



# Nonformal Education Guide

A Supplement to the Educator Guide

Federal Junior Duck Stamp Program

Connecting Children with Nature Through Science and Art!





# ***Nonformal Education Guide***

## ***A Supplement to the Educator Guide***

### ***Federal Junior Duck Stamp Program***

#### ***Connecting Youth with Nature Through Science and Art!***

An opportunity to investigate what is fun, unique, and mysterious about waterfowl and wetlands in North America and in your community.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

## Contents

Getting Started	5
What is the Junior Duck Stamp Program?	5
What is this Guide?	6
How is the <i>Nonformal Guide</i> Organized?	6
Using the <i>Nonformal Guide</i>	7
Introduction: The Call of the Wild Duck	11
Unit 1: What is ...a Waterfowl?	17
Unit 2: A Day in the Life: Preening, Dabbling, and Other Unusual Behaviors	25
Unit 3: Raising a Family in a Wetland	35
Unit 4: Going the Distance: Migrating Across Continents	47
Unit 5: Learning from the Past; Taking Action for the Future	55

## Appendices

Appendix A Education Outside of the Formal School Setting . . . . .	61
Appendix B Field Investigations: Safety Considerations . . . . .	62
Appendix C What are Duck Stamps? . . . . .	63
Appendix D How do Duck Stamps Benefit Wildlife? . . . . .	64
Appendix E What is the Junior Duck Stamp Contest? . . . . .	65



## Acknowledgments

The Junior Duck Stamp Conservation and Design Program and Curriculum are products of the Federal Duck Stamp Office, U.S. Fish and Wildlife Service (USFWS). The curriculum was made possible with support from the U.S. Fish and Wildlife Service.

### ***U.S. Fish and Wildlife Service***

Michael Kreger, Deputy Chief, Division of Bird Habitat Conservation

Patricia Fisher, Chief, Federal Duck Stamp Office

Elizabeth Jackson, National Junior Duck Stamp Program Coordinator, Federal Duck Stamp Office

Rachel Levin, Communications Coordinator, Migratory Bird Program, Division of Bird Habitat Conservation, USFWS

### ***Project Coordinator***

Phil T. Seng, DJ Case & Associates, Mishawaka, Indiana

### ***Research and Writing Team***

Elaine Andrews, Dolly Ledin, and Kate Larkin Reilly, Community & Environment Consulting, Washington, DC

Phil T. Seng and Sarah Hughes, DJ Case & Associates, Mishawaka, Indiana

### ***Layout and Design***

Karen Gavrilovic, Beth Salman, Phil T. Seng, and Sarah Hughes, DJ Case & Associates, Mishawaka, Indiana

(Select illustrations by Laura Maloney, Eleanor Davis, and Dan Wolfe)

### ***Junior Duck Stamp Curriculum Evaluation Team***

Lead: Elizabeth Jackson, National Junior Duck Stamp Program Coordinator, Federal Duck Stamp Office, USFWS

Patricia Fisher, Chief, Federal Duck Stamp Office, USFWS

Lorrie Beck, Outdoor Recreation Planner, Great Plains Nature Center, Wichita, Kansas

Rachel Levin, Communications Coordinator, Migratory Bird Program, Division of Bird Habitat Conservation, USFWS

Julie Study, Education Specialist, USFWS National Conservation Training Center, Shepherdstown, West Virginia

Dr. Gary San Julian, Wildlife Biologist, Penn State University, State College, Pennsylvania

Laurina Isabella Lyle, Ph.D., Executive Director and National Network Coordinator, Project WET USA, Bozeman, Montana

Mara Koenig, Visitor Services Specialist, Minnesota Valley National Wildlife Refuge, Bloomington, Minnesota

Darcy Schatz, Homeschool Educator, Eagan, Minnesota

Blaine Eckburg, Training Specialist, USFWS National Conservation Training Center, Shepherdstown, West Virginia

Suzanne Fellows, Wildlife Biologist, USFWS Migratory Bird Program, Lakewood, Colorado

### ***Principal Editorial Reviewer***

David Klinger, Writer-editor, USFWS National Conservation Training Center, Shepherdstown, West Virginia

### ***Junior Duck Stamp Program Teacher Evaluation Team***

Gaye Kohl, Pine Valley Elementary School, San Diego, California

Doris Nichols, Fillmore Elementary School, Stockton, California

Jaye Boswell, Retired Educator, Sanibel, Florida

Jennifer Johannes-Heck, Manatee Middle School, Naples, Florida

Diana Brown, Cache Elementary School, Cache, Oklahoma

Lisa Cutchin, St. John Regional Catholic School, Frederick, Maryland

Sharon Stoick, Pinewood Elementary School, Mounds View, Minnesota

### ***Project Contributors***

California Waterfowl Association

*Thank you to our many biologists and our U.S. Fish and Wildlife Service colleagues who were interviewed for this effort. Their valuable contributions enabled us to stay focused on conservation sciences and helped us illustrate to young people the importance of wildlife stewardship and staying connected to the natural world.*

*The Federal Duck Stamp Office developed this publication on behalf of the Federal Junior Duck Stamp Conservation and Design Program to support conservation education. The Junior Duck Stamp Conservation and Design Program Curriculum Guides are public domain materials. Content from these guides may be copied in whole or in part to use by public school, non-formal, and home school educators. Other parties must request written permission prior to reproducing any materials contained in these guides. Please credit the U.S. Fish and Wildlife Service, Federal Duck Stamp Office, Junior Duck Stamp Program, when using any of the content or activities in these guides.*



## GETTING STARTED

Are you a youth group leader or an educator at a natural area (park, nature center, wildlife refuge, state or national forest, or other conservation area)? If so, this guide is for you. This *Nonformal Education Guide* for the U.S. Fish and Wildlife Service Junior Duck Stamp Program offers guidance and fun activities for engaging youth in exploring nature, in learning about waterfowl and wildlife conservation, and in participating in a conservation service project.

The Junior Duck Stamp curriculum was written for youth in grades 5 through 8. Students at any age will get the most out of the curriculum if they have an active voice in choosing what they will do and how to proceed. To adapt the curriculum to younger audiences, it may be necessary to provide simpler, more directed processes for existing activities or to choose alternative activities from the resources list in Appendix B of the *Educator Guide*.

### What is the Junior Duck Stamp Program?

The Junior Duck Stamp Conservation and Design Program provides a science-based arts curriculum emphasizing conservation of waterfowl (ducks, geese, and swans) and wetlands. It is designed to spark youth interest in habitat conservation through a variety of complementary academic disciplines: science, art, math, and technology. The program encourages students to explore, investigate, and express what they've learned through science and the arts, and then share their thoughts and feelings with other members of their communities.

The primary tools of the Junior Duck Stamp Program are the *Educator Guide* and *Youth Guide*, which provide a rich source of meaningful activities for young people. The *Youth Guide* includes all the instructions and materials that a young person would need to study waterfowl and to build skills for competing in the Junior Duck Stamp Art Contest, if they so choose. The *Educator Guide* provides additional background materials and tips that educators can use for incorporating waterfowl conservation education into an ongoing curriculum, as well as for facilitating youth involvement.



Each of the learning units in the program combines information on biological and ecological sciences, conservation science careers, and math, as well as a variety of visual and language arts. This multidisciplinary structure provides multiple entry points for students, depending on their interest, and allows educators from a variety of academic areas to combine efforts to make an even greater impact on student achievement and engagement. In addition, the unit activities encourage the realization of common goals among community partners (schools, education associations, scientists, land managers, other community members, etc.).

More information about U.S. Fish and Wildlife Service conservation programs and the Junior Duck Stamp art contest is available in the Appendices.

## What is this Guide?

This *Nonformal Education Guide* is designed to be used with the Junior Duck Stamp *Educator Guide* and *Youth Guide*. It highlights program activities that are appropriate for educational experiences outside of the formal school setting, and particularly for settings that are close to waterfowl habitat. Both guides can be found on the Junior Duck Stamp website at [www.fws.gov/juniorduck](http://www.fws.gov/juniorduck).



USFWS photo by Thom Lewis

Nonformal education, or education that is not part of a formal certification or degree program, affords unique opportunities to engage learners in activities beyond what is possible in a formal school setting; and especially to engage them in activities that require time in the outdoors. Wetland restoration, service learning, scientific research (“citizen science”), collaborative art, and community education are examples of the kinds of projects young people could experience in a nonformal setting.

Each lesson in the *Nonformal Guide* introduces the activities and background materials for one of the six themes of the Junior Duck Stamp Program. Use this guide as an introduction to the larger collection of program activities and education ideas found in the *Youth Guide* and *Educator Guide*. If you want to focus on waterfowl conservation for an extended period, your experience in using the *Nonformal Guide* will ultimately enable you to design your own field site experiences. You will be able to choose and organize activities from throughout the Junior Duck Stamp Program materials that best address the interests of your group of young people and the opportunities presented by the field site.

For more information about nonformal learning and education, see Appendix A.

## How is the *Nonformal Guide* organized?

The *Nonformal Guide* provides six hands-on lessons of approximately 90 minutes each, introducing the themes for each of the units outlined in the *Youth Guide* and *Educator Guide*:

**Introduction:** The Call of the Wild Duck

**Unit 1:** What is ...a Waterfowl

**Unit 2:** A Day in the Life: Preening, Dabbling, and Other Unusual Behaviors

**Unit 3:** Raising a Family in a Wetland

**Unit 4:** Going the Distance: Migrating Across Continents

**Unit 5:** Learning from the Past; Taking Action for the Future



Each lesson is organized into five major sections:

- **Preparation** – information to show the educator where the lesson fits in the overall curriculum.
- **Orientation** – activity(ies) designed for indoor locations that prepare the students for more in-depth learning.
- **Investigation** – activity(ies) primarily designed for outdoor locations where students can put their indoor learning to use.
- **Put It All Together** – reflection activity designed to reinforce learning.
- **Follow-up Ideas** – suggestions for reinforcing learning over time.

The *Youth Guide* and *Educator Guide* offer additional information that provides a context for activities as well as additional activities and educator resources for exploring a particular theme.

## Using the *Nonformal Guide*

The lessons presented in this guide are especially appropriate for use as part of an education program held at a wildlife refuge, nature center, or other site where there is waterfowl habitat. If you are a field site educator working with visiting groups, we recommend that you share this entire guide with the visiting teachers or youth leaders so they can arrange for introductory and follow-up activities, to ensure that this is not a one-time, isolated experience.

### Optimizing Learning

To optimize learning in the outdoors, plan your activities with the following issues in mind.

#### Tips For Optimizing Learning In The Nonformal Setting<sup>1, 2</sup>

- Consider safety issues (see Appendix B)
- Prepare learners for learning
- Prepare for the learning experience by considering:
  - How will you manage the physical environment?
  - How will you “hook” your youth – how will you get them interested and motivated?
  - How will you involve youth in the planning?
  - What would ensure that your youth feel “satisfied” at the end of the experience?
- Provide time for the group to think about what they did and what they would like to do next

Remember to connect the experiences your students will have at your site to experiences they will have before and after the field experience—in their classroom or youth group. The *Educator Guide* provides quick tips on effective teaching techniques on pages 26-27.

<sup>1</sup> Carlson, S. P., Heimlich, J. E., Storksdieck, M. (2011). Validating an Environmental Education Field Day Observation Tool. *International Electronic Journal of Environmental Education*, Vol. 1, Issue 3.

<sup>2</sup> University of Minnesota Extension guides: Best Practices for Field Days; Best Practice: Develop and implement program evaluation.



## Selection of Activities

The lessons you choose to pursue with your group will depend on the time available, specific habitat at the site, and time of year, as well as the interests of the group and/or the curriculum requirements of the class attending the program. Teachers visiting with their classes may want to choose which of the six lessons would be best suited to their curriculum goals. While it is important to consider youth leader or teacher preferences, you may want to recommend activities that are best suited to the habitat at your site and for the current season.

## Place-based Programming

Whatever topic they select, youth leaders should begin with an activity or visual presentation that introduces your specific site. Why is this place special? Why is it important to waterfowl? What is the history of this piece of land? What are some current threats or opportunities? How are people helping to manage this land for waterfowl/wildlife? The specific content of the orientation should be focused on the topic of the day's program. Keep lectures or PowerPoint presentations brief so the event emphasizes actively involving students in exploring, investigating, expressing, and sharing for most of the program. The activities will be more meaningful if you use examples of species, habitats, and conservation issues specific to your site.

## Activity Materials

The most important material for any of the activities is the field site itself. Beyond that, the activities in this guide will be more effective if you are able to gather a few props, provide copies of handouts, and organize equipment for gathering data about the site. You may want to provide maps, photographs of birds, flip chart paper and markers, bird books, binoculars, etc. If you find it difficult to locate or acquire the required materials, don't give up! This might be an excellent opportunity to work with a partner. See page 9 for ideas on working with partners.

## Extending "One-time" Experiences

Nature centers and museums usually offer field trip options for classrooms and youth groups, and they often host special events. It can be a challenge to ensure that these are not isolated experiences, but rather are connected to the curriculum and/or longer-term educational goals. The field site educator can coordinate with the teacher or youth leader to suggest activities to prepare students before the experience and to follow-up afterward.

If you are working with visiting groups or bringing many groups to the same field site, consider devising ways to connect the experiences of all visitors to help them feel part of a longer-term program. For example, you could have each visitor or group record observations of plants or animals or weather measurements, etc. You could collect these data over time and display them on charts or graphs, so each visitor can see how his/her observation is part of a larger set of long-term data. Recording observations of phenological events would be especially useful for this purpose, and could be the basis for citizen science projects. In addition to being part of a longer-time science experience, visitors could create



artwork that could be part of a larger whole. For example, a large mural could depict the marsh at the nature center. Each class could draw or paint the wildlife they see that day on the mural. Either science or art projects could involve digital elements as well as hands-on materials.

### Service Projects

Consider incorporating a small service project into each group's field site activity. Also consider that one group's service contribution can be more meaningful to them (and to you) if it is part of a long-term project that is a collaboration of many visiting groups. For example, one group can clear a small habitat area of an invasive plant species, but twenty groups, over an entire season, may be able to clear several acres. In this example, the field site educator could keep track of areas cleared by logging locations with GPS equipment and by showing progress on maps available online so students can track progress after their visit.

If students have already learned skills such as recording data or identifying invasive plants, have them use those skills during their experience at your site. You can also teach these skills on-site and suggest projects that students can continue in their schoolyard or neighborhood to use their new skills in a meaningful community project.



© janetandphil, Creative Commons

### Working with Partners

Projects that engage students in “real world” experiences, such as restoration and citizen science, often require a partnership with a group or organization. Many conservation organizations have volunteer and citizen science opportunities that youth can participate in. Others may have ideas for projects that would be beneficial to waterfowl in your area. These organizations may be interested in collaborating with you to provide youth with authentic experiences. Page 24 of the *Educator Guide* provides additional ideas on potential partners.

A partner may be able to offer conservation equipment or supplies, ideas for service projects, technical assistance in planning and completing a project, and/or informational resources. A partnership could also include an introduction to a career possibility.

Think of your youth group as an equal partner in a service project. Youth bring enthusiasm, energy, and creativity. As equal partners, youth can benefit from learning how to apply a problem-solving approach as well as learning to take responsibility for their own environmental impact. For additional tips on involving youth as partners, see pages 24-25 in the *Educator Guide*.



**NOTES:**



## INTRODUCTION: THE CALL OF THE WILD DUCK

### PREPARATION

#### Focus

Prepare students for enjoying outdoor experiences, and learning how to collect and interpret outdoor observations about waterfowl and wetland habitats.

#### Background

One way for students to record their observations throughout their study of waterfowl and connect their experiences is by keeping a Nature Notebook. Nature Notebooks are used in many of the lesson activities in this guide. If possible, before your group starts its study of waterfowl using lessons 1 - 5, provide time for students to make and/or learn to use a Nature Notebook.

Many famous naturalists, from Charles Darwin to Meriwether Lewis, kept nature journals, describing and drawing their observations and experiences. Comparing his drawings and observations of birds living on different islands helped Darwin to develop his theories of evolution. Lewis' journals, written during the Lewis and Clark expedition, illustrated new species of plants and animals that had never been recorded. By keeping a nature journal, students can make their own important discoveries!

#### Learning Objectives

Youth will be able to:

- Observe wildlife systematically.
- Write and draw in a Nature Notebook as a means of exploring questions, recording observations and data, and reflecting thoughts and feelings about nature.

#### Conservation Concepts

- There are living and non-living components of wetland ecosystems.
- Complex interactions exist among organisms in an ecosystem.
- There are people who make their livings studying and managing natural resources.

#### Science Skills for This Lesson

Collecting information, communicating, describing, gathering evidence, identifying, observing, organizing information, planning, and recording.

#### Disciplines for This Lesson

Language arts and visual arts.

#### Where to Find More Information

*Educator Guide*, pages 33-38, especially page 38.

*Youth Guide*, The Call of the Wild Duck, pages 7-24.



## Organizing Questions for Students

When you see something in the world that interests you, what do you usually do to help remember it so you can think about it again later? Tell a friend? Take a photo? Write about it in your diary?

## ORIENTATION

### Goals for Learning:

- Youth can make a blank Nature Notebook that appeals to them personally, and where they will be able to explore questions, record observations and data, and reflect on their thoughts and feelings about nature.
- Youth can organize the information they include in their Nature Notebook.

**Materials:** (depend on which activity you choose from the options below)

- Nature Notebooks could be made with recycled materials.
- Cardboard or some stiffer material for the front and back cover.
- Paper (could be used on one side).
- Three-hole punch.
- Yarn or string to bind the Nature Notebook pages together.
- Decorations: Used greeting cards, contact paper, stickers, markers, crayons, leaves, flowers for rubbings, etc.
- *Youth Guide* pages 16, 18-19. Make copies and/or a PowerPoint slide of the Nature Notebook examples on pages 18-19 (insert a “print screen” version onto a PowerPoint slide).

### Indoor Activity: (20 – 30 minutes)

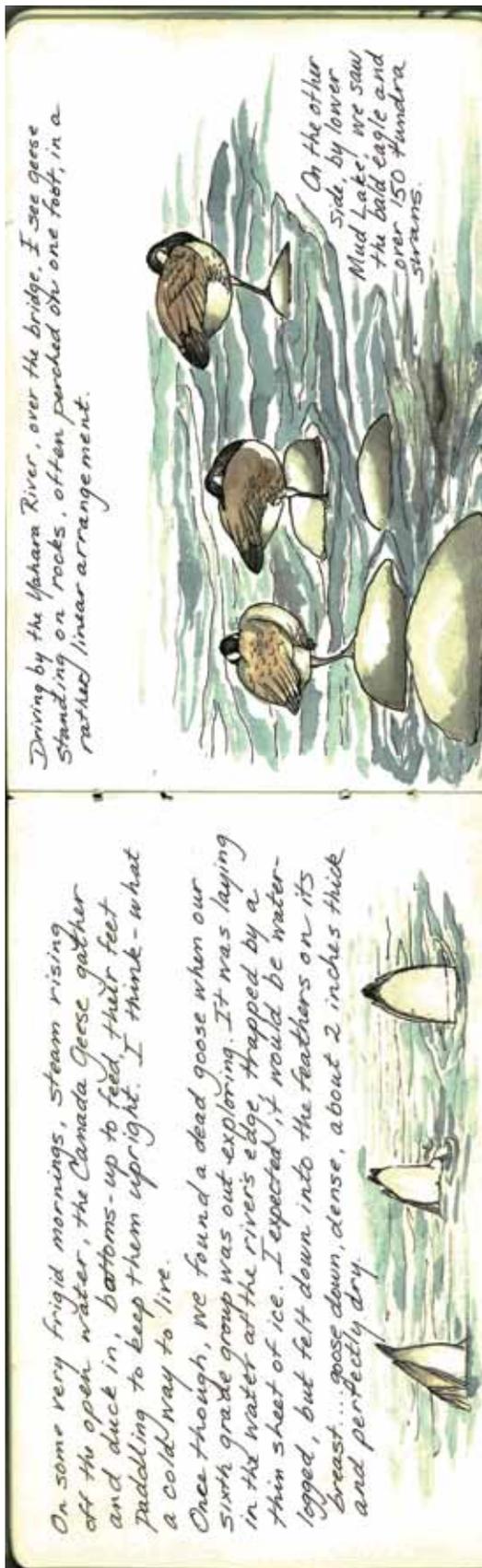
*Making a Nature Notebook:* Use this lesson to engage students in making a Nature Notebook or journal. Encourage students to create a notebook where they will want to write their ideas and draw what they observe. Or ask the teacher or youth leader to have students make notebooks before their site visit. Be sure the students bring them along when they visit.

Provide supplies that would make the notebook fun for the students. If possible, provide examples of a Nature Notebook like the one illustrated in the following activity. You may want to have students do the activity before their site visit, as preparation for making a notebook that will best meet their needs and interests.

### Indoor Activity: (20 minutes)

*Using your Nature Notebook:* Ask students to read the notes and look at the drawings in this journal entry by Janet Moore. (Copy the example on page 13 for your students.) Organize students in pairs or in small groups. Ask them to discuss the following questions. Post these questions on a flip chart sheet that everyone can see.





Sample Nature Notebook entry by Janet Moore

### Questions:

- What else did Ms. Moore include in addition to details about the geese and the setting?
- Can you tell how she felt about the geese?
- Can you imagine what it felt like to be outside watching geese that day?
- What questions and possible answers did Ms. Moore include?

Ask students to share a few of their thoughts. Suggest that they think about using descriptive language in their journals to describe what they think and feel about their observations.

Give students a template as an example of details to include each time they write in their journal. You could provide a copy of the notebook example, or simply list the items in the illustration:

Things to include each time you write in your Nature Notebook:

- Date and location.
- Weather conditions.
- Time of day.
- Plants (write or draw).
- Animals, including insects, birds, mammals (name or draw).
- Sounds, smells.
- Sketch or written description of any plants or animals you find interesting.

## INVESTIGATION

### Goals for Learning:

- Youth can observe wildlife and natural habitat and write and/or draw what they see and feel and what they wonder about in their Nature Notebooks.

### Materials:

- Nature Notebooks or other note-taking/journal materials.

### Outdoor Activity: (30 – 40 minutes)

*Budding naturalists - first observations:* Take students outside and give them 15 or 20 minutes to make observations about the nature they see in your local environment. If possible, take them to a wetland or other waterfowl habitat. Ask them to write and draw what they see in their Nature Notebooks, responding to the details mentioned above. Ask them to include their own thoughts, feelings, and any questions they may have about what they observe.

## PUT IT ALL TOGETHER

Assemble the group and ask each youth to share one thing he/she noticed or found interesting or a question that came up.



### FOLLOW-UP IDEAS

Encourage students to practice using their Nature Notebooks. Suggest that they visit a natural area at least once a week for 15 minutes and record their observations and questions in their notebooks. These weekly visits could be to a city park, empty lot, or their schoolyard or backyard. Students can observe birds, mammals, reptiles and amphibians, or even insects. The observation and recording skills they use will help them become better scientists and artists.

### NOTES:

NOTES:



## UNIT 1. WHAT IS ...A WATERFOWL?

### PREPARATION

#### Focus

Waterfowl external characteristics and their significance for the habitat where waterfowl live.

#### Background

Birds are warm-blooded vertebrates. They have three characteristics that distinguish them from other animals: feathers, hard-shelled eggs, and hollow bones. Waterfowl can be distinguished from other birds by their characteristics that maximize the ability to survive in a wet environment. For example, waterfowl have a specialized feather structure (including waterproof external feathers), a body shape designed for swimming, feet and foot webbing that is distinctive as compared to other water birds, unique positioning of feet and legs on the body in a way that is adapted to food gathering and other life activities, shapes of the bill that are adapted to food gathering and eating, and characteristics pertaining to the way they fly. Understanding how waterfowl are adapted to their environment helps people protect or manage the special habitats waterfowl need to thrive.



Laura Maloney, DJ Case & Associates

#### Learning Objectives

Youth will be able to:

- Investigate how waterfowl are adapted to survive in specific habitats.
- Investigate how waterfowl colors, shape of bill, and placement of feet help them survive in specific habitats.
- Use specific characteristics to identify species of waterfowl.

#### Conservation Concepts

- Organisms have basic needs and can survive only in environments in which their needs can be met.
- Different kinds of organisms are adapted for living in different environments.
- There are people who make their living studying and managing natural resources.

#### Science Skills for This Lesson

Collecting information, communicating, describing, designing an investigation, gathering evidence, identifying, observing, planning, questioning, and recording.

#### Disciplines for This Lesson

Science, math, language arts, and visual arts.

## Where to Find More Information

*Educator Guide:* Why Waterfowl and Wetlands, background information, pages 10-18; and Unit-by-Unit Guide for Unit 1, background information, pages 41-44.

*Youth Guide:* Unit 1 activities, pages 25-58, especially pages 34-44 and 46.

## Organizing Questions for Students

What does a duck look like? A goose? A swan? How do you tell them from other water birds? How do you know which is which?

## ORIENTATION

### Goals for Learning:

- Youth can use specific characteristics to identify a species of waterfowl.

**Materials:** (depends on which activity you choose from the options below)

- Photos, PowerPoint slides, or other visual representations of waterfowl species found at the natural area you are visiting. Photos are available on the Cornell Lab of Ornithology or the Ducks Unlimited website, among others.
- Three-ring binder(s).
- Plastic sleeves to fit into the 3-ring binder(s).
- Notebook paper or pre-organized worksheet copies, to include a space for species name, outstanding characteristics, and habitat for each bird.
- Bird identification books.

**Indoor Activity:** (10 – 20 minutes)



© Roger Strand

*Search image – learning what to look for:* Provide students with a visual orientation to the waterfowl that might be found at your site. Explore photos or other visuals in a fun, interactive way. Following are three options. Whatever option you choose, guide students to think of questions about possible connections between the waterfowl present at your site and the unique habitat at your site that enables waterfowl to survive there.

- Print photos of waterfowl. Give each student or team a photo and ask them to write down a description for their bird and make up a name for it based on its appearance. Collect the photos and post them on the wall. Have each team read their bird's name and description. Ask other teams to figure out which bird the team described/named.

After ducks are identified by their made-up names, provide the real names. Are there any similarities?

- Show a few PowerPoint slides of waterfowl found on your site. Organize students into large or small teams depending on the size of your entire group. Ask each team to identify the most unusual characteristic of each species by discussing it among themselves. Ask them to identify which characteristic makes this species different from all the others. You may want to show all the slides at once to provide an overview, then go back and identify unique characteristics by showing the slides one by one. After students have described each bird in the slide collection, provide species names. As a follow-up activity, add slides of species you don't have at your site and see if students can tell which species don't belong (and why).
- Ask students, as individuals or in small groups, to make a field guide specific to your site using photos you have printed out of a few species that are common at your site. Give students photos and materials to assemble the photos into a booklet (insert photos into a 3-ring binder with plastic sleeves). Ask students to provide a written description for each photo, including the species name, outstanding physical characteristics, and habitat, and have them add these to the notebook. Have students take their field guide along when you take them outside.

## INVESTIGATION

### Goals for Learning:

- Youth can investigate how the shape of a waterfowl bill helps the bird to survive in specific habitats.
- Youth can observe how waterfowl colors, shape of bill, and placement of feet help them survive in specific habitats.

### Materials: (depend on which activity you choose from the options below)

- Strainer or slotted spoon.
- Tweezers.
- Tongs with sharp "teeth."
- Loose tea in water or other small floating objects.
- Rice grains, plants growing in soil.
- Small objects buried in sand (such as shell pasta).
- Rubber fish or gummy fish floating in water.
- Waterfowl description questions on cards or on a flip chart that students can see from their observation point.
- Student notebook – or Nature Notebook (from the Introductory Lesson).
- Binoculars and/or spotting scopes.
- Wetland field guides.



## Indoor Activity (15 – 20 minutes)

*Option 1 – Investigating waterfowl artifacts:* If your facility has mounted waterfowl specimens, feathers, feet, etc., give students an opportunity to examine them. Divide students into small groups. Give each group an artifact to examine. Have them think up explanations for how that item would help an animal survive. For additional ideas for how to investigate adaptations of waterfowl, see pages 33-43 in the *Youth Guide*.

*Option 2 – The right bill for the job:* An alternative to examining authentic artifacts is to experiment with various tools simulating different types of bills to gather food. You can use many types of tools to simulate bill types and food items (see Table 1.). Choose those that best simulate the species and food sources present at your site. Provide students with a collection of “tools” (including their own hands) and a collection of “food.” Have students experiment, trying to use each tool with each type of food to determine which is most effective. Ask students to talk about their results in small groups or as part of a larger group. What do they think each of the types of “bills” represents in reality? What do they think each type of “food” represents? Encourage students to use their imagination in giving answers. Don’t worry about the “right” answer at this point. Let the students know if any of the waterfowl at your site have similar adaptations.

*Table 1. Tools and foods for use with “The right bill for the job” activity.*

Tool (to simulate bill types)	“Food”
Strainer or slotted spoon (Shovelers and Mallards )	Loose tea or other small floating objects in water (Aquatic plants, seeds, insects, small swimming invertebrates)
Tweezers (Canada Goose, Snow Goose)	Rice grains, plants growing in soil (grass, grains)
Fingers (sea ducks)	Small objects such as shell pasta buried in sand (Clams and shellfish)
Tongs with sharp “teeth” (Mergansers)	Rubber fish or gummy fish floating in water (fish)

## Outdoor Activity: (30 minutes)

*Adaptations and habitat – a matching game:* Take students outside to an observation point on your property to observe waterfowl. Have them describe the habitat they see. Organize students in small groups. Have each group focus on one of the following sets of questions. Use the questions to help students think about how to “match” the specific adaptations (color, bills, and feet) to the habitat. Provide the questions on a flip chart that everyone can easily see or on cards that students can carry with them. If students brought notebooks (or the Nature Notebooks they made in the introductory lesson), ask them to write the answers there. After each group has had time to observe and make notes, bring all the groups together. Ask each group to choose a representative and one interesting point about what they learned that they would like to share with the others. When all the groups are ready, ask each representative to share their key observation.

*True Colors:* Waterfowl have some of the brightest and most interesting colors and patterns in the animal world. Ask the students why some ducks are so colorful when other ducks just fade into the background? Encourage them to look at the colors, textures, and general atmosphere of the habitat and consider:



- What words come to mind?
- What does the bird need to do in that habitat—do they need to sit on a nest, attract a mate, or hide from predators?
- In your Nature Notebook, draw a duck, goose, or swan and then shade in the colors of the habitat for that bird around the drawing.

*The right bill for the job:* What kind of food is available in this habitat? You may need to help students identify some of the plants and small animals that are food sources for waterfowl on your site. Have students draw some of these food sources in their Nature Notebooks. Notice the types of bills on the waterfowl that use this habitat. How are their bills uniquely adapted to eat the particular types of food that occur here?

*The winner by a foot:* Observe the water in this habitat. Is it a lake, a coastline, or a wetland? How deep is the water? How do the waterfowl move? Do they swim underwater or tip-up to feed? Do you see them on land or only in the water? You may not be able to see close enough to observe the waterfowl's feet, but you might be able to see where their feet are placed on their bodies. Are the feet near the center of the body or near the back? How might their feet help them survive in this particular habitat?



USFWS photo by Donna Dewhurst

## PUT IT ALL TOGETHER

### Goals for Learning:

- Youth can apply specific waterfowl characteristics to identify species, to explain how the species fits in its habitat, and to draw examples.

### Materials:

- Copies of pages 33, 34, 40 41, and 42 of the *Youth Guide*.
- Binoculars and/or spotting scopes.
- Nature Notebook or other writing paper.

### Indoor or Outdoor Activity: (20 minutes)

*Telling the difference:* Now that students have learned about different physical adaptations of waterfowl, they can start to develop the skills they'll need to identify the differences among various species of waterfowl. At your outdoor classroom or other location where waterfowl are present (or looking at photos of different waterfowl if the activity is indoors), ask students to look at each bird's size, bill, legs, feathers (plumage), habitat, and behavior. Give them the following six tips to help them identify birds. Tell students that, with practice, these tips will come to mind automatically when they look at a new bird and will help them

to remember its important features. Often the details of a bird's structure, plumage, or behavior are soon forgotten, and the observer may spend much time trying to recall them. If these six points are remembered or noted at the time of the observation, a more thoughtful analysis can be made later.

Remind students that it can be extremely helpful to write or sketch what they have seen in their Nature Notebook at the time of sighting.

Have students observe one species of waterfowl, noting each of the six identification tips in their notebooks for that one species. Challenge them to compare their notes and drawings to a field guide to identify the species they observed. Then ask students to describe and/or illustrate the habitat for the species they observed and write or tell how the characteristics of the species helps the bird survive in its habitat.

## Six Simple Tips for Quick Bird Identification

1. What is the bird's relative size? Compare the bird with other birds that are well known to you. Is it larger or smaller than a SPARROW? If larger, is it larger or smaller than a PIGEON? If larger, is it larger or smaller than a HAWK?
2. What is the shape and color of the bird's bill? The shape of its bill is a guide to what it eats, classifying the type of bird it is. Is the bill short and round like that of a songbird, or powerful and hooked like that of a hawk? What color is it? Many birds have blackish bills, but some are brightly colored.
3. What length and color are the bird's legs? Does the bird have unusually long wading legs, short perching legs, etc.? Are its legs a distinctive color?
4. What plumage colors or markings do you notice? Bold markings, colors, or bars on the bird's wings, tail, breast, or above the eyes should be noted. Also note that in some bird species the males are brightly colored and the females tend to be camouflaged.
5. In what habitat do you see the bird? The habitat in which the bird is seen is another important clue to the kind of bird it is. Is it in a garden, in water, in grassland, in the forest, etc.?
6. What is the bird doing? Is it walking, hopping, wading, or swimming? Does it peck at the ground, probe in mud, or feed in a tree? Try to detail its behavior as closely as possible.



## FOLLOW-UP IDEAS

### Indoor Activity: (20 minutes)

*Turning observations into art:* Does your facility have any artwork depicting waterfowl or habitat? If so, have students observe the art and compare it to photos or their actual observations from the field site. Is the depiction in the artwork realistic? Does it indicate how the artist feels about this species? Does the artwork show waterfowl habitat? What is the bird doing? What artistic techniques are used?

Provide students with copies of pages 48 and 49 of the *Youth Guide* to take home so they can practice drawing waterfowl, including specific adaptations they noticed on their field trip.

Encourage students to share their Nature Notebooks with their families or other friends. Ask them to send photocopies or scanned copies of their drawings for you to post on a mural at your facility.

### NOTES:



NOTES:



## Unit 2. A DAY IN THE LIFE – PREENING, DABBING, AND OTHER UNUSUAL BEHAVIORS

### PREPARATION

#### Focus

Waterfowl behaviors and where these behaviors take place within the habitat at the field site.

#### Background

While all waterfowl perform the same general selection of behaviors—feeding, resting, flying, mating, raising young—the way they perform each behavior is often unique to the species. These behaviors provide another way of distinguishing one species from another, as well as providing humans with insights about habitat needs specific to each species. Look at how ducks fly, for example. Consider how they maneuver as part of a flock, and how each individual takes off and lands on water. How do they get their food? Do they “tip up” and feed in shallow water, or dive deep, surfacing many feet away? Do the birds stay with their mates, or take off on their own? Do mates care for their young together or are ducklings or goslings usually accompanied by only one parent as they grow? There are hundreds of questions your students can consider about how these birds survive in their environment. Help build curiosity among your students about these fascinating aspects of our natural world.

**Note:** The objective of this activity is for students to actually observe waterfowl. If possible, this should be scheduled at a time of year and a time of day when waterfowl can be easily observed.

#### Learning Objectives

Youth will be able to:

- Describe common waterfowl behaviors.
- Describe what behaviors happen in which habitats, and offer an explanation about why this is the case.
- Describe at least one common tool used by humans to make it easier to observe waterfowl (decoys, calls, and blinds).
- Apply aspects of waterfowl behavior into their language and visual arts projects to make their work more realistic.

#### Conservation Concepts

- Species differ in their ability to adapt to changing environments.
- All living things depend on habitat that includes adequate supplies and suitably arranged food, water, shelter, and space.
- There are people who make their livings studying and managing natural resources.

### Science Skills for This Lesson

Communicating, describing, designing a solution or process, gathering evidence, identifying, investigating, modeling, observing, organizing information, planning, predicting, questioning, recording observations.

### Disciplines for This Lesson

Science, language arts, math, and visual arts.

### Where to Find More Information

*Educator Guide* Unit-by-Unit Guide for Unit 2, pages 57-73, especially pages 59-61.

*Youth Guide*, Unit 2, pages 59-86, and especially page 70, Observation Checklist for Behaviors; photographs of duck blinds, pages 80-81; research questions, pages 71-73; and Native American stories, pages 75-77.

### Organizing Questions for Students

As you watch ducks or geese, what do you think they are doing? Are they swimming or flying? Are they eating or sleeping? How can you tell what they are doing?

## ORIENTATION

### Goals for Learning:

- Youth can describe common waterfowl behaviors.

### Materials:

- Flip chart or PowerPoint slide capability.
- Index cards for charades, each containing one behavior from the list in the activity.
- Students bring their own Nature Notebook for recording observations, or provide note paper or blank file cards.
- A person who is currently conducting research on waterfowl behavior (if available). For help in locating an expert, see *Educator Guide* pages 23-24.

### Indoor Activity: (15 – 20 minutes)

*Waterfowl behavior charades:* Find out what the students already know about waterfowl behavior. Ask them to write all the waterfowl behaviors they can think of in their Nature Notebook or on an index card. Then show the list of behaviors below on a slide or flip chart. How many did they already know?

Make cards for charades with each of the following behaviors. Divide students into two teams. One student from each team picks a card and acts out the behavior for his/her team. Teammates try to guess the behavior. Make this activity into a contest or competition between teams, if students would enjoy the challenge.



**Charade cards:**

Aggression	Courtship	Dabbling	Diving	Drinking	Feeding
Preening	Resting	Swimming	Walking	Flying	Calling

After the activity, explain that although most waterfowl engage in most of these behaviors, there are many differences in how species behave. How they behave is directly related to their habitat.

If possible, show a few slides from your field site of various waterfowl species exhibiting some of the specific behaviors listed above. As you show photos, ask students to identify what behavior the birds are exhibiting and ask them to describe the habitat.



USFWS photo by Donna Dewhurst

*Optional:* Is there anyone conducting research on waterfowl behavior at your site? Could students make some of the same kinds of observations that this researcher makes? If so, invite the researcher to give a 10-15 minute (maximum) presentation about his/her research. Make sure they have visual aids and speak at a level the students can easily understand. Have this researcher give them an assignment, perhaps a data sheet to complete, while observing waterfowl on your site. Ideally, the researcher would accompany the group to go outside and collect data for his/her research. For help in locating an expert, see *Educator Guide* pages 23-24.

**INVESTIGATION**

**Goals for Learning:**

- Youth can describe common waterfowl behaviors.

**Materials:**

- Observation chart – copy for each student; or large copy on a flip chart that all students can see from their observation site.
- Nature Notebooks, or note paper or observation chart where students can make notes.
- Stopwatch or watch with a second hand for each pair of students.
- Binoculars and/or spotting scopes.

**Outdoor Activity: (30 – 40 minutes)**

*Observing behavior of birds:* Tell students that to learn about bird behavior—and to truly learn about and enjoy birds—you need to watch them for a long period of time; as long as the bird will let you. Identifying what a bird looks like is certainly interesting to many people.

But noticing what they do, what they eat, and how they interact with other birds can be really fascinating—and can help you understand how they survive.

Before you go outside, highlight the main habitats found at the site using slides, illustrations, or views from an observation area. Then take the group outside to observe waterfowl at one or more different habitats. If possible, use techniques to help ensure that they will see waterfowl. Do you have waterfowl blinds on your site? Could you use duck calls? Decoys? See *Youth Guide* pages 80 and 82.

*Optional:* Invite a local hunter, birdwatcher, or member of a local conservation group to join your field trip. Have this person describe how they use blinds, decoys, or calls. What have they learned about bird behavior through observation?

Provide students with copies of Table 2 or have them make a chart in their Nature Notebooks. Have students work in pairs. If you are working with a group that is not your own, ask the visiting teacher or leader to pair the students. In each pair, one student will be the timekeeper and one will be the data recorder for this activity.

Student pairs will watch one bird for 10 minutes.

The Timekeeper will keep track of the time using a stopwatch or watch with a second hand. The Timekeeper will announce “one minute” at the beginning of each new minute.

The Recorder will use the checklist in Table 2 to note what types of behaviors the bird is performing. Put a check in the box for each behavior that takes place during a minute. Tell students to make a new observation each time the timekeeper announces “one minute.”

While you are still outside, after students have completed the chart, give them an extra 10 minutes to draw the bird they observed in their Nature Notebook. Encourage them to include the behavior they observed and elements of the habitat in their drawing.

Another possibility would be to have students bring cameras (or loan a camera to each pair of students) and have them take photographs of waterfowl behaviors and habitats during their observations.

### NOTES:



Table 2. Observation Checklist.

Observation checklist for behaviors										
Minute	1	2	3	4	5	6	7	8	9	
Aggression (fighting, chasing)										
Courtship (swimming together, displaying)										
Dabbling ("tipping up")										
Diving										
Drinking										
Feeding (on what?)										
Mating										
Preening										
Resting										
Swimming										
Walking										



## PUT IT ALL TOGETHER

### Goals for Learning:

- Youth can explain how behavior is related to habitat characteristics.
- Youth can describe at least one common tool used by humans to make it easier to observe waterfowl (decoys, calls, and blinds).
- Youth can incorporate examples of waterfowl behavior into their language or visual arts project.

### Materials:

- Student data from outdoor activity (pages 26-28).

### Indoor Activity: (20 minutes)

*Analyzing the data:* Ask the student pairs to look at their data. What did the bird spend most of its time doing? Ask student pairs if they have more than one checkmark on any of the behaviors?

For upper elementary through high school students, add this math activity:

Make a rough calculation of what percentage of the 10 minutes was taken up by any specific behavior ( $\% = \text{number of minutes spent on a behavior divided by the total minutes times } 100$ ). For example, if you saw a bird feeding for 6 minutes, the percentage of time feeding would equal  $6/10 \times 100 = 60\%$ .



© HarshLight, Creative Commons

If the bird did more than one behavior in a minute, students could count each behavior as if it took the whole minute in order to get a general idea of what happened. More accurately, they could modify their calculation so that the number of total minutes on that behavior reflect the fraction (half of the minute, quarter of the minute, etc.). But it is not necessary to try to make an observation this precise for the purpose of this activity, unless the students would enjoy the extra thinking and challenge.

If you decide to ask the students to examine the behavior more carefully, provide this example for how to make the calculation. If a bird ate and acted aggressively towards others during one of the minutes (two behaviors in one minute) four different times, calculate the percentage of time spent feeding by adding the fractions for each of the behaviors, then follow the formula above (multiply  $2/10$  (behavior #1)  $\times 100 = 20\%$  behavior #1). (See Table 3.)

Table 3. Sample Behavior Observation Chart.

Minute	Behavior #1	Behavior #2
2	.5 min	.5 min
4	.5	.5
6	.5	.5
8	.5	.5
<b>TOTAL min.</b>	<b>2.0</b>	<b>2.0</b>

Ask student pairs to use this information to create a picture of the behavior of their bird. Ask pairs to discuss their results with one or two other pairs. Did one bird spend more time resting than another? More time feeding than another? Did birds in different habitats behave differently? Pairs could compare their bird with a different kind of bird, or the same bird under different circumstances.

*Animal behavior research:* After watching the bird, ask each pair of students to write a question. Help them develop a good scientific question that could be answered by further observation using Table 4 on page 32.

Encourage the students with these ideas: Do the same kinds of birds behave differently in different habitats, different weather conditions, and different times of day? These differences are called variables. Analyzing differences among variables is one of the basic aspects of all scientific research.

*Other possible variables:* Compare behavior in different individuals—do all the ducks seem to have the same behaviors? Compare behaviors among different species of ducks or geese or from different species of birds.

Ask each pair of students to offer one of their questions to the whole group.

#### NOTES:



Table 4. Questions for Scientific Research.

Type of question	Your questions
<p>Descriptive question:</p> <ul style="list-style-type: none"> <li>How many?</li> <li>How frequently?</li> <li>When did... happen?</li> </ul>	
<p>Comparative questions (comparing two situations):</p> <ul style="list-style-type: none"> <li>Is there a difference between                             <ul style="list-style-type: none"> <li>Groups?</li> <li>Conditions?</li> <li>Times?</li> <li>Locations?</li> </ul> </li> </ul>	
<p><b>Correlative questions:</b> (considering how two things are related or connected):</p> <p>Is there a relationship between the weather conditions and the amount of time that the bird feeds?</p>	

## FOLLOW-UP IDEAS

Collect students' data and drawings or photographs to post on the website for your field location, or maybe on a chart or mural at the visitor center. Have students write their questions on a poster that will stay at the visitor center or add to the website so future visitors can see students' questions and add their own.

Have a large mural posted in your center showing a simple representation of the habitats at the field site. Have students post copies of their drawings or photographs depicting various waterfowl behaviors in the habitat where they observed them. Put a number on each drawing or photo. Students can write brief descriptions on index cards of the behaviors and what they learned about them. Write numbers on the cards corresponding to the numbers on the drawings. Subsequent classes or visitors can view the drawings and read the students' descriptions to learn about waterfowl behavior at your site.

Encourage students to think about how they could use their question to guide observations. Use pages 71-73 in the *Youth Guide* to help guide student thinking about how they might design research to answer their question. Encourage students to try out their study idea. Remind them to keep track of their observations in their Nature Notebooks.

Younger children might enjoy a group reading of the Native American Stories in the *Youth Guide*, pages 75-76. Ask the students to name the bird behaviors described in the story. Are these real or pretend behaviors? How did they decide?

### NOTES:



NOTES:



## UNIT 3. RAISING A FAMILY IN A WETLAND

### PREPARATION

#### Focus

Understanding waterfowl food, shelter, and reproduction needs, in the context of their homes—wetlands and the surrounding upland habitats.

#### Background

**Note:** This lesson is ideal for a spring field trip to a location where you might see waterfowl nesting or at least see the habitat components important to nesting waterfowl.

Waterfowl are normally solitary nesters. The size of the nesting territory that is defended by a particular hen or mated pair is determined by the aggressiveness of those particular birds. Pair formation in geese and swans tends to be permanent until one of the pair dies. If that happens the remaining bird will often re-mate. Ducks tend to seek new mates each year.



USFWS photo by Donna Dewhurst

Waterfowl breed in wetlands and the surrounding upland areas. Habitat is critical for nesting—providing food and shelter, as well as nest-building materials. The U.S. Fish and Wildlife Service Small Wetlands Program uses funds from the sale of federal Duck Stamps to permanently protect some of the most threatened and productive migratory bird habitat in the U.S. Learn more about the federal Duck Stamp on page 162 of the *Youth Guide*.

#### Learning Objectives

Youth will be able to:

- Investigate where waterfowl raise their young and what they feed on.
- Explain how changes in habitat, especially the food materials available, can affect the survival of waterfowl young.
- Describe nesting materials and behaviors of a specific waterfowl species.
- Describe common waterfowl behaviors related to reproduction.

#### Conservation Concepts

- All living things depend on habitat that includes adequate supplies and suitably arranged food, water, shelter, and space.
- Living things tend to reproduce in numbers greater than their habitat can support. Populations are limited by the quantity and quality of food, water, shelter, and space. Disease, predation, and climatic conditions also may play a critical role.

## Science Skills for This Lesson

Analyzing, comparing, designing a solution or process, explaining, gathering evidence, interpreting, investigating, observing, organizing information, planning, predicting, questioning, and recording observations.

## Disciplines for This Lesson

Geography, language arts, science, and visual arts.

## Where to Find More Information

*Educator Guide* Unit-by-Unit Guide for Unit 3, pages 75-98 and especially background materials on pages 80-87.

*Youth Guide* Unit 3, pages 87-120, especially Sample Mating Behaviors on page 94; nesting sites on page 99; and habitat graph on page 104.

## ORIENTATION

### Goals for Learning:

- Youth know what questions to ask and where to find out where different types of waterfowl raise their young.
- Youth can describe common waterfowl behaviors related to reproduction.

### Materials:

- *Youth Guide* habitat graphic, page 104 – enlarge to mural size so the whole group can see the graphic, or show in a PowerPoint slide (use the print screen function to copy to a slide) or provide individual copies to students.
- Habitat cards, as described in the activity instructions (using information from *Youth Guide* page 98).
- Photos of the ducks cited in each habitat description (or a photo of the ducks, geese, or swans that might live in each of the habitats near the field trip site).
- Photos or slides of nesting waterfowl typical for the site.
- Photos or slides of courtship behaviors typical for waterfowl at the site.
- Site map or photo.

### Outdoor Activity: (20 minutes)

*Where to build a nest:* Use visuals and nesting habitat descriptions to orient students in preparation for the investigation activity. Show students a large picture of a general landscape of the field site. This could be an aerial photo, a large map, or a simple large outline of the major landscape features. If possible, send a copy to the group leader ahead of time, so students have an idea of the area they'll be visiting.

When students arrive at the site, show the aerial photo or map and ask them, "if you were a duck, goose, or swan, where would you want to build a nest?" What would they need to consider in selecting the best place? Tell students that it may be hard to decide where to



build a nest by just looking at the map because small details (that might be very important) don't show up.

Take the students outside and ask them to look at details of the habitat, such as things described on the cards on pages 38-41. They will be looking for all the habitat components that are important to nesting waterfowl.

Make copies of pages 38-41 – one page for each nest type. Hand out a page to groups or pairs of students. Have students read the page and decide where their duck would nest in the actual habitat on your site. Ask a few students to explain their decisions.

### NOTES:

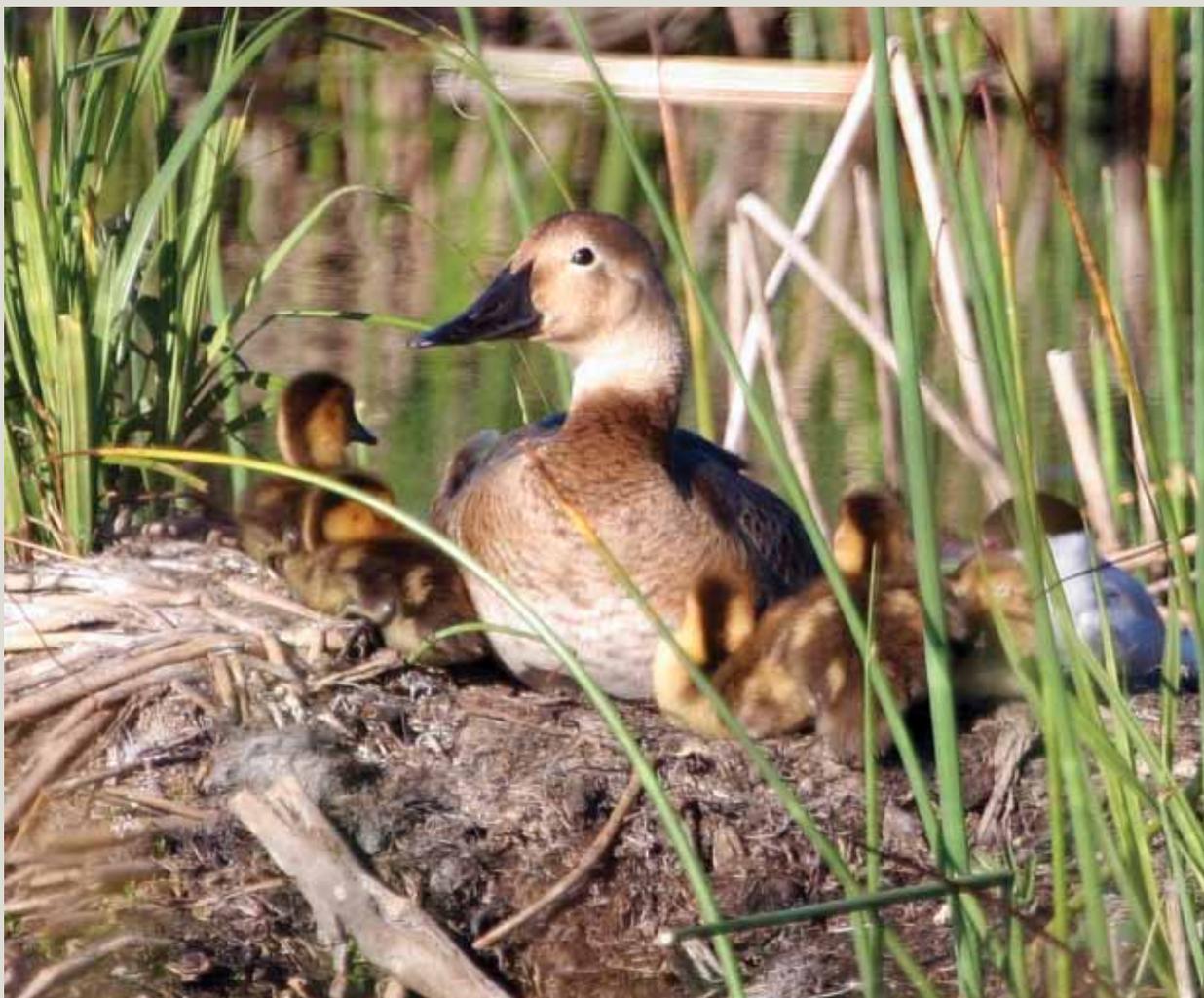




USFWS photo by Pam Garrettson

### **UPLAND**

Mallards and Pintails arrive in the Prairie Pothole Region during April and May to establish their nesting territories. They look for grassy upland habitats with nearby shallow ponds and wetlands where the hens can eat protein-rich invertebrates like insects and snails to recover from migration and get ready to nest. The protein, fat, and calcium in these critters are just what a female duck needs to produce and lay a clutch of eggs, which is no small feat. Once they've eaten enough, they explore the surrounding grasslands to find the best place to nest. Some species nest farther from wetlands; some nest in thicker cover. Researchers have learned that more Mallard ducklings hatch when the nests are built in dense, heavy vegetation.



USFWS photo by Donna Dewhurst

## OVERWATER

Redheads and Canvasbacks make their nests right in wetlands, on floating mats of vegetation like cattails and bulrushes. They prefer deeper, year-round wetlands with dense stands of emergent vegetation (plants that stick out of the water). Hens create a platform of vegetation to support the eggs. They fold cattails and other plants into a cup-shaped raft. Overwater nests are safer and easier to defend as predators would have to swim to reach them. This prevents predators like skunks and opossums from reaching eggs or young as these predators don't often swim. Overwater nests also provide easy access to aquatic animals or plants for food.



© Roger Strand



© Roger Strand



© Nick Hill, Sylvan Heights Waterfowl

### CAVITIES

Some ducks, like Wood Ducks and Hooded Mergansers, nest in holes in trees. Ducks can't create their own holes, so they depend on cavities created by woodpeckers or damage from decay, wind, or lightning. They also will readily use man-made nesting boxes. Cavities generally are more secure than ground nests from predators like skunks.



USFWS photo by Thom Lewis

### **DUMP NESTING**

Some ducks use a strategy called “dump nesting.” A hen Wood Duck, Redhead, Northern Shoveler or Blue-winged Teal may lay eggs in another duck’s nest, hoping the other hen will raise her young! Some Wood Duck boxes will be so full of eggs from a number of hens, that the hen who laid the first eggs may abandon the nest. Dump nesting saves a hen the energy of building a nest and allows her to continue feeding rather than sitting on eggs.

**Indoor Activity:** (optional – as materials and time permit)

*Ages and stages – waterfowl changes through a year and through a lifetime:* If possible, show a few slides or photos of nesting waterfowl on your site. Show photos of males, females, and young. Create a matching game with the photos of males, females, and young. Ask students to match males to females and adults to young. Indicate at what age each species gets its adult plumage. Ask students why males and females look different. How would their bright color or camouflage help them survive? Comment on any of the above nesting strategies as it pertains to your site.

If possible, show photos or videos of species exhibiting courtship behaviors (such as the ones listed in Figure 1.) so students know what to watch for in the field:

*Figure 1. Behaviors to Illustrate.*

- Head bobbing
- Bowing
- Fluttering wings
- Making courtship sounds
- Chasing each other
- Fluffing feathers to appear larger



© Andrew Reding

### INVESTIGATION

#### Goals for Learning:

- Youth can identify places where local waterfowl raise their young.
- Youth can describe nesting materials and behaviors of a specific waterfowl species.

#### Materials:

- *Youth Guide* habitat graphic, page 104—make copies for students.
- Habitat cards, as described in the orientation activity instructions.
- Site map or photo—make copies that students can use to locate and mark habitat features on the site.
- “Scavenger hunt” list for each type of nesting site.
- A clipboard, pencil, and colored pencils or crayons.
- Optional: nets for catching aquatic macroinvertebrates, simple field guides for identifying plants or invertebrates, hand lenses, and binoculars.

**Outdoor Activity:** (20 minutes)

*Nesting site search:* How you organize this activity will depend on the diversity of habitat types on your site.

Divide students into groups according to the nesting type they discussed in the orientation. Assign each group a certain area for their habitat assessment. Here is an example of possible assignments:

The Mallards group will investigate an upland area.

The Canvasbacks group will investigate a wetland or shoreline.

The Wood Ducks group will investigate a wooded area.

(Students with the “Dump Nesting” card can join any group.)

Have each group take their nesting type card, a copy of the habitat graphic (*Youth Guide* page 104), a copy of the site map, a clipboard, pencil, and colored pencils or crayons). Give students about 10 minutes to look for elements of the habitat that are important for their species to nest. Provide specific examples of what to look for on the site—specific plants that are important for nesting cover, specific food items, etc. Provide details in the form of a “scavenger hunt” list for each type of nesting site. Have students take photos or draw what they find.

Examples of scavenger hunt items:

Mallards group – thick grassy vegetation.

Canvasbacks group – emergent vegetation, cattails.

Wood Ducks group – dead standing trees, wood duck nesting boxes.

Reconvene the groups, or stop by each group individually, and talk with them about what they have found.

### Outdoor Activity: (30 minutes)

*Classifying and mapping nest sites:* Have students analyze which habitat type best describes their area (e.g., wet meadow, shrub wetland, etc.). Ask student pairs/groups to mark the areas on their map that might serve as the best nesting places. Give each group 10 minutes to analyze their site. Then have the whole class visit each site, with the initial group leading the “tour” of their site, identifying important habitat components.

### Outdoor Activities: (optional)

*Building a nest by hand (or bill):* Have students in each group build a nest with available nesting material in their habitat type. Think about how waterfowl do this with their bills and feet!

*Observing mating behaviors:* If you are lucky enough to see waterfowl and it is mating season, you can have students look for, write about, and draw any courtship and mating behaviors they might see. The first step in reproducing is to find a mate. Waterfowl use some amazing and interesting behaviors to attract mates. Most scientists think that these interesting behaviors evolved from basic survival behaviors like preening and bathing.

Table 5 lists some of the most interesting courtship behaviors in the world of waterfowl. See how many of these behaviors you can observe. Write down and draw which behaviors you’ve observed in your Nature Notebook. The actual process of mating may involve the male forcing the head of the female underwater!

Table 5. Types of Waterfowl Courtship Behavior.

Sample mating behaviors	Observed?
Head bobbing	
Bowing	
Fluttering wings	
Sounds – Mergansers have a cat-like call; Mallards whistle and grunt.	
Chasing each other—Mergansers chase each other on the water, in the air, and even under the water! Canvasbacks chase each other while flying.	
Fluffing feathers to appear larger.	

Have students draw or photograph the behaviors they observe.

## PUT IT ALL TOGETHER

### Goals for Learning:

- Youth can investigate where waterfowl raise their young and what they feed on.
- Youth can explain how changes in habitat, especially food sources, might affect the survival of waterfowl young.

### Materials:

- Site map or aerial photo. (Find aerial photos on Google Earth.)

### Indoor Activity: (20 minutes)

*Aerial view of nesting areas – sharing and mapping observations:* Have students look again at the large aerial photo or map of your property. Now they know a lot more about the site than when they started! Ask each group to identify the best nesting sites they found on the map. Make sure to note if they actually saw waterfowl or found any nests. If time permits, have them draw some of the plants and animals they found at their site and post the drawings onto the large photo or map.



If you are not the manager of the field site, invite the local site manager to talk with the students about changes in habitat that have occurred over the years. Ask the students what they think about these changes. Could they improve the ability of the waterfowl to find nesting sites and raise their young? Why or why not?

### FOLLOW-UP IDEAS

Have each group point out the area they analyzed on the map and review the main habitat components they found there.

Have each group make lists of the plant and animal species they saw and add to a list of daily sightings for the field site.

Ask students to review and summarize what they've learned about how waterfowl nest and care for their young. Imagine if someone decided this would be a good place for a new subdivision or shopping mall. How would you convince them that this place is important and should be conserved?

*Service:* Have students build or install a nesting structure on the field site. Ask them to identify the best location(s) and help them (as needed) with installation. Provide plans for habitat improvements they could do on your site or other sites in your community. This might include removing invasive species and planting species important to waterfowl.



Middle school class installing Wood Duck boxes that they've built. Photos courtesy of Victoria Rydberg (Madison, WI)

NOTES:



## UNIT 4. GOING THE DISTANCE – MIGRATING ACROSS CONTINENTS

### PREPARATION

#### Focus

Investigate some parameters of waterfowl migration, including weather and migration patterns at the field trip site.

#### Background

One of the first things waterfowl managers learned from early waterfowl banding efforts was that waterfowl follow distinct, traditional migration corridors or flyways in their annual travels between breeding and wintering areas. Birds use several visual and nonvisual orientation mechanisms to navigate. Some of the visual cues include the sun, polarized light, the stars, and landmarks on the Earth. The female duck always makes the choice for the breeding area because she is homing to the site of her birth or a site where she successfully hatched a clutch of eggs before.

In most duck species, males and females will go their separate ways after the breeding season, each returning to their respective wintering sites from the previous year. Female ducks tend to winter farther south, and those that were successful at raising young arrive there much later than the males.

The large body sizes of waterfowl enable them to store nutrients as body reserves. In some cases, birds consume nutrients for an upcoming stage in the life cycle at one wetland and transport them as body reserves. The protection of natural systems and the restoration and management of degraded systems increases choices of habitats and foods available to waterfowl. Where natural wetlands remain intact, they should be conserved as unique components of the ecosystem. Likewise, the provision of adequate refuge areas where birds are protected from disturbance is an essential ingredient to ensure that food resources are available to waterfowl and can be used efficiently during important times in the birds' life cycle.

**Note:** It is best to do this activity in fall or spring, when waterfowl are migrating through your area.

#### Learning Objectives

Youth will be able to:

- Describe basic characteristics of waterfowl migration.
- Explain why waterfowl migrate.
- Give one or two examples of how different species follow different paths or flyways.
- Explain how waterfowl know when and where to migrate.
- Describe some threats to waterfowl as they migrate and what can be done to minimize those threats.
- Explain possible impacts of climate change on waterfowl migration.

## Conservation Concepts

- Ecosystems change over time.
- Changes in environmental conditions can affect the survival of individual organisms and entire species.
- Species can become extinct because of habitat change or loss.
- The impact of the human species has major consequences for other species.

## Science Skills for This Lesson

Analyzing, describing, investigating, explaining, gathering evidence, interpreting, organizing information, and questioning.



Photo by USFWS Refuge Staff

## Disciplines for This Lesson

Geography and science.

## Where to Find More Information

*Educator Guide*; Unit 4 background information, pages 102-107.

*Youth Guide*; Unit 4 activities, pages 87-120.

## Organizing Questions for Students

What happens when a bird migrates? Why do waterfowl migrate?

## ORIENTATION

### Goals for Learning:

- Youth can describe basic characteristics of waterfowl migration.
- Youth can give one or two examples of how different waterfowl species follow different paths or flyways.
- Youth can describe some threats to waterfowl as they migrate and what can be done to minimize those threats.

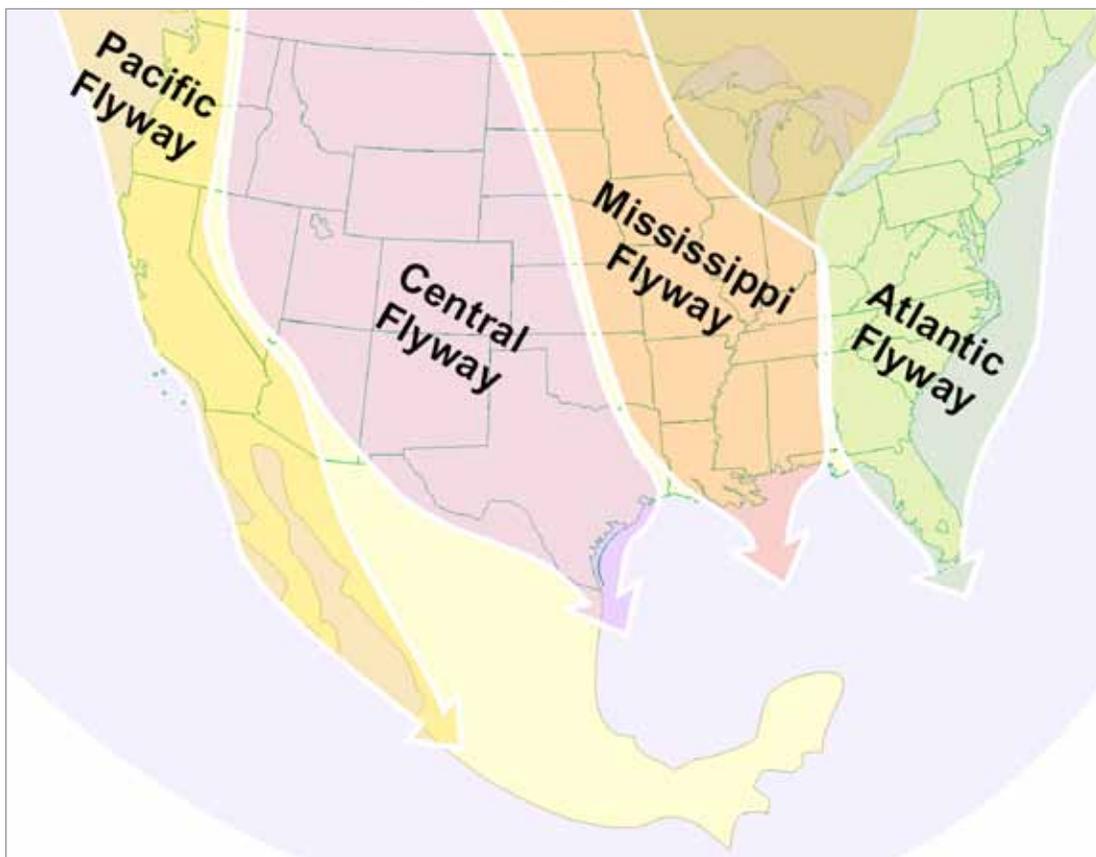
### Materials:

- North America flyways map (see Figure 2).
- Stickers (such as stars).
- Large, flat items such as hula hoops, carpet squares, large paper plates.
- Props to symbolize food, water, shelter (ask students to suggest what to use).
- Rope.
- Waterfowl species names on paper, to pin on the backs of selected students.
- Waterfowl species photos (if available).

**Indoor Activities:** (30 – 40 minutes)

*Flyway orientation:* Tell students that after a brief introduction and a migration activity, they are going to investigate why this place is important to waterfowl on their migration route. They will make observations of the habitat and weather conditions today, at one point in time. Then they'll look at how these conditions change throughout the year.

*Figure 2. North American Flyways Map.*



Begin by showing a large map of North America with flyways outlined. Ask students if they know what a flyway is. Take some suggestions and provide a brief explanation if needed. Put a star or sticker on the map, indicating the location of your property.

*Map Your Flyway:* Organize students in teams of two to four to make a three-dimensional map or model of a “flyway” in a large open space.

After students have located your property on the flyway map, also point out the nesting grounds, wintering grounds, and if possible, other stopover sites for waterfowl in the flyway. Show photos of some of the species that follow this flyway. Ask a few students to imagine themselves as one of these species. Put the species name or a photo on the backs of a few students (hereafter referred to as “students designated as waterfowl”).

In a large, open space, give student teams about 20 minutes to make a “map” of the flyway, with wintering habitat on one end and nesting habitat on the other. Encourage them to think like their bird species. What would they want if they were that bird? Tell students that their “flyway” should be designed for a somewhat narrow corridor, to allow for the work of several teams.

Provide props such as ropes to mark off the wintering and nesting grounds on either end of your open space and use other markers to represent stopover sites. What would waterfowl see/need along the way (e.g., food, water, shelter, safety from predators) and why? How could students symbolize each “ingredient?” (Offer various props symbolizing food, water, and shelter). Have students place the props representing habitat components in the stopover sites on the flyway.

When they are ready, ask each team to explain their “flyway” to the group. Ask **students designated as waterfowl** to simulate a flight from the wintering grounds to the nesting grounds, gathering at least one of each habitat component (food, water, shelter) along the way. If they found the right resources, they survived their journey and have the energy to reproduce! Have them return the habitat components to the playing field.

Now ask students to suggest changes to the land that might alter the availability of food, water, or shelter. Ask students to explain what might happen to the habitat components for at least two of the following events:

- Wetlands are drained or filled for development or agriculture.
- Invasive plant or animal populations increase.
- Disease.
- Flooding.
- Urban or agricultural runoff.
- Oil or chemical spills.

Have students remove any habitat components from their model that would be damaged through these activities.

After these changes, have another group of **students designated as waterfowl** “travel” from the wintering grounds to the nesting grounds as before. If they can’t find one of each habitat component they will not survive or may not have enough energy to reproduce, and will have to sit out.

What can humans do to help? What are some positive things we can do to restore wildlife habitat? Have students brainstorm their ideas first, then add your ideas and describe examples:

- Plant native species to provide food and/or shelter.
- Remove invasive species.
- Plant buffer strips to reduce runoff.
- Preserve wetlands instead of filling in for development.
- Restore degraded wetlands.

If you have time, ask students to simulate one or two of these actions in their “flyway,” restoring the habitat symbols to their model. Have a third group of students designated as waterfowl travel to their nesting grounds, now able to survive and reproduce. Those players who didn’t survive earlier can now return as ducklings, goslings, or cygnets.

To end the activity on a positive note, describe activities that land managers use to protect waterfowl habitat, such as restoration of wetlands, planting native species, using



conservation practices that increase the number of wetlands, and acquiring new wetlands habitat using Federal Duck Stamp dollars. See Appendix C and the *Youth Guide* page 162 for more information on the Duck Stamp. See *Youth Guide* page 133 for a map of National Wildlife Refuges. Many were established to protect important stopover sites along the flyways.

After this activity, ask students to each name one thing that they learned. Explain the importance of your field site in relation to this activity. Is your field site a nesting site, a wintering site, or a stopover site? What are some important specific features of the habitat at your site that are important for waterfowl survival?

Tell students that next they are going outside to investigate why this field site is important to waterfowl on their migration route. Give students an outline of the data to be collected (see below) to write in their Nature Notebooks or a data sheet to complete outside.

## INVESTIGATION

### Goals for Learning:

- Youth can describe habitat that waterfowl might visit during migration, giving as many details as possible.

### Materials:

- Data sheet outline.
- Weather measuring equipment: thermometers, anemometers, barometers.
- Rain gauges (previously set up in several places on the property).
- Optional: cameras.
- Nature Notebooks (See Introduction Lesson in this guide).

### Outdoor Activity: (40 minutes)

*What's the weather?* Take students outside to view the various habitats on your site. Divide them into groups of four or five. What you decide to have students measure depends on their age and what equipment you have available. If possible, have rain gauges set up at various locations on the property and give each group a thermometer, anemometer, and barometer for making measurements. If weather monitoring equipment is not available, or not appropriate for the age group, prepare ahead by gathering wind speed, air pressure, and precipitation data from the newspaper or online resource.

Check with students to make sure that they know how to read any equipment they will use. Ask them to tell you what each instrument measures, for the location you are in, as you assign the equipment. Ask students to look at the data sheet, and take a few minutes to give an example for each of the items on the sheet. Be sure they understand what is expected.

Assign each group to a specific location and ask them to complete the data sheet (Figure 3 on page 52) at their location. Each student within a group should be responsible for certain measurements. If cameras are available, have students take photos of their habitat and any waterfowl they observe. (Older students may be able to count numbers of specific species; younger students may just count waterfowl in general.)

Figure 3. Data to Be Collected.

Adapt the data list below as needed to make it appropriate to your site, the equipment you have available, and the age of the students. For example, if you don't have access to a barometer or anemometer, or if the students are younger than 5th grade, you may want to delete wind speed and barometric pressure.

Date:	Time:	Temperature:	Wind speed and direction:	Barometric pressure:	Precipitation from the previous 24 hours (check the rain gauge):

**Cloud Cover:** (circle)      Clear      Partly Cloudy      Mostly Cloudy

---

**Current Precipitation:** (circle)      None      Fog      Drizzle      Rain      Snow      Sleet

---

**Habitat Type:** (circle)      Wetland      Shrub      Grassland      Woodland

---

**Timing of Plant Life Cycle:** (circle)      Bare twigs      Budding      Leaves      Flowers      Fruits

---

**Water:** (circle)      Open water      Frozen

---

**Observations of Waterfowl** (e.g., count numbers of ducks, geese, or swans):

---



---



---



---



---



---



---



---



---



---



---



---

## PUT IT ALL TOGETHER

### Goals for Learning:

- Youth can describe weather and habitat characteristics that might affect waterfowl migration, and what difference they might make.
- Youth can explain possible impacts of climate change on waterfowl migration.

### Materials: (depends on which activity you choose from the options below)

- Craft paper or flip chart paper divided into sections shown on the data sheet in Figure 3.
- Poster paper-sized graph for selected items (date; brief weather description; number of ducks, geese, or swans).
- Long term weather data for your site (at least several months), if possible.
- Outdoor activity data developed by student groups (pages 51-52).

### Indoor Activity: (30 minutes)

*Weather snapshot:* Have each group post their data from the outdoor activity (pages 51-52) on large sheets, organized by category of data. Did everyone get exactly the same data? Why or why not? (There may be differences between micro-climates on the same property, there may be differences in accuracy of each instrument, or there may be differences in reading instruments or interpreting observations).

Tell students that on these charts we have a “snapshot” of this site on this day. What do you think was different a month ago? What would it be like one month from now? What difference would this make to waterfowl? Which of the things you observed would matter to waterfowl? What might cause them to migrate? How many ducks, geese, or swans did you observe?

Show students data from the past several weeks or months, if possible. Have large graphs for students to plot their data about waterfowl population numbers along with data from previous student groups (or staff). What has changed? Notice any changes in numbers of waterfowl. Are there more or less? Ask students if they think migration is happening right now. If possible, show data from previous years for the month before and after the date of the visit. Ask students to predict how many ducks or geese will be at the site a week from now.

Have students post their photos or draw a waterfowl species they observed and place it on the flyway map.



USFWS photo by John and Karen Hollingsworth

### FOLLOW-UP IDEAS

*Service:* Organize site staff or other adult volunteers to help your group perform a service project related to migratory needs of waterfowl. Students could plant an important food species like wild rice, for example, or remove invasive species that inhibit growth of food species.

*Investigate on your own:* Explain to students that they have been studying phenology (the study of seasonal changes) today. This is something they can continue to study in their backyards or at their school or community center. Budding, blooming, and fruiting of plants, breeding and migration of animals, and freeze and thaw of lakes are all important events in the survival of waterfowl. Studying these seasonal changes for many years can help us understand if conditions are changing in a way that might impact waterfowl survival. What do you think might be causing changes in these seasonal events?

Look up answers to questions about migration:

- Explain why waterfowl migrate.
- Explain how waterfowl know when and where to migrate.
- Explain possible impacts of climate change on waterfowl migration.

**NOTES:**



## UNIT 5. LEARNING FROM THE PAST; TAKING ACTION FOR THE FUTURE

### PREPARATION

#### Focus

Focus on an issue involving waterfowl and habitat that is relevant at your site.

#### Background

Human activities have affected waterfowl populations and habitat for many years, both negatively and positively. Sometimes there is conflict between the needs of people and stewardship of the environment. Examples include:

- Habitat loss.
- Invasive species.
- Overpopulation of urban waterfowl.
- Species in decline.
- Climate change.
- Oil spills.

People can also make decisions and take actions that help waterfowl and protect or restore their habitat. For each of the negative impacts listed above, people can take positive action to help waterfowl populations and their habitats.

This lesson provides a study example focusing on the impact of invasive species. Invasive species are those species that can out-compete other organisms and take over an area. In new areas where they may not have any natural predators, the populations of these species can literally explode, causing great damage to native plants and animals. These invaders often “hitchhike” on boats, clothes, water toys, and other equipment that people use to work and play in the water. People moving from one body of water to another may transport these invaders without even knowing it.

You may want to develop a different investigation focusing on habitat loss, urban waterfowl, or other issues that are more critical at your site. The best resource for an investigation is current research at your site. Students can learn what issues are affecting waterfowl, how biologists and/or managers are studying these impacts, and what can be done to improve habitat and waterfowl survival.

#### Learning Objectives

Youth will be able to:

- Describe some past and present examples of human impacts on waterfowl populations or wetland habitat.
- Explain the possible impacts of at least one human-caused change on waterfowl populations (examples in Background).



- Participate in research to study human impacts on waterfowl populations or habitat.
- Plan a stewardship activity that would benefit waterfowl through habitat restoration.

## Conservation Concepts

- All living things depend on habitat that includes adequate supplies and suitably arranged food, water, shelter, and space.
- Ecosystems change over time.
- Changes in environmental conditions can affect the survival of individual organisms and entire species. Species can become extinct because of habitat change or loss.
- The impact of the human species has major consequences for other species.
- Science-based management considers the needs of humans as well as wetlands and waterfowl.
- Everyone should understand and participate in the stewardship and support of our natural resources.

## Science Skills for This Lesson

Observing, comparing, analyzing, describing, investigating, explaining, gathering evidence, interpreting, organizing information, and questioning.

## Disciplines for This Lesson

Science and language arts.

## Where to Find More Information

*Educator Guide*; Unit 5 background information, pages 119-129.

*Youth Guide*; Unit 5 activities, pages 160-161, 166-169, 171-181, 182-185, 186-189, 191-196.

## Organizing Questions for Students

How do humans affect waterfowl? How have waterfowl been viewed by and used by humans in the past? What are some current problems for waterfowl (and for people concerning waterfowl)? What are some careers and volunteer opportunities for people to help waterfowl and their habitat? How do biologists and wildlife managers study human impacts on waterfowl?



USFWS Photo

## ORIENTATION

### Goals for Learning:

- Youth can identify invasive species at your site.

### Materials:

- Samples of a variety of plants found on your site, including species important for waterfowl and invasive species. Try to provide at least two individuals of each species.
- Cards or posters with photos and descriptions of plants (could be copied pages from a field guide).

### Indoor Activity: (30 minutes)

*Matching plants – trash or treasure:* Give each student one of the plants. First have them find their “partner(s)” (other(s) in the group who have the same plant). This will give them several different views of their plant, which will help them notice small differences. Once they’ve found the other person(s) with the same plant, have the pair or team draw the plant, describe its characteristics, and come up with a descriptive name for it. Ask them to decide if they think this plant would be valuable for waterfowl. Why? Have each group share their description with the whole group. Then show students posters or cards with photos, actual names, and descriptions of the plants. Which of these plants are beneficial for wildlife? Which are invasive? Why should we be concerned about invasive plants?

## INVESTIGATION

### Goals for Learning:

- Youth can define “invasive species” and offer examples.
- Youth can conduct a survey at the field site to determine the abundance of invasive plants.
- Youth can explain how invasive species are able to out-compete native species, which have undergone specialized adaptation to survive in their environment.

### Materials:

- One square meter quadrat for each team of 4-5 students (quadrats can be made out of PVC pipe, or simply line up meter sticks to form a square).
- Clipboards, worksheets, pencils.

### Outdoor Activity: (35 minutes)

*Field research – where are the invasives?* Tell students that they will investigate whether there are invasive plants at this field site. Organize students in teams to measure plant diversity in their quadrat. The orientation activity should help students identify the most common species they will find. The goal is to determine how many different species there are in their quadrat, and estimate how many individual plants of each species are present. It’s best to do this in a relatively open area and concentrate on herbaceous (non-tree) species to keep it simpler.



Have some students work on quadrats close to a trail and others farther away from the trail. Decide on an educational but safe place. Make sure that students can identify and thus avoid any species of harmful plants such as poison ivy or wild parsnip. Students nearest to the trail will likely find their quadrats dominated by invasive species, while students away from the trail will find a greater number of species. This will help illustrate the idea of invasiveness (they will visually notice invasive plants crowding out other plants) and demonstrate the role of humans in dispersing invasive species (i.e., invasive plants are most common near trails, where people help spread them).

## PUT IT ALL TOGETHER

### Goals for Learning:

- Youth can use field data to summarize the scope of an invasive species problem, and to propose ways to stop the spread of invasive species.

### Materials:

- Large paper.
- Markers – two colors.

### Indoor Activity: (25 minutes)

*Mapping natives and invasives:* On a large sheet of paper, have a simple map of the students' research quadrats. Have two colors of markers, one color for invasive species, another for native species. Ask each research team to draw a visual representation of their quadrat on the map, using the two colors of markers. For example, if they counted 25 invasive plants and 10 native plants in their quadrat, they would draw 25 red plants and 10 green plants. (They could also just draw symbols to represent the plants). Once all the teams have posted their visual data, ask students to step back and look at the big picture. Do some areas have more invasive species than others? What can we learn from this about how invasive species are spread at this field site? First, list any ideas that students come up with. Share additional ideas such as how invasive plants can be managed:

- Clean your hiking boots before entering an area that is free of invasive plants.
- Plant only native species in your garden.
- Clean your boat and trailer (and empty ballast water for large boats) before moving between water bodies.

### Additional Activity Ideas

The above activity will be meaningful if invasive species are a problem at your site. If other issues are more relevant, you may want to develop a similar activity to engage students in research on other issues. For example:

*Urban waterfowl:* Have students count numbers of ducks, geese, or swans at your site per unit area and observe problems caused by overpopulation.



*Habitat loss:* Have students observe an intact habitat. Provide a list of habitat components to look for. Have them draw the habitat and note important plants and other items you have identified. Then have them observe a degraded habitat, noting the differences and presence/absence of waterfowl in each location.

## FOLLOW-UP IDEAS

### Goal for Learning:

- Youth can describe at least two things that a person who studies or manages a field site does in his/her work.

### Materials:

- Field site staff or associated person who has some role in managing or studying the property.

### Activity:

*Career Exploration:* Get to know the people who make a difference at the natural area you are visiting (e.g., city, state, or national park; nature center; school forest; national wildlife refuge; or national forest). Introduce students to a person who has a natural resources management career. Tell students they will study one problem/issue at the field site, to learn how to use data to analyze and solve natural resources management concerns.

Work with a field site property manager or director to identify one staff person or visiting scientist who would be available to meet with your group. Contact this person ahead of time and invite them to talk with your students for a few minutes about what they do. Tell the science professional that students will follow the presentation with a few questions.



© viamoi, Creative Commons

Prior to the visit, tell students who they will meet and give a simple description of what that person does. Tell students that you would like them to think for a few minutes about questions they would like to ask. Ask them to work in pairs and to write down two or three questions.

Possible interview questions include:

- How does your job help waterfowl?
- What are the conservation issues/problems you are working on and why?
- What might be the next problem you would anticipate?
- What concerns do you have about conservation of waterfowl?
- What is the most important aspect of your work and why?

- What is the most difficult aspect of your work and why?

Introduce the science professional and tell students that he/she will talk for 5-10 minutes, and then it's their turn to ask questions.

*Service project:* Provide cards with photos of invasive species common to your area.

Students can return to your site to do a service project, working with you or another partner expert in conservation, to remove these species. Or they could do a similar project at other areas in the community.

**NOTES:**

### **APPENDIX A | Education Outside of the Formal School Setting**



An educational experience away from school can range from a closely directed experience to one that allows the learner a great deal of choice. Either can be effective if good learning design is observed. As with any educational program, the education is more likely to lead to desired goals if it has a clear purpose and uses accurate information and effective teaching strategies. Conservation programs are most likely to be effective when developed by a team that includes a natural resource expert and an educator; and when they are designed to enhance related goals of a network or organization.

*Nonformal education* refers to education that is not part of a formal certification or degree program. The term is also often used, however, to refer to learning that takes place away from school property, but may address formal schooling requirements or be part of an organized sequence of educational activities or resources designed to reach specified objectives. Settings, audiences, and program types where nonformal education strategies may be applied are outlined in Figure 4. Consult the *NAAEE Nonformal Environmental Education Programs: Guidelines for Excellence* publication for detailed information about effective design and evaluation of nonformal education programs.<sup>3</sup>

*Figure 4. Typical Nonformal Programs.*

*Settings:* After-school programs, summer camps, day camps, nature centers, museums, zoos.

*Audiences:* K-12 classes on field trips, 4H, scouts, youth groups, museum or zoo visitors.

*Types of programs:* ongoing programs with daily, weekly, or monthly sessions; one-time events such as field trips, festivals, or field days.

*Free-choice learning* refers to the learning that occurs when people choose what, when, how, and why to learn. People learn when they watch TV, visit a museum, read instructions for how to do something, talk with their neighbors, etc. According to the Institute for Learning Innovation<sup>4</sup>, free-choice learning is “the most common type of lifelong learning” and is “self-motivated and guided by the needs and interests of the learner.”<sup>5</sup>

Designing an education experience for free-choice learning situations considers many of the same criteria that are important to all education programs, but from the point of view that the learner has the freedom to choose whether to participate. Educators organize an experience that answers the question: what will attract the learner to this opportunity?

As with any education initiative, when designing free-choice experiences, educators focus on content that will be meaningful to the learners, meets learners’ needs, is at an appropriate skills and knowledge level, and is challenging yet not beyond the scope of learners’ experience and skills.

## APPENDIX B | Field Investigations: Safety Considerations<sup>6</sup>

<sup>4</sup> <http://resources.spaces3.com/b33925e6-69d6-4832-8442-5e3f32287b7b.pdf>

<sup>5</sup> <http://www.ilinet.org/display/ILI/Home>

<sup>6</sup> <http://www.ilinet.org/display/ILI/Home>

<sup>6</sup> Adapted from Give Water a Hand Leader Guide.



- What are the general risks?
  - weather
  - busy streets
  - crime
  - water, even if it is shallow
  - sunburn
  - hypothermia, from getting wet
  - insect bites
  - stinging plants
- Are there any project-specific risks?
  - trash with sharp edges, hazardous substances, tools
- What are the human behavioral risks?
  - running, fighting, playing with tools
- What can be done to reduce risks?
  - work with a buddy at all times
  - read and follow instructions
  - get training in use of equipment
  - identify students with bee allergies
  - wear protective gloves or eye wear
  - wear proper clothing (such as reflective safety vests), wear seat belts
  - use bug spray
  - be careful near the water's edge
  - ask group leader for help removing broken glass or unidentified items
  - use crossing guards
- Establish emergency procedures and make sure everyone knows them.
  - post 911, hospital, and other emergency phone numbers
  - have a first aid kit and a car and driver available when working on projects
  - have a trained first aid person on-site or nearby

## APPENDIX C | What Are Duck Stamps?

Since 1934, the Federal Migratory Bird Hunting and Conservation Stamp, also known as the “Duck Stamp,” has been a required purchase for waterfowl hunters. These stamps are not



postage stamps; they have a greater purpose: to help preserve wetland habitat for waterfowl and other migratory birds, and lots of other types of wildlife.

Ninety-eight cents of every dollar generated by the sale of federal Duck Stamps is used to acquire wetland habitat to add to the national wildlife refuge system. The federal Duck Stamp Program is one of this country's most successful conservation programs.

Hunters over the age of 16 are required to buy a new Duck Stamp every year to legally hunt waterfowl. But lots of other people buy Duck Stamps, too. People who watch birds buy Duck Stamps because they help to protect habitat for many different birds. People who collect stamps buy them because Duck Stamps are a unique addition to their collection. People who care about the outdoors buy Duck Stamps to support waterfowl and wildlife conservation. And people who visit national wildlife refuges buy Duck Stamps because a current Duck Stamp gets you free admission to any refuge in the country.

The first federal Duck Stamp was produced in 1934. It was designed by Jay N. "Ding" Darling, who was a conservation leader and an editorial cartoonist. For the first 15 years of the Duck Stamp Program, famous artists were asked to submit designs for each year's stamp. Beginning in 1949 and continuing today, the stamp design is selected through an open competition. The contest is open to any artist 18 years or older who wants to enter; hundreds of hopeful artists submit designs each year. Many state natural resource agencies also hold art contests to select a design for their state duck stamps. Hunters in many states are required to buy a state duck stamp in addition to the federal Duck Stamp. The money raised by state duck stamps helps purchase habitat in those states.



### APPENDIX D | How Do Duck Stamps Benefit Wildlife?

Since 1934, the sales of federal Duck Stamps have generated more than \$750 million, which has been used to help purchase or lease over 5.3 million acres of waterfowl habitat in the U.S. These lands are now protected in the U.S. Fish & Wildlife Service's National Wildlife Refuge System.

Waterfowl are not the only wildlife to benefit from the sale of federal Duck Stamps. Numerous other bird, mammal, fish, reptile, and amphibian species that rely on wetland habitats have prospered. Further, an estimated one-third of the Nation's endangered and threatened species find food or shelter in refuges established using federal Duck Stamp funds.

People, too, have benefited from the federal Duck Stamp Program. Hunters have places to enjoy their hunting heritage and other outdoor enthusiasts have places to hike, watch birds, and visit. Moreover, the protected wetlands help purify water supplies, store flood water, reduce soil erosion and sedimentation, and provide spawning areas for fish important to sport and commercial fishermen.



### APPENDIX E | What is the Junior Duck Stamp Contest?

The Junior Duck Stamp Design Contest is the culmination of the Junior Duck Stamp educational program. After studying waterfowl anatomy and habitat, students may articulate their newfound knowledge by drawing, painting, or sketching a picture of an eligible North American waterfowl species.

Students from around the United States submit drawings to their state, territory, or district competition. The top winner from each of these competitions, called the “Best of Show,” is then submitted to the Federal Junior Duck Stamp Design Contest. One image from the 53 Best of Show entries will become the next Junior Duck Stamp.

Junior Duck Stamps are sold for \$5 each by the U.S. Postal Service, Amplex Corporation, and various National Wildlife Refuges. Proceeds from the sale of Junior Duck Stamps are returned to states for environmental and conservation education programs.

Information about the Junior Duck Stamp contest is available online at:  
<http://www.fws.gov/juniorduck/>.

#### More about the Junior Duck Stamp Program

In 1989, with a grant from the National Fish and Wildlife Foundation (NFWF), the first curriculum was developed for the Federal Junior Duck Stamp Conservation and Design Program. This arts curriculum taught wetlands and waterfowl conservation to students in kindergarten through high school. The program incorporates scientific and wildlife management principles into a visual arts curriculum.

The Junior Duck Stamp curriculum made its debut as part of a pilot program in California; in 1990, 3,000 students in public and private schools were the first to participate in the Junior Duck Stamp Program curriculum and art contest. Florida and Illinois were added in 1991, while Arkansas, Kansas, and Vermont entered the program in 1992. At that time, a state stamp sheet was developed using the “Best of Show” winners from each participating state from 1991 and 1992. This \$10 stamp sheet included nine state Junior Duck Stamp designs. It was determined that a national competition, using the “Best of Show” winning designs from each state, would be held to select a design for the federal Junior Duck Stamp.

Maryland and South Dakota entered the program in 1993. With eight states competing, the first national competition was held to select only one stamp design to become the first federal Junior Duck Stamp. On June 30, during the First Day of Sale Ceremony for the federal Duck Stamp, judges selected the national first, second, and third place Junior Duck Stamp winning designs. The first federal Junior Duck Stamp design winner was Jason Parsons from Canton, Illinois. His design, titled “Ruffling Redhead,” was used to create the first junior stamps, which sold for \$5.00 each.

All 50 states eventually joined the program. The U.S. Fish and Wildlife Service supported legislation to gain Congressional authorization for the federal Junior Duck Stamp Program and to direct the proceeds from stamp sales to support conservation education in the form of awards and scholarships for the participants. The Junior Duck Stamp Conservation and Design Act of 1994 directed the Secretary of the Interior to create a Junior Duck Stamp as well as to license and market the stamp and stamp design.

In 2010, Congress reauthorized the Junior Duck Stamp Conservation and Design Program Act for an additional five years. The Program continues to expand the use of its conservation education curriculum throughout the U.S. and its territories. Today, all 50 states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands have joined the program and each year more than 27,000 students submit entries to state or territorial Junior Duck Stamp contests.

As part of the program, students are invited to create a North American waterfowl art piece and write a conservation message for submission to their state contest. First place winners from all 50 U.S. states, the District of Columbia, and several U.S. territories advance to the national contest, where one entry is chosen to be the next Junior Duck Stamp design. At the national level, first, second, and third place winning art entries and the winning conservation message receive cash prizes. All of the funds from the sale of Junior Duck Stamps go toward supporting this environmental education and arts program.



