GIS)	A computer mapping program that can be used to create maps at local, state, national, and global scales, using specific sets of data.
Groundwater	Water that travels through the ground, where it is cooled and purified naturally.
Habitat	A natural environment where an organism lives. Habitats contain the food, water, shelter and space an organism needs in order to survive.
Herbivore (primary consumer)	An organism that eats only plants or other producers.

GLOSSARY (continued)

Impervious	A surface that cannot be penetrated.
Indicator	In ecology, a plant or animal whose existence in an area is linked to specific environmental conditions.
Invasive species	A species that can be native OR non-native to an ecosystem, and whose introduction can cause harm to the environment, native species, the economy, or human health. Invasive species generally have no natural predators in their environment and reproduce rapidly.
Lateral line	A line of special scales with pore-like openings that detects disturbances in water.
Limiting factors	Situations that prevent a population from exceeding carrying capacity (i.e., disease, predator-prey relationships, pollution, and habitat destruction).
Macroinvertebrates	Invertebrates (animals without a backbone) large enough to be seen without a microscope.
Mile	A measurement of distance equal to 5,280 feet or 1,609 meters.
Native species	A species that lives in a region or place without an intervention from people.
Naturalized species	A non-native species that brings minimal negative impacts to a new ecosystem.
Nearshore ecosystem	A system of shallow areas along the shoreline of a large lake that provides an abundance of food, shelter, and space for many freshwater species.
Neutral	A substance with about the same amount of hydroxide ions (OH ⁻) and hydrogen ions (H ⁺). pH of a neutral substance is between 6-8.
Non-native species	A species (not in captivity) introduced by humans to a place outside of its historical range.
Omnivore	An organism that eats both plants and animals.
Opaque	Not clear; not transmitting or reflecting light or radiant energy.
Open water ecosystem	A system of deep, dark, and cold water lacking food and shelter for most freshwater species.
Operculum	Gill cover, which protects fish gills.
Parr	Juvenile trout or salmon.
Pelagic	Any water in a lake or ocean that is not near the bottom or the shore.
Pelvic fins	Paired fins on a fish that provide stability and help to steer the fish when swimming in an upward or downward direction.

GLOSSARY (continued)

Permeable	Allowing a substance like water flow through.
Pervious	A surface that can be penetrated.
pH	A measurement of the ratio of Hydrogen ions (H ⁺) to Hydroxide ions (OH ⁻). pH is measured on a scale from 0-14.
Pool	A stretch in a stream where stream velocity is lower than average, and water depth is above average.
Population	Number of organisms of the same species in a place.
Preference	When one option is favored over another option.
Primary consumer (herbivore)	An organism that eats only plants or other producers.
Producer	An organism that creates its own food
Ravine	A landform narrower than a canyon that is often the product of erosion from streams.
Riffle	A stretch in a stream where stream velocity is higher than average, usually because of a drop in elevation.
Runoff	Water that is not absorbed by the ground.
Salinity	The amount of salt in a solution.
Sand	Loose material produced by the natural breaking up of rocks.
Secondary Consumer	An organism that eats other consumers. Secondary consumers can be either omnivores or carnivores.
Sediment	Soil material carried away by moving water. Sediment is a form of pollution that can alter an ecosystem.
Sedimentation	The process of depositing sediment in layers.
Silt	Very small soil or clay particles in water.
Solute	A substance that is dissolved in another substance.
Solution	A homogenous mixture of two or more substances.
Solvent	A substance that dissolves another substance.
Species	A group of organisms with common attributes and the ability to reproduce fertile offspring together.

GLOSSARY (continued)

Square mile	A measurement of area equal to a 640 acres.
Stormwater	Water that falls on the land during a storm.
Stream ecosystem	A system of flowing water supported by groundwater and runoff, and provides food, shelter, and space for many freshwater species. The availability of these resources can change seasonally, depending on the stream's flow rate.
Substrate	The material make-up of the benthic (bottom) region of an aquatic ecosystem.
Suspended solids	Solid matter that is contained within a volume of water. May include silt and clay particles, plankton, algae, and fine organic debris.
Terminal mouth	A horizontal pointing mouth common on fish species that consume other fish, such as the Rainbow trout.
Terrestrial	Related to earth. In the context of ecology, terrestrial describes a land-based ecosystem, as opposed to an aquatic ecosystem such as a ravine stream or a lake.
Tolerance	The ability to deal with something that is difficult or painful.
Ton	A measurement of mass equal to 2,000 pounds or 907 kilograms. An average car weighs about one ton.
Topographic map	Maps with contour lines that express changes in elevation.
Translucent	Almost transparent; allowing light to pass through diffusely.
Transparent	Able to be seen through with clarity.
Trophic level	Feeding levels of a food chain (i.e., producer, primary consumer, secondary consumer, and decomposer).
Turbidity	A measurement of light passing through water (i.e., relative clarity).
Velocity	Speed, like the speed of a current in a stream.
Vent	The location on a fish where solid and liquid waste are released.
Ventral mouth	A downward pointing mouth common on bottom feeding fish species, such as the White sucker.
Watershed	An area of land where all the water drains into the same place.