MIDDLE SCHOOL
LESSON GUIDE

Into the Outdoors

TECHNOLOGY IN FISH CONSERVATION

educational partners

Great Lakes RESTORATION

Natural Resource Science

GRADE LEVELS
Elementary/Middle - Grades 4-6

CONTENT AREA
Science & Technology/21st Century Skills

UNIT THEME
Technology of Fish Conservation

TOPIC
Conservation, technology, careers in fish biology/ecology

TIME REQUIRED
Two 45 minute sessions

OVERVIEW

Technology plays a key role in studying fish and helping to conserve and restore our fish populations. People who study fish are called "aquatic ecologists" or "fish biologists." The technology scientists use today has changed how biologists study fish.

Fifty years ago, ecologists didn't have much technology that helped them study fish living in their wild environments. Scientists caught the fish in nets or on a hook, observed the fish directly in the water, or got into the water with the fish. Fish Biologists also may have caught the fish and then put them into a tank, but this prevented them from studying fish in their natural environment.

Today, technology advances have changed how scientists study fish. Some of the newer technology scientists use include the following:

Electro-fishing: A gas-powered generator is used to send an electrical current into the water and when a fish gets within the electrical field, the current makes it swim toward the anode and is scooped into a net.

PIT Tag: PIT stands for Passive Induction Transponder. It is a micro-chip that is injected underneath the fish's skin to track it. It is the same kind that people use for their cats and dogs.

Passive Listening Devices: The electronic surveillance of fish which could include using sonic listening devices and acoustic pinging implants to track fish.

Internet: Fish biologists can research and even publish new information using the internet. This allows for an open exchange of new information such as identifying trends in fish migrations.

CONCEPT: How conservation, technology, and careers in fish biology/ecology work together to study fish and conserve fish populations.

ENDURING UNDERSTANDING:

It is important for students to understand the modern technology scientists use to study and manage fish. Students can then begin to understand how to use these technologies to help conserve and restore our fish populations.

CONTENT OBJECTIVES:

Students will develop an understanding of key vocabulary words related to fish biology and current technology.

LEARNER OBJECTIVES:

1. Students will describe how today's technology has changed how biologists study fish by comparing technology today and 50 years ago.

2. Students will recall the types of technology biologists use and describe how they use it to study fish.

PROCESS OBJECTIVES:

Students will work collaboratively to complete the extension activity.

MATERIALS NEEDED (each group, each student):

1. Student Worksheet
2. Venn diagram worksheet
3. Internet access for Extensions

PROCEDURES

1. Before watching the video, ask students how they think scientists study fish. Make a web with "Fish biology" in the center. Tell students that the root word -ology means study of, therefore, a fish biologist studies fish. Dictate students' ideas on the web.

2. Tell students to take notes on the following questions as they watch the video. Go over the questions with the students before viewing so they know what to listen for.

50 years ago, a fish biologist may have captured a fish and studied it in a tank. But what did this prevent them from doing? (It prevented scientists from studying fish behaving naturally in their ecosystems)

Describe how "electro-fishing" works. (A gas-powered generator is used to send an electrical current into the water and when a fish gets within the electrical field, the current makes it swim toward the anode and is scooped into a net)

How does the internet help fish biologists? (Fish biologist can research and even publish new information using the internet)

What is a PIT tag and why is it useful? (PIT stands for Passive Induction Transponder. It is a micro-chip that is injected underneath the fish's skin to track it. It is the same kind that people use for their cats and dogs)

What do biologists do with the information from a passive listen device? (Biologists use this information to help decode the migration and spawning patterns of fish)

PROCEDURES *(continued)*

Would you be interested in becoming a fish biologist? Why or why not? (Accept any reasonable answer)

3. After viewing the video, review the discussion questions as a class and go back to the web and add information if needed.

4. Hand out the Venn diagram to each student and have them compare and contrast the technology biologists used 50 years ago and today. Remind students to look back in their discussion notes for ideas. Discuss as a whole class after students have worked independently. Have students fill in any information they may have missed.

ASSESSMENT

Students will be informally assessed based on their participation in the class discussion. Teachers could collect the discussion notes students took during the video to check for completion. Students can be formally assessed using the Venn diagram to see if students were able to compare technology then and now. The second learning objective (recall types of technology) can be formally assessed if students complete the extension activity.

EXTENSION ACTIVITIES

1. Students will be divided into "fish biologist teams." They must work together as a group to research an assigned type of technology fish biologists use to study fish. Types of technology could include the following: electro-fishing, internet, PIT tags, sonic listening devices, and acoustic pinging implants. Students will develop a presentation to share with the class (PowerPoint, Slide Rocket, Poster, etc.)

2. Students could develop projects that visually teach important ideas conveyed in the video

3. Invite a fish biologist to speak to the class about his/her job. Particularly have the guest speaker discuss or show the types of technology he or she uses to study fish. Have students develop questions for the speaker about his/her career. Some of the questions asked could include the following:

- What do you like about your job?
- What is the hard part of your job?
- What type of education did they need for this job?
- How do you learn about new technology related to your job?

SPECIAL CONSIDERATIONS:

1. During the video, the instructor may want to stop the video after each major section to allow students time to take notes.

2. It may help to have the discussion questions already typed up so students don't have to take notes in notebooks.

RESOURCES

- http://dnr.wi.gov/
- EEKK (science website for kids)
- Click on Regulations and Recreation tab to learn more about fishing in Wisconsin

KEY VOCABULARY WORDS

- Conservation: Preservation, protection, or restoration of the natural environment, natural ecosystems, vegetation, and wildlife.
- Ecology: The study of species
- Ecologists: Scientists who study a species
- Aquatic Ecologists: Scientists who study fish

STUDENT PORTION

- Charts, graphs, worksheets, Journal Pages: See Venn Diagram on Page 7.

The following **Student Proficiency Standards** can be met by teaching TECHNOLOGY IN FISH CONSERVATION:

WISCONSIN STATE STANDARDS AND BENCHMARKS

B.4.1 Use encyclopedias, source books, texts, computers, teachers, parents, other adults, journals, popular press, and various other sources, to help answer science-related questions and plan investigations

C.4.1 Use the vocabulary of the unifying themes to ask questions about objects, organisms, and events being studied

C.4.2 Use the science content being learned to ask questions, plan investigations, make observations, make predictions, and offer explanations

C.4.3 Select multiple sources of information to help answer questions selected for classroom investigations

C.4.6 Communicate the results of their investigations in ways their audiences will understand by using charts, graphs, drawings, written descriptions, and various other means, to display their answers

C.4.8 Ask additional questions that might help focus or further an investigation

H.4.1 Describe how science and technology have helped, and in some cases hindered, progress in providing better food, more rapid information, quicker and safer transportation, and more effective health care

The following **National Common Core Standards** can be met teaching TECHNOLOGY IN FISH CONSERVATION:

NATIONAL COMMON CORE STANDARDS

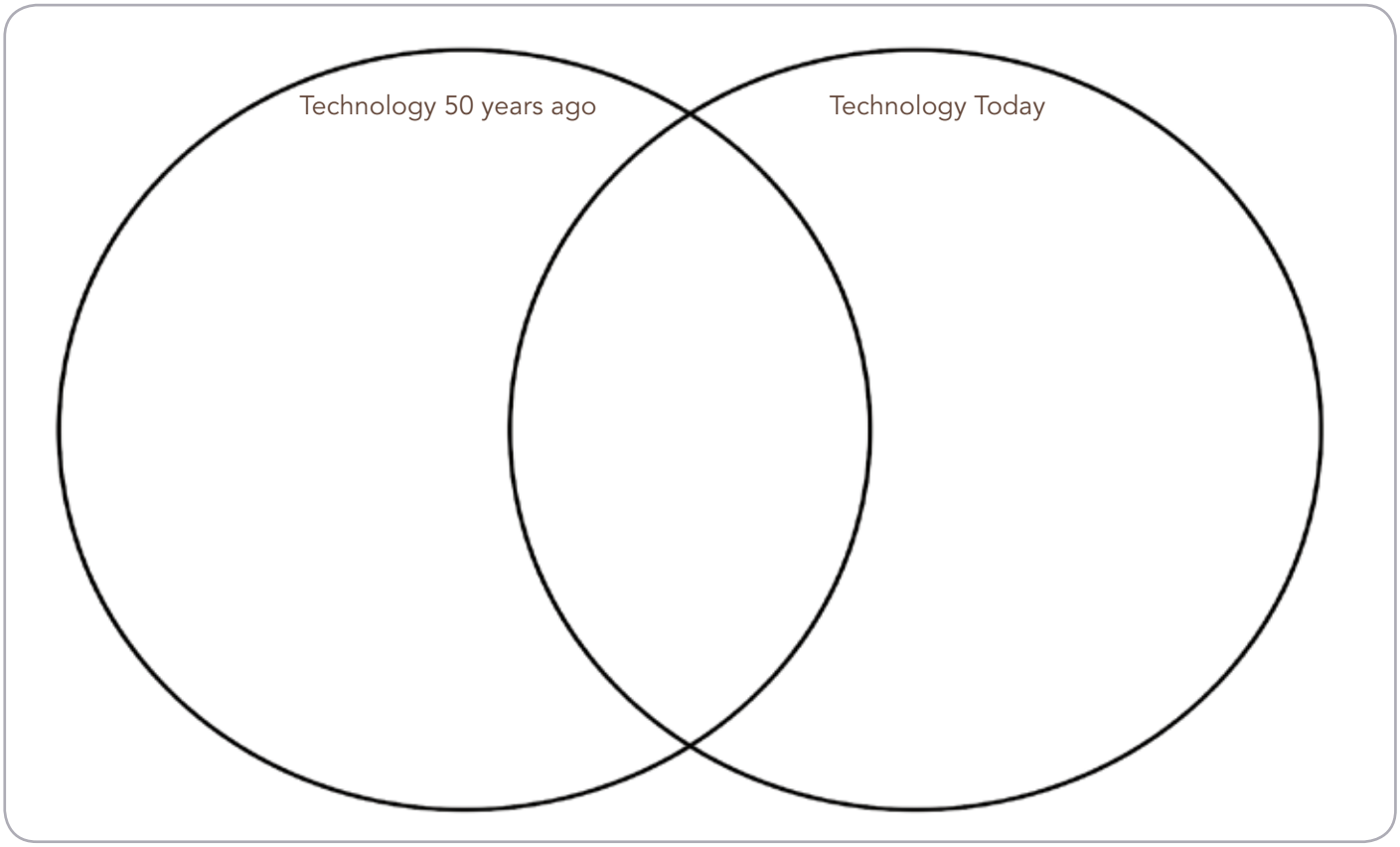
CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

CCSS.ELA-Literacy.CCRA.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCSS.ELA-Literacy.CCRA.SL.2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-Literacy.CCRA.SL.4 Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

Venn Diagram



The following **Wisconsin Teacher Standards** which may be met teaching BIOLOGICAL CARRYING CAPACITY:

Standard 1: **Subject matter**

This curriculum provides information not readily available in other forms.
A teacher using this material will be well-informed about the subject matter.

Standard 2: **Broad range of ability**
This curriculum provides instruction that supports their intellectual, social, and personal development.

Standard 3: **Adapt instruction**

This curriculum provides suggestions for learners with a variety of intelligences and levels of ability.

Standard 4: **Instructional strategies**

This curriculum includes the use of technology to gain information and suggestions for using research in extending learning.

Standard 5: **Individual and group motivation**

Both prior knowledge and carefully designed group projects promote motivation for students to learn.

Standard 6: **Verbal and nonverbal communications**

Instructional media and technology that promotes active learning are key parts of this curriculum.

Standard 7: **Organizes and plans systematic instruction**

This curriculum is organized to support teacher knowledge, to draw on and motivate students to engage in active learning, and promotes active inquiry, collaboration, and supportive interaction in the classroom.