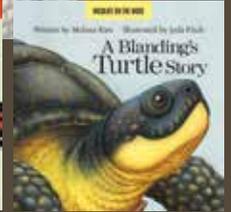
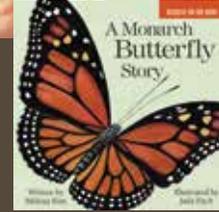
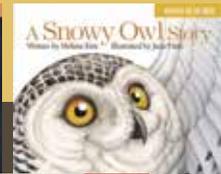
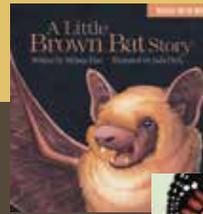


WILDLIFE ON THE MOVE

Teaching Guides



A Maine Audubon/Islandport Press Partnership

TABLE OF CONTENTS

Introduction 2
About Maine Audubon
About Wildlife on the Move
How to Use This Guide

Background Information 4

Discussion Questions 6

Lessons and Activities

Unit 1: Snowy Owl Adaptation and
Life Cycle 7
Owl Adaptations
Bird Life Cycle
Clutch Size Game

Unit 2: Snowy Owl Irruption
and Habitat 9
Maine/Tundra Comparison
Food Chains
Snowy Owl Irruption

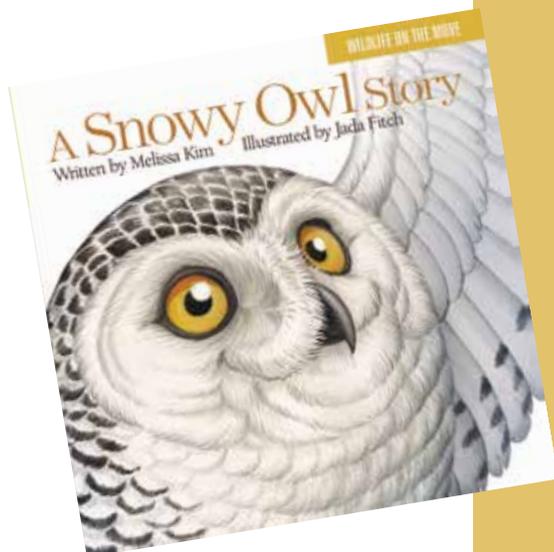
Unit 3: People and Snowy Owls 11
Nature Journaling
Bird Basics
Plan a Visit with a Bird Expert

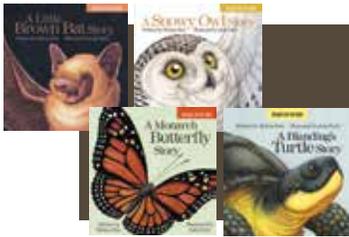
Take Action 13

Take Learning Outside 14

Appendix 15
Connections to Maine Early Learning
and Development Standards
Book lists
Songs and fingerplays

Reproducibles





Introduction

ABOUT MAINE AUDUBON

Maine Audubon is building a community of people who understand that when Maine's wildlife thrives, Maine thrives. Since 1843, we have been connecting people to nature through a science-based approach to conservation, education, and advocacy. The largest Maine-based wildlife conservation organization, Maine Audubon has eight wildlife sanctuaries, 10,000 members, and serves over 50,000 people annually.

We work with children, adults, families, and educators to foster environmental literacy and stewardship through science-based and experiential education programs.

ABOUT WILDLIFE ON THE MOVE

"Wildlife On the Move" started with a great story. In January 2014, a Snowy Owl got stuck in an abandoned building in downtown Portland, Maine, and Maine Audubon staff were called on to assist. Both on scene that day and in the days following, we saw a fantastic opportunity in this front page story to explain basic wildlife ecology, why animals venture far from home, and what positive human intervention looks like. Our friends at Islandport Press agreed, and together we set to work developing a series of books that would help introduce and expand upon these important themes for families and classrooms in Maine and beyond. Not only did the trapped Snowy Owl get a happy ending, but we hope that her and other stories will live on to benefit and inspire generations of young naturalists and conservationists to come.

Why these species? The species chosen for the Wildlife on the Move project are iconic, charismatic, and most importantly, representative of the challenges facing Maine's wildlife. Even students who have never seen a Snowy Owl, for example, are able to relate to the experience of living in Maine. Though the story of each species is unique, they explore similar themes of animal movement, human interactions with wildlife, animal adaptations, seasonal changes, and habitat requirements.

Why this format? The Wildlife on the Move books are written for preschool-aged children through second graders, with simple prose supported by a strong foundation of scientifically accurate content and illustrations. This allows educators, aided by these curriculum guides, to dig deeper into the underlying scientific concepts and to challenge older students to take on a greater load of the cognitive work. The

smaller board books allow students of all ages to explore the books at their own pace and practice reading skills, while the large teacher editions allow for large group reading and discussion while inviting further interaction with the detailed illustrations.

HOW TO USE THIS GUIDE

Like the books in the Wildlife on the Move series, these companion teaching guides can be used in multiple ways. It is certainly possible to choose a standalone unit or lesson from one teaching guide, or to use them to provide context and background information to inform your own usage of the Wildlife on the Move books.

However, we hope that your interactions with this book series will go deeper than that. Taken as a whole, the Wildlife on the Move series provides an opportunity to explore multiple themes related to ecology, geography, and stewardship throughout each season and from multiple angles. This seasonal focus also provides an excellent starting point for incorporating outdoor exploration and field work into your teaching. You'll find tips for that in this guide, too.

Finally, we are proud to have put together a set of books that truly speak to a wide range of ages—from preschool to second grade. If you have the opportunity to work with multiple age groups, we hope you'll take advantage of this by spiraling back to the Wildlife on the Move books as your students grow. Not only will they be glad to revisit these familiar stories, but you'll be prepared to help them delve deeper into the ecological themes contained within the books.

Acknowledgments Maine Audubon and the Wildlife On The Move project have benefitted from many partners and collaborators. These guides include contributions from teachers at Portland Public Schools and Opportunity Alliance, and were funded by the Jane B. Cook 1992 Charitable Trust and Edward H. Daveis Benevolent Fund. We especially thank Melissa Kim at Islandport Press for her tireless support.

In each guide, you'll find these sections:

Background information This section will give you the context and background knowledge necessary to teach these books confidently! It's certainly not necessary to have all of the answers, but knowing where to look for more information is important. If this section doesn't answer all of your (or your students') questions, the resources listed at the end of the guide should point you in the right direction.

Discussion Questions Part of what makes these books work for a wide range of ages is their careful balance between scientific accuracy and conciseness. This gives educators the opportunity to highlight certain ideas and themes in the books by asking well-chosen open-ended questions before, during, and after a read aloud. This section contains examples and ideas for all three.

Lessons and Activities We've provided a range of lessons and activities in each guide organized around several themes and guiding questions. Though each works as a standalone, we think that they work best when bundled. This allows you to explore a topic in different ways, address multiple learning styles, and incorporate other subjects.

Standards Addressed For the purpose of these teaching guides, we've chosen to focus on the Next Generation Science Standards (NGSS). The reason for this is twofold; first, while many of the lessons and activities in this guide integrate multiple subject areas, we believe that it is their accurate and accessible science content that sets the Wildlife on the Move books apart.

Secondly, the NGSS align with Common Core State Standards for Math and English Language Arts. These Common Core connections are listed for each NGSS performance expectation and accessible on the NGSS website.

We have also taken the Maine Early Learning Developmental Standards into account for those educators working with preschoolers. You'll find a list of the science standards most relevant to this guide in the Appendix.

Objectives The importance of firsthand observation and hands-on, sensory experiences in nature cannot be overstated, especially for young children. Throughout this guide, you will notice that many of the lesson

objectives reflect that by going beyond knowledge and skills to include experiences and actions.

Extensions Each lesson includes extension options and ideas for incorporating other subjects, specialties, and areas of your classroom. These are just a starting point—consider working with other teachers at your school or parents to fully integrate Wildlife on the Move themes into other areas.

Take Learning Outside Research has shown that students are happier, healthier, and more engaged when they are given opportunities to play, learn, and explore outside. Authentic experiences in nature support students' learning, but also their social, emotional, and physical growth and development.

Focusing on the seasonal themes of each Wildlife on the Move book can be a great springboard for taking your students outside, and many of these lessons include outdoor exploration and observation components. Consider allowing extra time outdoors for students to explore and play on their own, too. Unstructured time in nature often leads to unexpected teachable moments and gives your students a chance to relate to you—and each other—in new and positive ways.

Take Action The final part of this section describes ways that you and your students can take meaningful action to help wildlife. We know that time and resources vary from school to school and we have included projects that vary accordingly. Maine Audubon is committed to helping schools take action, so let us know if we can be of help.

Appendix In this section are the following resources:

- Maine Early Learning and Development Standards
- Book lists, including children's books, teacher resources, and classroom-friendly field guides
- Songs and fingerplays
- Reproducibles, including graphic organizers and graphics used in lessons

Access online resources at maineaudubon.org/WOTM.



Background Information

WHAT MAKES OWLS SPECIAL?

Owls are predatory birds that are typically nocturnal. While they share some characteristics with hawks, eagles, and other diurnal birds of prey, they also have specialized adaptations that help them hunt at night.

Owls, like other predatory species, have forward facing eyes that give them binocular vision and therefore good depth perception. Their large eyes are fixed in place, however, by a bony structure called the sclerotic ring. They compensate for this with the ability to rotate their heads 270 degrees in either direction (being able to turn their head 360 degrees, as many people believe, would mean that their head wasn't attached to their body!).

Despite their excellent night vision, owls rely more on hearing to hunt at night. The feathers around their eyes form "facial disks" that funnel sound waves towards their ears and many owls can manipulate these feathers to enhance that effect. Furthermore, an owl's ears are asymmetrical, with one higher on the side of the head than the other. This allows owls to triangulate the source of a sound along a vertical axis as well as a horizontal one. Complementary to this excellent hearing is an owl's capacity for silent flight, although these adaptations are less pronounced in Snowy Owls and other species that are less nocturnal.

Owls capture their food with sharp claws called talons. They often swallow prey whole, but like other birds of prey have a sharp, hooked beak that can tear flesh. They later regurgitate pellets made up of the fur, bones, teeth, and other indigestible parts of what they have eaten.

SNOWY OWL LIFE HISTORY

Diet Snowy Owls feed mainly on small mammals, especially lemmings, though they also hunt for waterfowl and other birds. Their diet changes depending on lemming availability as well as location, since they can range widely in winter.

Range and Habitat Snowy Owls breed and sometimes winter in the Arctic tundra, a habitat found at high latitudes and characterized by extreme temperatures, little precipitation, and a layer of permanently frozen soil called permafrost. In the summer, temperatures range from 37 to 54 degrees Fahrenheit and some of the permafrost melts. This results in a shallow layer of thawed soil—enough for some plants, though not trees, to grow. The remaining permafrost inhibits

drainage, so shallow pools of water form as well. In the winter, temperatures drop to -20 to -30 degrees Fahrenheit. Dry conditions persist.

Availability of sunlight is another unusual aspect of the tundra. Days grow longer and longer during the summer to the point where the sun does not set in mid-summer. In the winter, the reverse happens and the sun does not rise in mid-winter. As a result, Snowy Owls are well adapted to hunt in both daytime and nighttime conditions.

Although some owls remain on the tundra year-round, others spend winters in southern Canada and the upper Great Lakes area. They sometimes head farther south during periodic irruption events (see below for more information).

Reproduction Snowy Owls form new pair bonds each year after returning to their breeding grounds in April or May. They nest in exposed areas that are slightly elevated compared to the surrounding landscape. They are one of the only owl species to build their nests, which the female does by scraping a bowl-shaped hollow into the ground. She lays 3 to 11 eggs in mid-May to early June and incubates them almost continuously. The male brings her food during this time.

When they hatch, the chicks are covered with fluffy down feathers and are mostly helpless. The female continues to brood them and feeds them smaller pieces of the food delivered by the male. The chicks leave the nest on foot after about 3 weeks and begin trying to fly shortly thereafter. They still rely on their parents for food but can now keep themselves warm. The parents continue to feed them larger and larger pieces of food until they fully fledge after 50 to 60 days and can hunt on their own.

Irruption Irruptions are irregular migration events in which a species temporarily expands its range to find food or other resources. Although scientists do not know for certain when or why Snowy Owls irrupt, these events have provided opportunities to better study the birds. By fitting birds with backpack-style cellular transmitters, it has also been possible to track their movements throughout the year. Necropsies performed on owls found dead in the contiguous U.S. (often hit by cars) have helped to dispel the long-held belief that the owls that traveled south were facing starvation. Instead, it seems that high lemming populations can lead to extremely productive breeding seasons for Snowy Owls. The resulting "baby boom" of owls then means that there are more young owls traveling widely during the non-breeding season.

CONSERVATION STATUS

Snowy Owls are not endangered or threatened, but it is important to note that they have not been studied as closely as other bird species that may nest in more populated areas or that do not range as widely. A better understanding of Snowy Owls will definitely be important in assessing how they may be impacted by climate change.

GLOSSARY

Irruption - a type of migration event in which a species temporarily expands its range

Nocturnal - active at night

Diurnal - active during the day

Predator - an animal that hunts and eats other animals

Prey - an animal eaten by a predator





Discussion Questions

Before Reading

- What do you already know about owls?
- Why do you think this bird is called a Snowy Owl? Where do you think it lives?
- Have you ever found an animal that needed help? What happened?

During

- What differences do you notice between the two Snowy Owls? (The one that catches the lemming is all white, so it is probably older.)
- Why does the owl leave the tundra?
- Before you turn to the last two pages, ask: What should we look for to see if the place the bird expert releases the owl is a good home?

After Reading

- Look again at the pages showing the tundra and the snowy field in Maine. What was the same? What was different?
- Will the Snowy Owl stay in Maine forever?





Lessons & Activities

Unit I: Snowy Owl Adaptations and Life Cycle

GUIDING QUESTIONS

How do Snowy Owls grow?

How are they adapted to hunt and survive?

NGSS Performance Expectations

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to fit their needs.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Owl Adaptations

Objectives: Students will look closely at pictures of owls and make inferences about how owls are adapted to hunt and survive.

Materials: pictures of owls, note-taking template (see appendix), writing utensils.

Procedure:

1. Begin by brainstorming and capturing some of the things that students already know about owls. This may include what they know about when owls are active, what they eat, how they move or hunt, etc. Explain that the students will be looking at pictures of owls to try to figure out how their bodies are adapted to do these things.
2. Invite students to look closely at the selection of owl pictures, noticing what characteristics they have in common. Have students take notes as they do so, connecting what they notice with the questions on the note-taking template. For example, they may notice that owls have big eyes and write that observation in the space under “What helps the owl find food?”
3. Come back together as a group so that everyone can share their observations. Make sure you cover the following key adaptations:
 - a. Large eyes help owls see their prey in the dark.
 - b. Owls catch their prey with sharp talons (claws). They usually swallow prey whole, but will also use their hooked beaks to tear larger prey if needed.
 - c. An owl’s soft feathers allow it to fly silently, and they are often patterned to help it camouflage.
 - d. Many owls have feathered feet so they can hunt in cold weather.
 - e. Students may not mention an owl’s sense of hearing, but it is acute. Many owls have facial disks that funnel sound toward their ears. Their ears, in addition to being sharp, are asymmetrical so that they can pinpoint exactly where a sound is coming from.

Extension: Have students create a field guide entry for a new species of owl. What characteristics will it share with the owls you observed? Will it be small like a Saw-whet Owl or large like a Snowy Owl? Where does it live and what will it eat?

Bird Life Cycle

Objectives: Students will be able to describe the typical life cycle of a songbird, duck, and owl as well as differences and similarities between the three.

Materials: bird life cycle prompts (see appendix)

Procedure:

1. Begin by working together to list what students already know about how birds grow up. Prompt them with questions about what baby birds look like, who takes care of them, and where they live, and remind them to think about lots of different kinds of birds. As students share ideas, record them in a graphic organizer with three columns labelled all birds, most birds, and some birds.
2. Introduce some of the vocabulary used to describe a bird as it grows:
 - a. Hatchlings have just hatched from their eggs. Their eyes may still be closed and they may not have any feathers yet.
 - b. Nestlings have open eyes and are starting to develop feathers. They stay in the nest and their parents care for them.
 - c. Fledglings have left the nest but may not be able to fly yet. They can move around and their parents still care for them.
 - d. Juvenile birds are immature but can fly and care for themselves. In some species, juveniles have different plumage than adults.
3. Divide the class into three groups and give each group one of the bird life cycle prompts. Have them prepare a skit acting out their life cycle for the class.
4. After the performances, discuss similarities and differences between the three. Is there anything from the chart created in step one that needs to be revised?

Extension: Consider putting up a birdhouse at your school and observe it throughout the breeding season. If that's not an option, visit the online resources for links to online nest cams.

Clutch Size Game

Objectives: Students will be able to describe the link between food availability and Snowy Owl clutch size.

Materials: dice, timer, and clutch size worksheets (see appendix)

Procedure:

1. Divide the class into pairs and give each pair a die and a copy of the clutch size worksheet. Explain that they are a pair of Snowy Owls building a nest together and that their goal is to successfully raise as many chicks as possible. They will need to catch lemmings to feed their chicks, which they can do by rolling certain numbers on their die. Some years there are lots of possible numbers (and therefore lots of lemmings) and it is easy to find enough food, and some years there are fewer. They'll be able to decide how many eggs to lay each year.
2. Have each pair decide how many eggs to lay (typical Snowy Owl clutch size is 3 to 11 eggs) and record that number on their worksheet. They'll need to catch at least one lemming per egg in order for the chick to fledge successfully and will have one minute to catch as many lemmings as they can by rolling a die. As shown on the worksheet, however, the chances of catching a lemming are different each round (year). For example, in year one students can catch a lemming by rolling a 1, 2, or 3.
3. Once everyone is ready, start the timer and have them begin rolling. Each time they roll one of the correct numbers, they should check one of the boxes in the lemming column. When time is up, have them count the total number of lemmings they caught. Was it enough to support the number of eggs they decided to lay?
4. Continue to play for several more rounds, then share and discuss the results. When were they able to raise the most chicks? When was it harder? Snowy Owls can't control the lemming population, but what else could they do to try to increase their nesting success?



Lessons & Activities

Unit II: Snowy Owl Irruption and Habitat

GUIDING QUESTIONS

**Where do Snowy Owls live?
Why do they irrupt? Where do they go?**

NGSS Performance Expectations

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.

K-ESS2-2. Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to fit their needs.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Maine/Tundra Comparison

Objectives: Students will compare the climate and landscape of the Arctic tundra with areas of Maine and infer which animals might live in each location.

Materials: landscape worksheets (see appendix)

Procedure:

1. What do animals need to survive? (food, water, shelter, and space). The place where an animal usually lives is its habitat, and that habitat must include all of the things that an animal needs to survive. Hand out the two landscape worksheets and ask students to look closely at them.
2. What is the same in each picture? What is different? Share the following statements and have students match them to the correct landscape:
 - a. There are four distinct seasons: fall, winter, spring, and summer (Maine)
 - b. There are two seasons: winter and summer (tundra)
 - c. A layer of the ground is permanently frozen (tundra)
 - d. The ground freezes in winter but not so deeply that trees cannot grow (Maine)
 - e. Only 6 to 10 inches of rain and snow fall during the year (tundra)
 - f. Between 40 and 50 inches of rain and snow fall during the year (Maine)
3. Ask students to draw and label some of the animals that might live in each location. Are there some familiar species that have Arctic counterparts (ex. Moose and Caribou or Red Fox and Arctic Fox)? At this point it's not important that they be completely accurate, but students should be able to provide evidence as to why they have or haven't chosen to include an animal (e.g., if Grey Squirrels require trees for shelter, they shouldn't include one in the tundra).

Extension: Research some of the animals that call the Arctic tundra home. How are they similar to animals that live in Maine? How are they different?

Food Chains

Objectives: Students will practice creating food chains and play a tag game that demonstrates the dynamic equilibrium that can exist between predators and prey.

Materials: an open area safe for running, and cones or other boundary markers

Procedure:

Introduction:

1. Begin by discussing why living things, including people, need food. (for energy) A food chain shows not only what eats what, but also how energy is transferred from one organism to another.
2. Work together to brainstorm the components of a food chain. If the concept is new to students, it may be easier to begin with a top predator. For example, a fox eats a rabbit, which eats plants.
3. Where do plants get their energy? (the sun) Add the sun to the food chain you are creating, then explain that arrows in a food chain always point in the direction the energy is moving. So, energy from the sun helps the plant make food, energy from the plant goes to the rabbit, and energy from the rabbit goes to the fox.
4. Have students practice making their own food chains in pairs or small groups.

Predator/Prey Tag

1. Designate a large rectangular playing area by placing a cone or marker in each corner and have students line up along one of the shorter edges of the rectangle. Choose a few students to begin the game as Snowy Owls and have them step into the middle of the rectangle. All remaining students on the edge are lemmings.
2. Explain that when you say “go,” the lemmings need to run to the other side of the field without being eaten (tagged) by an owl.
3. Owls can tag one lemming per crossing. At the end of each round, owls that successfully hunted remain owls. Lemmings that were eaten also become owls. Any owls that did not catch a lemming can join the remaining lemming population.

4. Continue to play for multiple rounds so that the owl and lemming populations have time to fluctuate and students have sufficient time to run around. Then, debrief by discussing how the numbers of owls and lemmings changed. What was realistic about the game and what was unrealistic? What happens when animals can't find enough food to eat?

Extension: Keep track of how many owls and lemmings there are in each round, then create a line graph of the results. Is there a pattern? Many predator/prey relationships show a dynamic equilibrium in which the populations shrink and grow in relation to one another.

Snowy Owl Irruption

Objectives: Students will be able to describe the link between food availability and irruptions, and will act out an irruption event.

Materials: an open area safe for running, and cones or other boundary markers

Procedure:

1. Return to the predator/prey tag game played in the Food Chains lesson and play for several rounds.
2. When you get to the point when there are many more Snowy Owls than lemmings, pause the game. What is likely to happen in the next round? This time, explain that the owls now have a new option: since there isn't enough food for them on the tundra, they can choose to fly elsewhere to find food. To do this, they should run one lap of the playing area, and can then wait and rejoin the game as owls when they think there is enough food again.
3. Play this new version for several more rounds, then bring the group back together to debrief. Ask an owl that chose to fly the long distance to explain why they did so. Why did others choose to stay and try to hunt? Explain that when food in the tundra is scarce and Snowy Owl irruptions occur, it is often the younger owls that leave, while older owls that are more experienced at hunting may remain.

Extension: Younger Snowy Owls have more black markings and get whiter as they get older, although females also tend to retain more markings than males. Have students look at pictures of different Snowy Owls to explore the range of plumages, then have them paint or draw their own.



Lessons & Activities

Unit III: People and Snowy Owls

GUIDING QUESTIONS

**How can people help snowy owls?
How do scientists study owls
and other birds?**

NGSS Performance Expectations

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time.

K-ESS3-1. Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

K-ESS3-3. Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

1-LS1-2. Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.

1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

Nature Journaling

Objectives: Students will practice looking closely at an animal, plant, or other natural artifact and will record their observations using scientific sketching, labels, and other notes.

Materials: two gull pictures, sample journal pages, journal templates (see appendix), writing utensils, clipboards

Procedure:

1. Begin with a quick demonstration to show why journaling can help us be more observant. Hold up one of the pictures for 10 to 15 seconds, then put it face down and ask students a few questions to see how accurately they can remember and describe it. What color was its beak?

Its legs? What did its tail look like? Then, repeat the process with the second picture but have the students sketch or take notes during the 10 to 15 seconds. Was it easier or harder to answer the questions the second time? Why or why not?

2. Explain that taking notes and sketching when observing nature can help us to be more observant, and can lead to new questions and discoveries. Hand out copies of the journal template pages and have students assemble their nature journals by stapling the pages together. You may also have them create custom covers for their journals using construction paper or cardstock.
3. Put the journals to use! You can take them outside and let students choose something of interest, or you may wish to begin with natural artifacts in the classroom. Give students opportunities to share their work, especially any questions that may arise from their observations.

Extension: Nature journals are a great tool to use when visiting the same spot regularly. Help students choose a spot at school or home that feels special to them and have them practice journaling in that spot on a monthly basis. What changes do they notice over time?

Bird Basics

Objectives: Students will begin to recognize the birds commonly seen in their neighborhood or schoolyard and will be able to describe some of the characteristics used to distinguish between these species.

Materials: field guides or other bird resources, bird profile worksheet (see appendix)

Procedure:

1. One of the exciting things about Snowy Owl irruptions is that it can provide an opportunity to see a bird that is not usually found in Maine. Becoming more familiar with the birds that are common in your neighborhood means that you're more likely to notice when something unusual turns up!
2. Visit an outdoor area and have students choose a bird and observe it closely. If they created nature journals in the previous lesson, they can use those to record their observations.

3. Provide field guides and other resources so that they can identify their bird, if they don't already know what it is. Then, have them research their bird, paying special attention to field marks or other identifying characteristics such as shape, size, color, etc.
4. Give students an opportunity to teach the rest of the group how to identify their bird. Were there some birds that shared certain characteristics?
5. Have students create a one-page info sheet that shares what they learned about their bird and put all of the pages together to create a classroom field guide. Continue to add more birds to the guide as you observe new species throughout the year.

Extension: Go on regular outdoor excursions with the goal of observing birds along the way. Practice using binoculars to get a closer look at birds, but also pay attention to their behaviors, sounds, and other clues that may help you identify them.

Plan a Visit with a Bird Expert

Objectives: Students will use a visit from a wildlife rehabilitator as an opportunity to learn about wildlife as well as how wildlife rehabilitators interact with wildlife.

Materials: This lesson is designed to supplement a visit or educational program offered by a certified wildlife rehabilitator. See “How to Find a Wildlife Rehabilitator” in the Take Action section for help finding one in your area.

Before the visit

1. Begin by revisiting the following interactions between people and the owl in *A Snowy Owl Story*:
 - a. People noticed the owl and thought it was trapped.
 - b. The firefighter opened a window to let the owl fly away.
 - c. A bird expert captured the owl.
 - d. The bird expert released the owl.

Why did the events happen in this order? You can also help to fill in some of the gaps in the story by explaining that when the owl didn't leave on its own, the people involved thought that it might be hurt. The bird expert examined the owl to determine that it was in good health before releasing it.

2. Explain that the “bird expert” in the book is a wildlife rehabilitator, whose job it is to care for injured or orphaned wild animals with the goal of releasing them back into the wild. Often the animals in their care have been hit by cars or have flown into buildings. Sometimes rehabilitators are brought animals (especially baby birds) that don't actually need to be helped! Work together to brainstorm a list of questions to ask the rehabilitator during their visit, making sure that at least some of the questions focus on how and why rehabilitators prepare animals to return to the wild.

After the visit

1. Debrief the visit by discussing what you learned. Was anything surprising? What do wildlife rehabilitators do to help an animal return to the wild? How is what they do different from caring for a pet or domestic animal? Why do they release animals whenever possible? Are the animals that remain in their care treated like pets?

Extension: The Center for Wildlife (thecenterforwildlife.org) has several online resources that can be used to supplement your visit, or that could be used if you cannot schedule a live program. A series of short videos provide a “virtual tour” of their facility, with details about how they care for animals. On the “Meet the Ambassadors” page, students can choose an animal to learn about in greater detail. Have students research and report back to the class on that animal's story (how it came to the Center for Wildlife, why it cannot be released back into the wild), what they learned about that animal species, and how to help other animals like it.



Take Action

Become a citizen scientist by reporting your bird sightings! You can collect data for eBird every time you go birding. For a more structured project, the Cornell Lab of Ornithology's Celebrate Urban Birds project has a simple protocol and there are materials available to help you learn common birds.

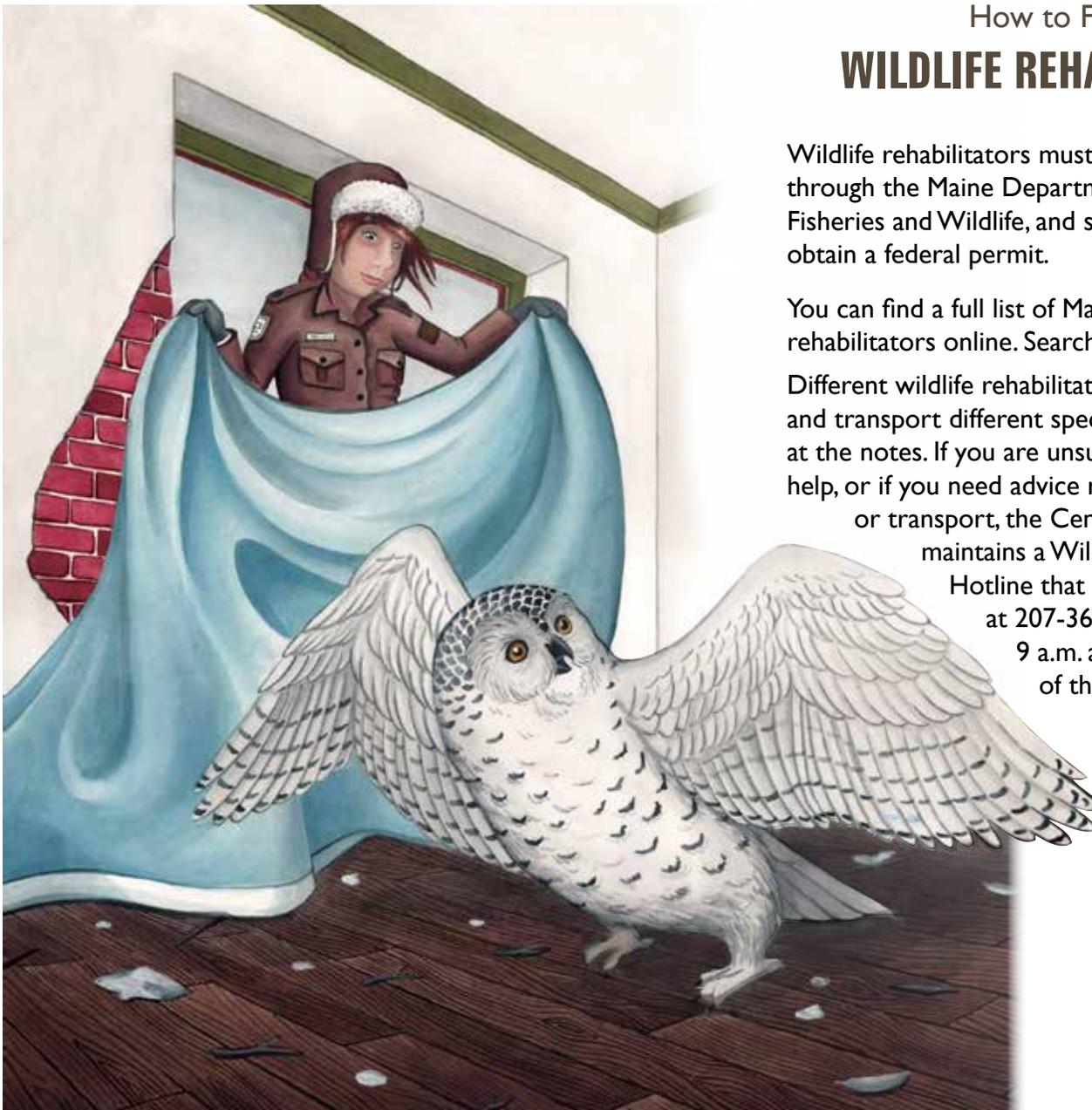
Work to enhance and restore habitat for birds in your schoolyard. You can start with a bird feeder, but don't stop there! Consider adding native plants that will provide shelter and food, and attract insects, too.

Help others learn when to intervene, and when to leave wildlife alone. Create posters or other displays that teach people what to do when they find a baby bird. Visit the online resources for links to helpful resources.

How to Find a **WILDLIFE REHABILITATOR**

Wildlife rehabilitators must obtain a license through the Maine Department of Inland Fisheries and Wildlife, and some also choose to obtain a federal permit.

You can find a full list of Maine wildlife rehabilitators online. Search at: maine.gov/ifw
Different wildlife rehabilitators are able to accept and transport different species, so look closely at the notes. If you are unsure if an animal needs help, or if you need advice regarding handling or transport, the Center for Wildlife maintains a Wildlife Assistance Hotline that can be reached at 207-361-1400 between 9 a.m. and 5 p.m. every day of the year.





Take Learning Outside

To extend your study of Snowy Owls and their habitat to the outdoors, try some of these ideas:

Fall

- We often think of the migratory birds that leave Maine this time of year, but there are many species that come to Maine from even colder areas! Look for waterfowl like Buffleheads and Goldeneyes, or songbirds such as Snow Buntings or Pine Siskins.
- Just as the lemming population can affect the behavior of Snowy Owls, a mast year (large crop) of acorns or cones from pines and other conifers can have a big impact on the animals that eat those seeds. What animals do you see eating and collecting them? What do they do with them?

Winter

- The white plumage of Snowy Owls helps them stay camouflaged in snowy areas and can make them stick out in other places. Look for animals that are camouflaged. Can you find some of the animals in Maine that change color in the winter?
- This time of year is your chance to spot a Snowy Owl in Maine! Check eBird.com for recent sighting reports, and visit maineaudubon.com for other birding resources.

Spring

- Birds are building nests! The nests that birds build vary greatly from species to species. Research some of these differences and provide opportunities for students to build nests with sticks, mud, clay, and other materials. Working together to build a life-size eagle nest is a great cooperative activity.
- Listen for birds singing as they establish territories and find mates, and practice identifying some common birds by sound.

Summer

- Many of our local songbirds are quieter this time of year as they are hard at work incubating eggs and feeding chicks. Birds rely heavily on insects, especially caterpillars, as a protein-rich food source for growing chicks. What insects can you find?
- Learn to recognize fledglings and you'll suddenly see them everywhere in spring and summer! Listen for buzzy begging calls and watch for an adult bird carrying food.

The BENEFITS

The benefits of taking your students outside are multifold. Getting students moving and exploring in a different settings offers physical benefits and gives them a chance to recharge. Connecting what you do outside with what happens in the classroom provides opportunities for students to excel and engage in different ways. Perhaps most importantly, it also provides a framework of shared experiences from which you can all work. Young children learn best from firsthand experience, but may not have ever looked under a fallen log or followed a bee from flower to flower before.

These benefits are magnified if you make outdoor learning a regular habit. Going outside and if possible, visiting the same location, throughout the year will highlight seasonal changes and spark lines of questioning that link to bigger ecological concepts. For example, hibernation and migration make much more sense if you've noticed insects and flowering plants getting scarcer and felt temperatures getting colder throughout the fall. Furthermore, as you and your students become more comfortable with the routines and expectations associated with outdoor learning, it will get easier and you'll be better able to take advantage of teachable moments as they arise.

The ideas here are only a starting point. At Maine Audubon, we want all educators to feel confident and supported in creating these types of experiences for their students. We provide this support through classroom visits that can serve to introduce content, field trips and field studies at our sanctuaries or local parks, curricular coaching, teacher workshops, and rentable materials through our Educator Resource Center. Visit maineaudubon.org for more information.



Appendix

Maine Early Learning and Development Standards

Earth Science:

- Demonstrates, through observation and investigation, an understanding that human action impacts the earth (i.e., use of resources and recycling, the process from cutting trees to recycling paper)

Life Science:

- Uses senses to observe and describe properties of familiar plants and animals
- Uses vocabulary for naming plants and animals moving beyond generic labels (e.g. “bug”) to names of specific creatures (e.g. “ant,” “beetle”) and uses symbols or icons to identify where they see such creatures.
- Develops plans, based on observations and guided inquiry, to care for plants and animals in the classroom and surrounding area
- Observes and describes animals in his/her immediate environment to learn what they need to live
- Uses nature journals, tally sheets and resource materials, with support, to summarize observations (e.g., make connections between the types and numbers of birds coming to a feeder in summer or winter by counting and categorizing)
- Listens to accounts and discusses pictures found in fictional or non-fictional books or media to enhance vocabulary and concept knowledge of living things and their environments
- Identifies problems affecting the lives of plants and animals (including themselves) and generates possible solutions
- With teacher support, creates drawings or models for possible solutions
- Compares tools or solutions and reflects on what works well
- Designs and creates materials to change the behavior or incidence of creatures (e.g. bird feeders, butterfly gardens) in places

Book Lists: Children’s Books

Arctic Animals

- *Over in the Arctic: Where the Cold Winds Blow* by Marianne Berkes: an Arctic version of *Over in the Meadow* that introduces young readers to the animals of the tundra along with rhyming, counting text

Animals in Winter

- *Animals in Winter* by Henrietta Bancroft and Richard G. Van Gelder: a simple but informative look at the variety of strategies that animals use to survive the cold
- *Over and Under the Snow* by Kate Messner: beautiful illustrations and informative text show wildlife sleeping, tunneling, and resting in a hidden world under the snow
- *Snowballs* by Lois Ehlert: a snowy day provides the perfect opportunity to build a family of snowpeople using an unusual assortment of items; invite readers to spot the familiar birds and wildlife snacking on the food that’s included
- *Under the Snow* by Melissa Stewart: a cozy look at the animals beneath winter snow, ice, and mud in a variety of habitats
- *Winter Bees and other Poems of the Cold* by Joyce Sidman and Rick Allen: a beautiful collection of illustrated poems that can be enjoyed individually or taken together to tell the story of winter

Birds and Nesting

- *A Nest is Noisy* by Dianna Hutts Aston: simple text paired with more detailed subtext and gorgeous illustrations of a variety of nests built by birds, reptiles, and even a mammal or two. Look for *An Egg is Quiet*, too.
- *A Nest Full of Eggs* by Priscilla Belz Jenkins: follow an American Robin nest from construction to fledging, interspersed with information about other species as well
- *Have you Heard the Nesting Bird?* by Rita Gray: while the other birds are busy singing, a robin on her nest doesn't make a peep! Ends with a page of questions and answers with the nesting bird herself.
- *Honk, Honk, Goose! Canada Geese Start a Family* by April Pulley Sayre: male birds are often absent from books about nesting, but the male goose in this story is kept busy chasing away potential predators
- *Mama Built a Little Nest* by Jennifer Ward: a fascinating look at a variety of bird nests. Each is described with a short, catchy poem, as well as a more detailed description.
- *Two Blue Jays* by Anne Rockwell: when two Blue Jays build their nest outside a classroom window, the students carefully observe the process
- *You Nest Here with Me* by Jane Yolen and Heidi Stemple: a cozy combination of rhyming text and lovely illustrations that show different birds nesting in different ways, that works equally well as a learning tool or a bedtime story

Book Lists: Field Guides

- *National Audubon Society Pocket Guide: Familiar Birds of North America East and North American Birds of Prey*: large photos make it engaging to flip through these guides, and each entry includes basic information that covers voice, habitat, range, and identification
- *Stokes Beginner's Field Guide to Birds: Eastern Region*: organized by color, so a good choice for beginner ID practice
- *The Sibley Guide to Birds* by David Allen Sibley: this book, or either of its regional versions, is worth getting acquainted with if you want to identify birds correctly

Adult Resources

- *Balanced and Barefoot: How Unrestricted Outdoor Play Makes for Strong, Confident, and Capable Children* by Angela Hanscom: written by a pediatric occupational therapist (and founder of TimberNook), an easily accessible description of the developmental benefits of outdoor play. A good one to recommend to parents
- *Nature Preschools and Forest Kindergartens: The Handbook for Outdoor Learning* by David Sobel: engaging accounts from existing programs along with guidance on everything from curriculum development to risk assessment
- *Hug a Tree and Other Things to Do Outdoors with Young Children* by Robert Rockwell, Elizabeth Sherwood, and Robert Williams: a classic compilation of outdoor activities for young children
- *Project Seasons: Hands-on Activities for Discovering the Wonders of the Natural World* by Deborah Parrella: a compendium of seasonal activities

Songs and Fingerplays

I'm a Snowy Owl (fingerplay)

I'm a Snowy Owl

With a pointed beak (pinch forefinger and thumb together)

Two yellow eyes (make hands into O-shapes and hold over eyes)

And talons on my feet (shake feet)

I flap my wings (flap arms)

And when I stretch them wide (stretch arms to sides)

All the lemmings know (point around room)

That it's time to hide (cover head and duck)

OWL ADAPTATION NOTE-TAKING TEMPLATE

What helps the owl find food? _____

What helps the owl catch its food? _____

What helps the owl stay warm? _____

What helps the owl stay hidden? _____

BIRD LIFE CYCLE PROMPTS

Mallard (duck)



1. The female builds a nest and lays eggs.
2. She sits on them until they hatch.
3. After they hatch, the ducklings have downy feathers and can move around.
4. The family leaves the nest the next morning. Ducklings follow their mother to water and can swim and find their own food.
5. The mother stays with her ducklings and protects them until they can fly.

American Robin (songbird)



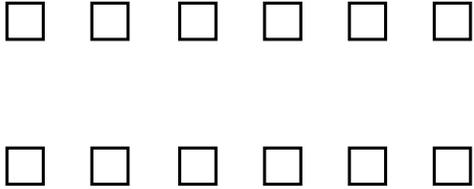
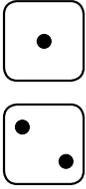
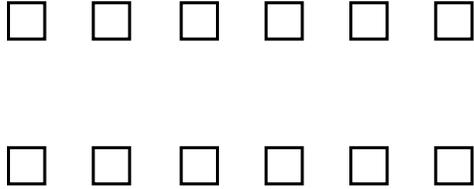
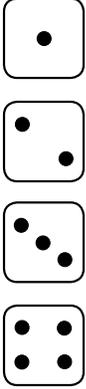
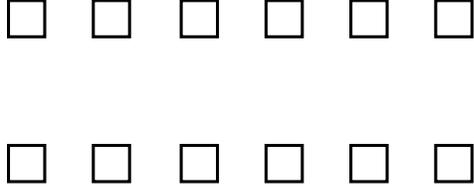
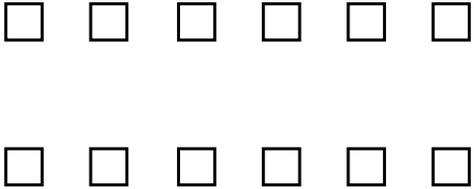
1. The female builds a nest and lays eggs.
2. She sits on them until they hatch.
3. After they hatch, the chicks have no feathers and cannot move very much or open their eyes.
4. Both parents feed the nestlings regurgitated (thrown-up) insects.
5. When the chicks leave the nest, the parents continue to follow them and feed them until they can fly.
6. The female starts a second nest.

Snowy Owl



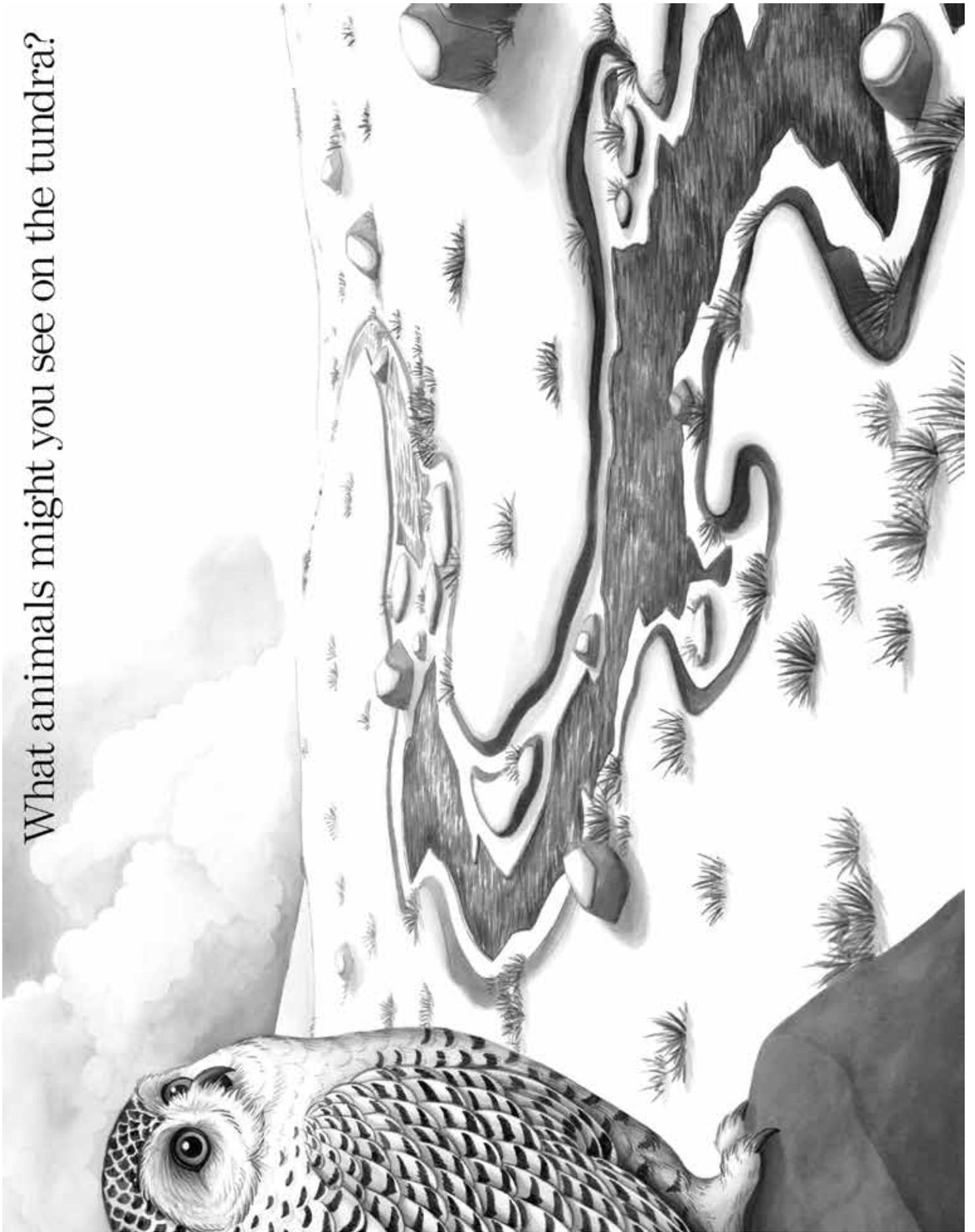
1. The female builds a nest and lays eggs.
2. She sits on them until they hatch.
3. After they hatch, the chicks have downy feathers but their eyes are closed and they cannot move very much.
4. The male brings food to the nest and the female gives pieces of it to the chicks.
5. When the chicks leave the nest, the parents feed them bigger and bigger pieces of food until they can hunt and fly on their own.

CLUTCH SIZE GAME

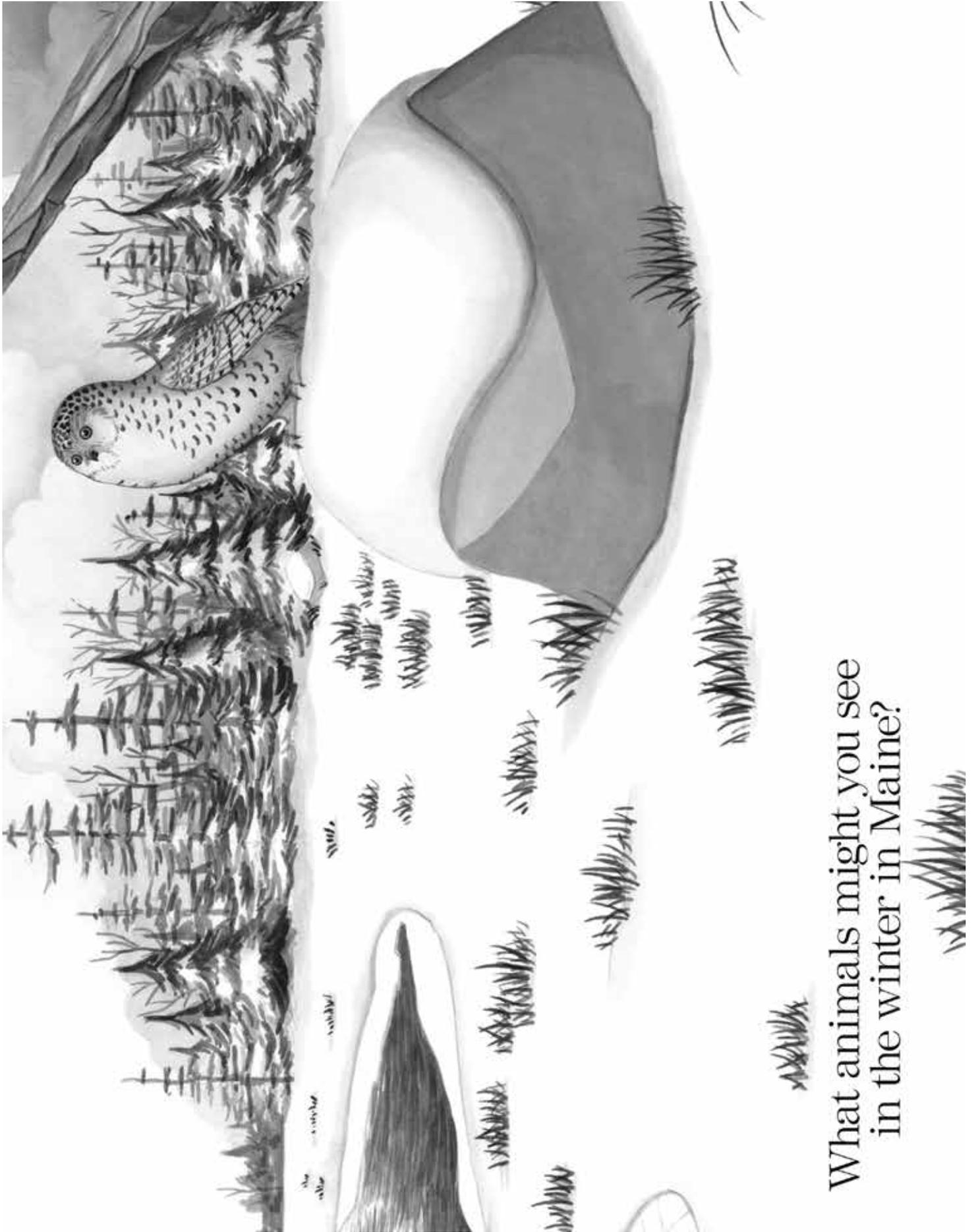
Year	Need to Roll	Number of Eggs	Lemmings Caught	Number of Chicks
1		_____		_____
2		_____		_____
3		_____		_____
4		_____		_____

MAINE and TUNDRA LANDSCAPE PICTURES

What animals might you see on the tundra?



MAINE and TUNDRA LANDSCAPE PICTURES



What animals might you see
in the winter in Maine?



GULL PICTURES

Herring Gull



Ring-billed Gull



NATURE JOURNAL TEMPLATE

Date: _____

Location: _____

Weather: _____

Sketch what you see:

A large, empty rectangular box with a thin black border, intended for drawing a sketch of what the user sees in nature.

I noticed: _____

I wondered: _____

BIRD PROFILE WORKSHEET

Bird Name: _____

How to recognize it: _____

What it eats: _____

Where it lives: _____

Cool facts about my bird: _____

