



Success of the Osprey: A Formerly Endangered Species

TEACHER'S GUIDE

Grades: 3-6

Subjects: Science and Living Organisms

Purpose:

This lesson serves as an in-depth case study of a former endangered species – the osprey. Students will investigate this species to learn about their physical characteristics, behavior, and life history. Throughout this investigation, students will be exposed to the intentional conservation efforts that brought this species from surviving to thriving.

Essential Question: What are the characteristics and defining features of ospreys?

Supporting Questions:

1. What is an endangered species and what makes something endangered?
2. Why were ospreys put on the endangered species list?
3. How do ospreys build their nests and care for their chicks?

Time Frame:

Up to three (3) 45-minute class lessons as described below under overview of lessons.

Focus Topics:

Endangered species, Birds of prey, Animal habitat, Animal physical characteristics

Description:

Ospreys, a bird of prey species that are also known as sea hawks, were a largely declining species due to human activity starting in the 1950s. When the pesticide DDT was commonly used for insect control, the pesticide began chemically impacting aquatic ecosystems and aquatic animals. Since an osprey's main food source is fish, the affected DDT-laced fish stunted osprey reproduction, which caused their eggshells to become thinner and decimated their numbers. By 1974, with fewer than 50 nests in the state, ospreys landed firmly on the New Jersey endangered species list. The use of DDT was then banned, and osprey populations slowly started increasing. Conservation groups erected platforms to encourage nesting in marshy habitats where development replaced tree lines, and the osprey caught on – by the mid-1980s there were more than 200 healthy pairs nesting in New Jersey. There are now more than 800 platforms around the state, and it's estimated that 75% of nesting osprey are using these man-made structures in New Jersey. Today, we know we must conserve and restore land at an unprecedented scale for the benefit of people, wildlife, and our climate. Ospreys remain a priority for TNC in New Jersey.



For more than two decades they have been stewarding osprey habitat and maintaining and monitoring osprey nesting platforms in suitable New Jersey habitats.

Ospreys are a fascinating species that are an inspiring example of the positive impacts of conservation work. Engaging students in this bird species can display a positive outlook on conservation efforts of a previously endangered species. Today, osprey nest cameras are an engaging way to receive a firsthand look at these species especially during their nesting season! Students can have the opportunity to learn about these animals while completing engaging hands-on activities.

Objectives:

In this lesson, students will:

1. Investigate the osprey species by learning about their natural history, physical characteristics, and bird call.
2. Discuss an age-appropriate definition of an endangered species.
3. Explore the cause of why ospreys were a declining bird species.
4. Draw and label a picture of an osprey.
5. Create their own osprey nest guided by an instructional video.
6. Interact with ospreys through the osprey nesting cam and complete a visual activity.
7. Complete a guided assessment about ospreys.

Standards:

Next Generation Science Standards:

Elementary School

Disciplinary Core Ideas:

- ESS3.A: Natural Resources
- ESS3.C: Human Impacts on Earth Systems
- LS1.A: Structure and Function
- LS1.B: Growth and Development of Organisms
- LS1.C: Organization for Matter and Energy Flow in Organisms

Crosscutting Concepts:

- Planning and Carrying Out Investigations
- Patterns
- Cause and Effect
- Stability and Change



Science and Engineering Practices:

- Asking Questions and Defining Problems
- Developing and Using Models

Performance Expectations:

Elementary School

Activities in this lesson can help support achievement of these Performance Expectations:

- K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.
- K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
- K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.
- 1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
- 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Middle School

Disciplinary Core Ideas:

- LS1.B: Growth and Development of Organisms
- ESS3.C: Human Impacts on Earth Systems

Crosscutting Concepts:

- Patterns
- Cause and Effect
- Stability and Change

Science and Engineering Practices:

- Asking Questions and Defining Problems
- Developing and Using Models

Performance Expectations:

Middle School

Activities in this lesson can help support achievement of these Performance Expectations:

- MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.



Common Core Standards:

6th-8th Grade Science and Technical Subjects

- CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multi-step procedure when carrying out experiments, taking measurements, or performing technical tasks.

Vocabulary:

1. **Endangered species:** An animal or plant that is in danger of disappearing forever.
2. **Extinct:** A living organism that no longer exists on Earth.
3. **Habitat:** The natural home or environment of a living organism.
4. **Observation:** Using our senses to gather information about the world around us.
5. **Organism:** Any living thing that has the ability to reproduce, grow, and breathe.
6. **Physical Trait:** Physical features including height, weight, size, shape, or another characteristic.
7. **Population:** The number of living organisms living in a certain area or place.
8. **Species:** A group of similar organisms with the ability to interbreed and produce offspring.
9. **Talon:** A large, hooked claw often associated with birds of prey.

Materials

For Teachers:

- Computer or laptop
- Projector or Screen Casting Capability
- Chart paper

Digital:

- [Digital Osprey Quiz for Kids \(Grades 3-5\)](#)
- [Osprey Quiz for Kids - Printable Worksheet](#) and [Answer Key](#)
- [Digital Osprey Quiz - Advanced \(Grade 6\)](#)
- [Osprey Quiz – Advanced Printable Worksheet and Answer Key](#)
- [Osprey Cam Field Notes - Printable Worksheet](#)
- [Osprey Cam Scavenger Hunt - Printable Worksheet](#)
- [All about Ospreys Kahoot! Game](#)

For the Nest Building Activity (Per group or individual nest)

1. Small container – Either small plastic Tupperware or small ramekin
2. 12” brown paper circle
3. Dried grass or faux grass
4. Clear glue
5. Scissors
6. Optional materials: colored felt or small pieces of plastic



For making osprey eggs:

1. Small mixing bowl
2. Small plate
3. Baking sheet or tray
4. 1 cup of flour
5. ½ cup of salt
6. ½ cup of warm water
7. Teaspoon or cookie scoop
8. Brown acrylic paint
9. Tea bags
10. Clear nail polish
11. Small paint brushes
12. Oven - If accessible
13. White paper to make paper eggs if needed

For Students:

1. Notebook paper or journal
2. Pencil or pen
3. Blank Copy Paper
4. Coloring pencils – Optional

Overview of Lessons:

Lesson 1

Activity 1: Introduction – What is an osprey? What can we learn about them?

Students will be introduced to ospreys through a guided activity using the digital guide - [Osprey Fact Sheet](#). This fact sheet includes a description, diet, habitat, migration, and nesting. This will give students an overview of information about this species. Teachers can finish their introduction by having students hear an osprey's call! Using the website - [TNC Stories Article - Birds of New Jersey](#) students can see a picture of an osprey and hear their call.

Activity 2: What is an endangered species?

Teachers explain what an endangered species is and discuss with the class why the osprey was an endangered species. The resource [TNC Stories Article - Osprey: From Surviving to Thriving](#) contains a detailed account of why ospreys were endangered, when their decline began, and how people have worked hard to increase the population size of this species.

Activity 3: What does an osprey look like?



After learning about what an endangered species is, students will work on drawing a picture of an osprey. To draw this picture, show pictures from the following resource - [TNC Stories Article - Osprey: From Surviving to Thriving](#). This article has multiple pictures of ospreys that can be used in reference to a drawing. A grade level dependent **extension** of this activity can be to label their drawing with the bird's body parts. Students can label the bird's wings, talons, beak, eyes, etc.

Lesson 2

Activity 1: Where do ospreys live and what can we see in their homes?

Students will start day 2 by watching a live osprey nesting camera to see where ospreys live in New Jersey. The live osprey camera link can be found here - [Live-stream Osprey Nest Cam](#). Students will be observing and taking note of what they see in the camera using either the [Osprey Cam Field Notes - Printable Worksheet](#) or the [Osprey Cam Scavenger Hunt - Printable Worksheet](#). The field notes worksheet is a more detailed activity than the scavenger hunt worksheet.

**Note to teachers: The osprey cam streams from March – September on a yearly basis.*

Activity 2: Build your own osprey nest!

After the live osprey cam activity, students will have the opportunity to create their own osprey nest! Instructions for building the nest can be found in the following video - [Build Your Own Osprey Nest! - YouTube](#). Students will need several materials to create the osprey nest. For younger grade levels, this activity can be done in small groups of 2 or 3 students.

Lesson 3

Activity: What did you learn about ospreys?

Students can complete the [All about Ospreys Kahoot! Game](#) in small groups or as a whole class activity to review information discussed in the previous two lessons. Afterward, to assess what students have learned about ospreys, teachers will have students complete an osprey quiz. For grades 3-5, resources can be found here - [Osprey Quiz for Kids - Printable Worksheet](#) and [Answer Key](#).

For grade 6, teachers may use the following quiz which includes more advanced questions - [Digital Osprey Quiz - Advanced \(Grade 6\)](#). The printable version of this quiz and answer sheet can be found here - [Osprey Quiz – Advanced Printable Worksheet](#) and [Answer Key](#). The quiz



can be completed digitally, or the quiz can be printed out and completed on paper. Teachers can also complete assessment verbally as a whole group activity.

Lesson Plan & Activities:

Lesson 1

Activity 1: Introduction – What is an osprey? What can we learn about them?

1. Start the lesson by showing students pictures of different birds and ask the class: “Do you know what these birds are called? Or - What is similar or different about these birds?” The TNC resource - [TNC Stories Article - Birds of New Jersey](#) has examples that can be shown to the class, or the article [Backyard Birding](#) can be used as well.
2. Take student responses and prompt the discussion to include - feather color, beak shape, size of the bird, etc. to begin to have students differentiate by these characteristics.
3. Discuss with students how different animals including birds, have different *physical traits* or details that make them different from each other. These traits are similar to how people have different hair color, eye color, heights, etc.
4. Tell students that today they are going to be learning about a type of bird called an osprey! Explain that these birds have their own traits that we will be learning about and tell students that these hawks have a special nickname – they are also known as sea hawks!
5. Display the [Osprey Fact Sheet](#), which has a general description about ospreys and information about their diet, habitat, migration, and nesting. Grade dependent, students can take guided notes based on the fact sheet. For younger students, take more time to describe each section displayed.
6. For North America based schools, use the map on the fact sheet to find the state that you’re located in. **Ask students** - Is our school or educational space close to where osprey’s live or migrate? Where do they live in the winter?
7. Ask students to share one fact they learned about ospreys. Then, ask students to guess what the ospreys call is? If needed, explain first why a bird makes calls?
8. After students share their responses, tell them that we can hear a recording of an osprey’s call! Then go to the [TNC Stories Article - Birds of New Jersey](#) article and find the osprey’s call to play for the class. Students can then hear other bird calls from the website.

Activity 2: What is an endangered species?

1. Ask students if they have heard what an *endangered* animal is? What might *endangered* mean?



2. Explain to students that *endangered* means: **An animal or plant that is in danger of disappearing forever.** Discuss that animals and plants can sometimes become endangered if their homes are changed by a large amount.
3. Class dependent, use this discussion as an opportunity to make a more tangible example for students. For example, “what would happen if all of our food would disappear?”
4. Use the resource - [TNC Stories Article - Osprey: From Surviving to Thriving](#) to explain why ospreys are endangered. Share the pictures from the article as you are explaining the following facts. The following text can be adjusted as needed for your grade level. The focal points for this conversation should include:
 - Ospreys used to be *endangered* because a harmful chemical spray used to control insect numbers made its way to the osprey’s habitat or home.
 - The harmful spray was found in the water and affected the ospreys food – fish. When ospreys ate the fish, their baby’s eggshells became weaker, and their young were harmed. Overtime, ospreys were not healthy. This led to them becoming endangered.
 - Their *populations* or the total amount of osprey’s in one area became very small.
 - When scientists learned of this problem, they worked with the government to protect osprey’s and other animals affected by people. All of this hard work ended up creating a law known as the Endangered Species Act, to protect these animals.
 - Scientists and animal protection groups worked hard to help osprey’s and other animal species. Eventually, the harmful spray was banned and not used anymore, which helped the osprey’s and their chicks from being harmed further.
 - Osprey populations became bigger again but at a slow rate, so scientists had an idea. They started to build platforms above ground for ospreys to use as nests! The osprey’s liked these platforms and started to use the man-made nests to raise their chicks!
 - As time went on, osprey numbers continued to increase! Grade dependent, share the osprey population numbers in New Jersey for context. Scientists estimate that there are 733 nesting pairs in the state of NJ in 2022. That’s 45 new nests compared to 2021! Scientists found a total of 720 young were produced from the 555 known-outcome nests throughout the state in 2022.
5. After the explanation, take questions as needed. Ask students to share one thing they learned about ospreys with a partner from class. Take class responses to the question after.

Activity 3: What does an osprey look like?



1. Tell students that to learn more about the osprey today, we will be drawing a picture of one! Explain that the class is to draw their own picture of an osprey, by using a real-life picture of one.
2. Use the pictures from the previous article - [TNC Stories Article - Osprey: From Surviving to Thriving](#) for examples. The article has multiple pictures of ospreys that can be used in reference for a drawing. The drawing can be in color.
3. As students are drawing, ask them to add small details to the osprey's *physical traits* such as their – feathers, feather color, beaks, eyes, eye color, talons. Explain what the osprey's talons are as needed.
4. As students are finishing their drawings, review the purpose of their physical traits. Students can be asked:
 - Why do ospreys have such large talons?
 - Why do ospreys have a sharp beak?
 - Why do you believe ospreys have large wings?

Extend

1. A grade level dependent extension of this activity can be to label their drawing first on their own with the bird's body parts. Students can label the bird's wings, talons, beak, eyes, etc.
2. Students can then add descriptive information about the purpose of each body part on the bottom or back of the drawing.

Lesson 2

Activity 1: Where do ospreys live and what can we see in their homes?

1. Review with the class one fact that they learned from yesterday's class. This review can be done as a whole review, or in small groups.
2. Tell students that today we will be continuing learning about ospreys by completing some activities.
3. Review the [Osprey Fact Sheet](#) and focus on reviewing their habitat and nesting as you show the picture of the osprey nesting platform on the top of the fact sheet. This is an example of a man-made platform!
4. Tell students that one way that scientists study ospreys is by attaching cameras to the platforms and watching their movements. Explain to students that today we will all be field scientists as we observe a live osprey camera!
5. Discuss with your students that as they are watching the [live-stream osprey nest cam](#), they will making observations of what they see and record their observations on a worksheet.
6. Hand out the [Osprey Cam Scavenger Hunt - Printable Worksheet](#) and explain that this can be used to check off what the osprey's are doing during our observations.



7. The second worksheet is the [Osprey Cam Field Notes - Printable Worksheet](#). This worksheet is for making more detailed observations and taking notes on what is seen on the osprey cam.
8. Teachers can choose which worksheet best suits their grade level, class time, and if the osprey's are currently at their nest or not.
9. Show students the osprey cam and have them complete the worksheet activity.

Activity 2: Build your own osprey nest!

1. Have a short review of what was viewed in the osprey cam. Did you see an adult osprey? Do the osprey's have eggs to care for or chicks? If the nest is empty, discuss with students what could we expect ospreys to do in their nest.
2. Explain to students that to be able to observe an osprey's nest close up, we will be making one out of some simple materials!
3. Go over the materials with the students and explain that we will be making an osprey nest by using a guided video. Nest building can be completed as an individual activity or in small groups of up to 3 students. **Materials for this craft project are found in the materials section of the guide.**
4. Show students the video - [Build Your Own Osprey Nest! - YouTube](#) and stop as needed during each step to give students to work on building their nest.
5. The video has step by step instructions for building the nest. Students may need help with wrapping the brown paper around the container. After the container is wrapped, students can glue lightly around the wrapped container to add their dried grass or artificial grass.
6. Making the osprey eggs is dependent on if the teacher would like to bake the model eggs or not and accessibility to an oven.
7. Eggs can be made in class and can be baked after if needed.
8. As a conclusion for this activity, ask students to share one fact that they learned about ospreys and their nests from either this activity or from watching the osprey cam.

Lesson 3

Activity: What did you learn about ospreys?

1. To begin this final lesson on ospreys, students in small groups or as a whole class can complete the All about Ospreys Kahoot game.



All about Ospreys!

Learn about the amazing bird of prey species, the osprey. Ospreys were an endangered species due to harmful agricultural practices. Due to the Endangered Species Act of 1974, there are now 800+ osprey nesting platforms found in New Jersey! Ospreys are an inspiring example of the positive impacts of conservation.

Play Kahoot Game: All about Ospreys

2. After the Kahoot game, to access your students' knowledge about ospreys, have them complete the [Osprey Quiz for Kids - Printable Worksheet](#) and [answer key](#) can be found here. This quiz is most applicable for grades 3-5.
3. For grade 6, teachers may use the following quiz, which includes more advanced questions [Digital Osprey Quiz - Advanced \(Grade 6\)](#). The printable version of this quiz and answer sheet can be found here - [Osprey Quiz – Advanced Printable Worksheet](#) and [Answer Key](#).
4. This lesson can be concluded with a full review of the osprey quiz, or a review of the activities completed. Students can also see the osprey cam and make additional observations.

Resources for Teachers:

Articles:

1. [TNC Stories Article - Osprey: From Surviving to Thriving](#)
2. [TNC Stories Article - Birds of New Jersey](#)
3. [Osprey Fact Sheet](#)



Videos:

1. [Live-stream Osprey Nest Cam \(YouTube\)](#)
2. [Osprey Nest Fish Video \(YouTube\)](#)
3. [Build Your Own Osprey Nest! \(YouTube\)](#)
4. [New Jersey's Ospreys: A Symbol of a Healthy Coast \(YouTube\)](#)



Nature Lab Related Resources: The following lesson plans and videos can be used to supplement this teaching guide. **Students will learn about the role of trees in our environment, how to conduct a citizen science project, and how to build a school garden!**



Climate Heroes: The Power of Trees!

Grade Levels: 3-8

Trees are our climate superheroes! From Louisville, Kentucky, in the United States to St. Vincent and the Grenadines in the Caribbean, trees are playing critical roles in cleaning our air and improving our resilience in the face of climate change.

<https://www.nature.org/en-us/about-us/who-we-are/how-we-work/youth-engagement/nature-lab/virtual-field-trips/>



You're the Scientist! Citizen science, Frogs, and Cicadas

Grade Levels: 3-8

The conservation community relies heavily on volunteers not only to restore natural areas but to help gauge the success of restoration efforts.

<https://www.nature.org/en-us/about-us/who-we-are/how-we-work/youth-engagement/nature-lab/virtual-field-trips/>



How to Build a School Garden

Grade Levels: 3-8

Want to start a school garden? Our lessons cover planning, building, and caring for your garden, plus a video on overcoming common student fears.

<https://www.nature.org/en-us/about-us/who-we-are/how-we-work/youth-engagement/nature-lab/school-garden-resources/>