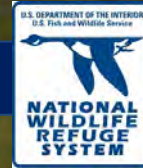


Missisquoi National Wildlife Refuge



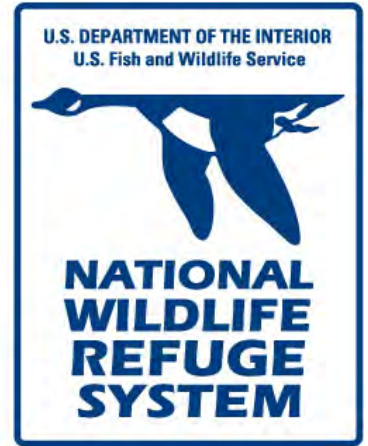
# Educator's Guide





## WELCOME!

Welcome to Missisquoi National Wildlife Refuge. The refuge consists of quiet waters and wetlands which attract large flocks of migratory birds and is home to a great diversity of animals. Missisquoi serves as a popular destination for birdwatchers, environmental education classes, photographers, fishermen, and hunters. Many people are drawn to the calm and beautiful landscape. The U.S. Fish and Wildlife Service and The Friends of Missisquoi National Wildlife Refuge welcome you to explore this special area.



## Sharing Missisquoi With Students



This Educator's Guide has been developed to help pre-K through High School educators utilize the learning opportunities available at Missisquoi National Wildlife Refuge. Our hope is that by using the refuge as an outdoor classroom, students and educators will gain understanding and connection to wildlife and natural resources of Missisquoi. We recognize that you are sharing this important place with our next generation of stewards. Thank you!

In this guide you will find background information on the natural resources of Missisquoi as well as hands on engaging activities to bring concepts from the classroom to the outdoors. There are

suggested schedules for different grade levels that include opportunities for a hike and/or pond discovery with activities along the way. The refuge also has many items that can be borrowed to enhance your experience.

The headquarters and the visitor center house interpretive and educational exhibits, a classroom, and public restrooms. Two ponds located, just outside the classroom, and a marsh area can be used for pond study and aquatic sampling. A large, open, mowed area is also located outside the visitor center where large group activities can take place. Five trails allow opportunities for observing wildlife.

We hope this guide provides you with the tools to explore and teach in our "outdoor classroom." If you would like to reserve any items, use our classroom space, or will be going on a trail, please complete the [Education Trip Request Form](#). Prior contact allows us to prepare items and make sure other groups will not be here at the same time as your visit.

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## What is The U.S. Fish and Wildlife Service?

The U.S. Fish and Wildlife Service is the principal federal agency responsible for conserving, protecting and enhancing fish, wildlife and plants and their habitats for the continuing benefit of the American people. The Service manages the 100-million-acre National Wildlife Refuge System, which encompasses over 560 national wildlife refuges, thousands of small wetlands and other special management areas. It also operates national fish hatcheries, fishery resources offices and ecological services field stations.



The agency enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign and Native American tribal governments with their conservation efforts. It also oversees the Federal Assistance program, which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies. [Learn more about the U.S. Fish and Wildlife Service.](#)

## Missisquoi National Wildlife Refuge

Missisquoi National Wildlife Refuge was established in 1943 to protect and manage habitat for migratory birds. Old farmland and vacant natural lands were purchased to create the refuge. The refuge consists of 6,729 acres, much of which is wetland habitats, which supports a variety of migratory birds and other wildlife. It includes the Missisquoi River delta where the river flows into the Missisquoi Bay and Lake Champlain. The refuge is located on the Atlantic flyway where birds migrate from South America to the northern reaches of Canada. Missisquoi serves as a stopover or nesting area for over 200 species of birds.

Missisquoi is able to support such abundance and diversity of wildlife due to its mosaic of plants and the lack of human interference with the land. As the great continental ice sheets that once covered the area melted around 8,000 years ago, they left behind river deltas and sand-gravel margins, creating a medium for the growth of a distinctive diversity of plants found in few other places in northern New England. Before European settlement, many areas in our region had the same distinct habitats we find today in the refuge, but development destroyed many of these areas. This left Missisquoi one of the few remaining places to protect this diversity of plants and animals and allow us to experience the wonder that it holds.

The refuge has been recognized for its international importance and designated in partnership with the State of Vermont to be a Wetland of International Importance under the Ramsar Convention. A mosaic of wetland habitats offers opportunities to see, and manage, more than 200 species of birds. Fall migration features 20,000-25,000 migrating ducks. Nesting bald eagles, osprey, and a great blue heron colony numbering more than 50 nests are present on the refuge.

The refuge continues to protect these habitats as it expands opportunities for visitor engagement.

In 2005 a new headquarters and visitor center was built on Tabor Road. It was designed with energy efficiency in mind and utilizes geothermal, solar and wind energy. The visitor center provides opportunities to learn more about the refuge and start your exploration.

## Natural Resource Overview

Basic information about the plants, animals, and natural communities of the Refuge are provided below. For more in-depth information please see [chapter 3 of the Missisquoi Comprehensive Conservation Plan](#).

### Main Habitat Types:

- Wetland Marsh and open water: 2,426 acres
- Forested Wetland: 1,330 acres
- Upland forest: 71 acres
- Shrub swamp: 1,162 acres
- Bog (includes pitch pine, shrub and sedge communities): 1,022 acres
- Managed Grassland: 320 acres

### Notable Plant Communities:

- Silver maple-sensitive fern riverine floodplain forest: It is the largest and highest quality in the state of Vermont.
- Maquam Bog: Largest bog in Vermont
- Pitch Pine woodland: within the bog, this is the only example of this plant community type in Vermont.

### Rare Plants found on the refuge:

- Few-seeded sedge (state threatened species)
- Virginia Chain Fern (state threatened species)
- Rhodora (found in the Maquam Bog)

### Wildlife:

#### Birds

A. Waterfowl: principally established to manage and protect migratory waterfowl, Missisquoi NWR is the single most important fall migration habitat for waterfowl in the state of Vermont.

- Up to 20,000 ducks and geese will use the refuge during fall migration
- Main species include mallard, black duck, ring-necked duck, green-winged teal, blue-winged teal, wood duck, common goldeneye and common merganser
- Many waterfowl use the refuge to molt post breeding

#### B. Wading Birds:

- Known historically as the largest great blue heron rookery in the state with between 300-500 nests each year. In the last few years nesting has been 50-100 total nests.
- American bitterns utilize marshes and grasslands for feeding and nesting.
- Great Egrets use the refuge during post-breeding – late summer.

#### C. Rare Bird Species:

- The entire state population of state endangered black terns nest on the refuge.
- 41-43 ospreys typically nest on the refuge (formerly threatened species) or about 30% of all nests in the state.
- Bald eagles have successfully nested on the refuge since 2012.
- Other species of concern include: pied-billed grebe, least bittern, and Northern harrier.



**Fish:** The refuge protects important spawning and foraging habitat for a diverse group of fish. Spring floods provide access into vegetated wetlands for species like northern pike and chain pickerel. Species of Concern: Walleye, lake sturgeon (state endangered) and eastern sand darter (state threatened).

**Mammals:** A total of 35 species of mammals are known or expected on the refuge. Commonly seen mammals include muskrat, beaver and white-tailed deer. Predators include bobcat, red fox, grey fox and coyote. Moose and bear occasionally use the refuge.

**Fresh Water Mussels:** The Missisquoi River provides habitat for at least 12 species of fresh water mussels, 6 of which are listed as state endangered (Cylindrical papershell, pocketbook, fluted-shell, fragile papershell, black sandshell, pink heelsplitter and one as a state threatened species (giant floater).

**Reptiles and Amphibians:** Many turtles, snakes, salamanders and frogs find homes on the refuge. A notable species is the spiny softshell turtle, a state threatened species. A significant portion of the northern lake population uses the refuge exclusively as summer habitat. Blue-spotted salamanders also use the refuge, which are designated as a rare state species.

## Cultural Resource Overview

Basic information about the peoples and human use of the Refuge are provided below. For more in depth information please see [chapter 3 of the Missisquoi Comprehensive Conservation Plan](#).

### Indigenous People

Indigenous people were traveling to what is now Missisquoi refuge land starting 6,000-7,000 years ago. Archaeologists have dated pottery, arrow points and fishing spear points found here. In the late 1600s, Europeans encountered the Abenaki people living along the Missisquoi River.

By 1736 an Abenaki village stood alongside the river in what is now Swanton and Highgate, Vermont. Grey Lock, an important warrior and chief of the Waronoc people, lived near the village in a settlement known as the "Indian Castle."

The Abenaki grew corn, squash and beans along the river floodplain. They gathered blueberries, wild strawberries, wild rice, butternuts and hickory nuts. They turned cattail leaves and stems into woven mats. They made string and nets from Indian hemp and dogbane fibers. They fished in the Missisquoi River and Bay. They hunted deer in the forest and waterfowl in the Missisquoi Delta. They still use the land and waters today of Missisquoi.

### English Settlers

In 1767 Simon Metcalfe, a surveyor from the New York Colony, set up a trading post on what is now Metcalfe Island, at the mouth of the Missisquoi River. Later he relocated upriver to Swanton Falls. There he built a home and worked a sawmill, while claiming thousands of acres of this region's timberland, under a New York land grant.

In 1800, Rufus and Elisha Barney fired up their forge, located just below falls. They processed local bog ore into iron for blacksmiths, who shaped the iron into wagon-wheel rims, sleigh runners and plows. The Barney family built an improved forge in 1849. Because of a reported bog ore shortage or competition from other ironworks, the facility closed in 1868.

In the 1800s and early 1900s, farmers used what is now Missisquoi National Wildlife Refuge land for raising turkeys. Because grasshoppers and other insects were so abundant on the islands of the Missisquoi delta, it was a natural place to raise lots of big hungry birds. At night, the turkeys roosted in the trees. One of the best known landmarks located here was the Donaldson Turkey Farm.

## Refuge Trails and Facilities Overview

Five trails are available for use by groups and the general public. Trails are one to five miles in length and each has their own highlights. The Discovery Trail and the Steven J. Young Marsh Trail are most often used by school groups. Please remember to stay on the trail even when doing activities with students. This helps to maintain habitat and reduce the risk of students encountering poison ivy or ticks. Below is an overview of each trail. Click on the trail name to get a comprehensive trail description with information about what can be seen along each trail and topics to present to students. Refuge nature trails are open year-round for pedestrian use only with the exception of hunting season. During rifle deer season, the Jeep Trail, Discovery Trail, Stephen J Young Marsh Trail, and the Old Railroad Passage Trail are closed. Cross country skiing and snowshoeing are allowed during the winter months.

### Missisquoi Visitor Center

The headquarters and the visitor center house interpretive and educational exhibits, classroom, and public restrooms. The classroom is equipped with audiovisual equipment including; a document camera, laptop computer, sound system, large screen, and ceiling mounted projector and can accommodate approximately 50 students. A 5 or 15 minute refuge video is available for viewing.



### Water and Bathroom Facilities

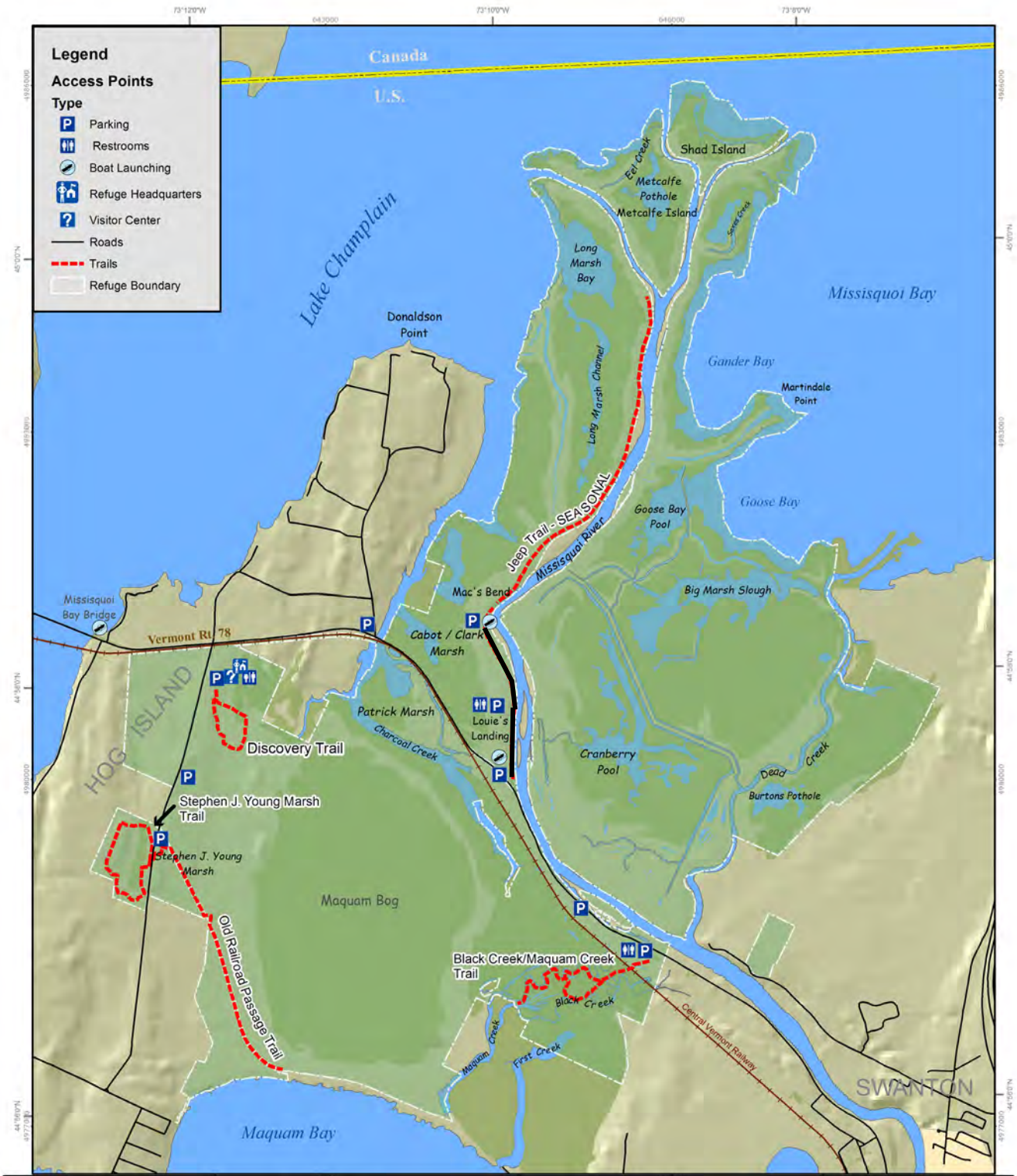
Missisquoi Visitor Center has flushing toilets with male and female restrooms with multiple stalls. There is also a sink to get drinking water, but there is not a drinking fountain. The refuge visitor center is the only place to get drinking water. There is a pit toilet available at the trailhead for the Black Creek/Maquam Creek Trails as well as along the road to the Jeep Trail.

### Water study areas

Water quality testing, as well as aquatic invertebrate collection, can be done in multiple places. Two ponds at the visitor center provide the easiest access and most room for a large group. Water quality testing can be conducted on the north end of the Stephen J Young Trail. Water quality testing can also be done at the Missisquoi River at Louie's Landing and Mac's Bend.



Trails and Facilities





## **Discovery Trail**

**Suggested for Pre-K through elementary students**

Round Trip Length: 1 mile

Time: 45 minutes to 1 hour

Bathroom At Trailhead: Yes

Trailhead: Refuge Visitor Center off Tabor Rd.

This loop trail passes by two small ponds, into a wooded wetland, and finishes in a grassland. It is a nearly flat trail with boardwalk raised areas. Redwing blackbirds, squirrels, a variety of ducks, muskrats, song birds, hawks, deer, red fox, and coyote may be spotted. This trail may have wet areas in the spring.



## **Stephen J. Young Marsh Observation Platform and Trail**

**Suggested for upper elementary through high school students**

Round Trip Length: 1.25 miles

Time: 1 to 1.5 hours

Bathroom At Trailhead: no

Trailhead: Refuge Trails Parking Lot off Tabor Road



Take in the colorful sights and distinctive smells of a freshwater wetland. This trail starts at the parking lot, passes through grassland, and crosses a road after a few minutes. Cars do not have a stop sign so proceed safely across the road. Across the road you'll find yourself near the edge of a marsh. Listen to the chatter of migrating ducks and geese in autumn. In summer, try to spot a green heron stalking fish, insects and frogs. Beavers have their lodges and osprey nest in this area. The trail circles the pond and moves from a marsh to upland hardwood forests. The trail returns to the marsh and a viewing platform over the water. This is generally the first trail in the spring to be dry.

## **Black Creek & Maquam Creek Nature Trails**

**Suggested for middle and high school students**

Round Trip Length: 2.5 miles but a shorter loop can be done

Time: 1.5 to 2 hours

Bathroom At Trailhead: Yes, one pit toilet

Trailhead: Parking Lot off Vermont Route. 78

These trails take you to Lookout Point. On the way you pass through fields that provide cover for small mammals and nesting habitat for birds. You will cross the railroad tracks. The trail passes through wooded lowland areas where you may see deer, beaver, leopard frogs, squirrels and rabbits. Forest openings provide homes for woodcock. Swamps and streams provide habitat for waterfowl, reptiles, and amphibians—especially frogs. This trail is a combination of dirt and boardwalks. Be cautious along the edge of the trail as poison ivy is present in many areas.

## **Old Railroad Passage Trail**

**Suggested for high school students**

Round Trip Length: 3 miles

Time: 1.5-2 hours

Bathroom At Trailhead: no

Trailhead: Refuge Trails Parking Lot off Tabor Road

On your way to Maquam Bay, look for bobolinks, field sparrows and meadowlarks in open fields. Next you'll head into a shrub area that surrounds Maquam Bog. The bog is home to rare and unique plant species such as rhodera, pitch pine and the state threatened Virginia chain fern. Much of the landscape of the trail stays the same for a mile. The trail ends in a forest near Maquam Bay. It is often not possible to get a view of the bay. The trail is dirt path that may be flooded in the spring.

## **Jeep Trail (Open August 1—April 1)**

**Suggested for high school students**

Round Trip Length: 5 miles

Time: 3-4 hours

Bathroom At Trailhead: yes, pit toilet

Trailhead: Louie's Landing parking lot off of Vermont Rt 78

The Jeep trail is closed from March 31 through July 31 to allow for migratory bird nesting. This dirt path follows the river through a peaceful flood plain forest. You may see a deer, mink or osprey. Great blue herons wade along the shoreline looking to snack on fish, frogs, and tadpoles.



## **Tips for a successful hike with students:**

- Have an adult at the front and at the back of the group
- Confirm if the bus is staying at your location or leaving and plan accordingly
- Try to walk quietly and you are more likely to see wildlife, perhaps include a “quiet stop” on the hike where students close their eyes and listen
- Stay on the trail and leave everything that you find
- Bring a first aid kit
- Have a cell phone in case of the need to call for an emergency
- Remind students to wear long pants and close toed shoes
- Insect repellent is helpful in early spring with mosquitos and throughout the season for ticks
- Keep any eye out for [poison ivy](#) and tell students not to touch it.

# Preparing for your visit to the Refuge

## Materials available during your field trip

We have many items to help you explore the refuge with students. Please fill out the Education Trip Form to reserve items. We also have [additional resources](#) such as books and [videos](#) that you may want to borrow for pre-site activities or to plan your trip.

- 20 sets of student binoculars and 15 bird field guides
- 2 Birdsong Identifiers: Listen to the birdsong of your choice on a small handheld recorder by pushing a button that corresponds to the bird's name and picture.
- Field Guide Lending Library-The refuge has a wide variety of field guides related to birds, tracks, plants and animals.
- Butterfly Nets (6)
- Microscopes (10)
- Dip Nets (20) for aquatic use
- Large tank in which to place macroinvertebrates
- Variety of Macroinvertebrates Identification Cards
- Hanna Instruments Soil Test Kit (3)
- LaMotte Water Monitoring Kit (6)
- Observation Jars and Magnifying Lenses (25)
- Plant Press
- Animal Skulls: raccoon, muskrat, fox, beaver, white tail deer, domestic dog
- Animal Pelts: Short tailed weasel, beaver, black bear,
- Bird Wings: American woodcock, turkey, and Mallard
- Mounted Bird: Large variety of bird species for use
- Rubber Track Casts, moose, bobcat, fisher, cottontail rabbit, grey squirrel
- 10 backpacks with: *Caterpillars*, *Bugs*, and *Butterflies* guide, *Pond Watchers Guide to Ponds*, *Eastern Backyard Birds Pocket Guide*, refuge bird list brochure, bug viewing box, small clipboard w/scavenger hunt, ruler, magnifying glass, binoculars
- Puzzles -Extra large Floor Puzzle: BUGS for ages 3 and up. 24 pieces
- Bingo- For 2-6 players, ages 3- adult. (1) Nature bingo (2) Bird bingo (3) Bug bingo (4) Butterfly bingo
- Scavenger Hunt Cards
- Paint chips for nature color matching
- "Who am I" cards





## Rules of the Refuge

Before your group visits the refuge, have a discussion about what kind of behavior they think is appropriate on the field trip. As a class, brainstorm and discuss a list of rules. Such a discussion can make students more likely to be courteous while on the refuge because they have designed the rules themselves.

- The outdoors is a place for learning, just like the classroom. Follow directions and be respectful of others, including the plants, animals, and people.
- Hike only on established trails. By staying on the designated trails, students will not harm the plants and animals. This will allow others to enjoy the plants and animals too.
- Take only memories - leave only footprints. All of the plants and animals on the refuge are protected. Collecting flowers, rocks, or any other natural objects is not allowed. Students can take pictures, drawings, rubbings, and memories.
- Walk and talk quietly. The students will see and hear more if they are moving quietly. They will also disturb less wildlife. Silence can allow you to listen to nature.
- Never run or chase any animals you see. You could injure the animal or yourself. Chasing an animal forces it to burn energy that it needs for survival. Also, the animals are protected by law.
- Touch and taste only if given permission. Some plants are poisonous. Students should only taste something if they are directed by an adult to do so.
- Clean equipment. Return borrowed items in the same condition you received them.

## Logistics

There is no fee to enter the refuge. Students need to bring a drink with them. There is a sink for water but there is no drinking fountain.

Please complete the Education Trip form. Even if you are not requesting a ranger guided trip, we want to make sure multiple groups aren't using trails at the same time. This allows your group to have the time and space they need for learning.

Full-length pants and close-toed shoes are strongly suggested. This will help protect students from the elements and insects. Insect repellent is necessary from mid-May through the end of September. Deer ticks are becoming more common. You can help prevent being bitten by a tick by wearing long pants and long sleeves and applying bug spray with DEET or permethrin. Staying on the trail is one of the best ways to prevent encounters with ticks as they are often found in tall grass. Have children check their hair, ankle, and wrist when the trip is done.

Trails are frequently wet during the spring from mid-March through mid-May, including occasional inundation in very wet years. Some trails are closed for short periods especially in the fall when hunting activities are ongoing

## Example Schedules and Activities

Below are schedules to make planning for your trip to the refuge easier. These can be modified to fit your curriculum needs. These are just suggestions and you can use the resources in the guide to create your own experiences for your students.

### PreK and Kindergarten

Theme: Biodiversity and simple food webs

9:30 Student's arrive at Refuge headquarters

9:30-9:45 bathroom break and snack

9:45-10:00 park video and overview of expectations for the day/5 minute introduction from refuge staff

10:00-11:30 hike the Discovery Trail with activities along the way

Activities include:

Scavenger Hunt

Shapes of Nature

Find Franchesca

Color Swatch Camo Match

Who Am I?

Predator Prey

11:30-12:00 lunch

12:00 return to school

### Grades 1-3

Theme: Habitats

9:30 Students arrive at Refuge headquarters

9:30-9:45 bathroom break

9:45-10:00 park video and overview of expectations for the day/5 minute introduction from refuge staff

10:00-11:30 hike Discovery Trail

Activities include:

Sharp Eyes

Who Am I?

Sound Mapping

Scavenger Hunt for Habitats

Micro-Hike

Predator/Prey

Web of Life- Simple

11:30-12:00 lunch

12:00-12:45 pond activities

12:45-1:00 wrap up, bathrooms

1:00 return to school

### Grades 4-6

Theme: Bird habitat and adaptations

9:30 Student's arrive at Refuge headquarters

9:30-9:45 bathroom break

9:45-10:00 park video and overview of expectations for the day/5 minute introduction from refuge staff

10:00-10:15 travel to trail

10:15-11:45 hike the Stephen J Young Marsh Trail with activities along the way

Activities include:

Sharp Eyes

Using Binoculars

Introduction to Habitats

Bird Observation sheet

Sensory walk

Food Web

11:45-12:00 travel to refuge headquarters

12:00-12:30 lunch and bathroom break

12:30-1:30 pond activities and wrap up or return to school

## Grades 7-12

Watersheds and water quality

9:30 Student's arrive at Refuge headquarters

9:30-9:45 bathroom break

9:45-10:00 park video and overview of expectations for the day/5 minute introduction from refuge staff

10:00-10:15 travel Stephen J Young Marsh

10:15-11:45 water quality testing

11:45-12:00 go over results of testing

12:00-12:30 lunch around trail area or head back to Visitor Center for lunch

12:30-1:30 Hike the Stephen J Young Marsh Trail with activities along the way

1:30 return to school

## Lesson Plans and Place Based Activities

These are suggested activities to help students engage with refuge plants, animals, and systems. Some can be done in the classroom as pre-site activities and others are specific to an outdoor setting. The grade levels are suggestions and often activities can be modified to reach younger or older audiences. Activities are grouped by a common theme but all activities can be mixed and matched to create a full day of exploration. Each activity title is a link to a longer description of the activity. Some links provide further information within this document and others take you to an outside website. Please note the materials list and check our [materials list](#) to see if we have the items available for loan. Some items you may need to bring/create for yourself.

### Introduction to Missisquoi:

#### [Visitor Center Scavenger Hunt](#)

Grades: 4-8

Location: Visitor Center

Students use the visitor center displays to find the answer to 15 questions. This service as an introduction to Missisquoi Wildlife Refuge including what is here and why it's here.

#### [Outdoor Wildlife Scavenger Hunt](#)

Grades: PreK-6

Location: Trail

Students look for animals and parts of their habitat as they hike outdoors.



## **Place based observation skills:**

### **Sharp Eyes**

Grades: All Ages

Location: Anywhere

Students match with a partner to hone their observation skills by changing small things about their appearance and having their partner guess the changes they made.

### **Eye spy**

Grades: PreK-4

Location: Indoors and Trail

A bandana filled with various outdoor objects (pine cone, twig, flower, ect.) is used to play a memory game.

### **Create and use “binoculars”**

Grades: PreK-3

Location: Indoors and Trail

Students use household materials to make their own “binoculars” and then use them as they explore outside.

### **Sensory Walk**

Grades: K-6

Location: Trail

Students pair up and one partner is blindfolded. The other person leads them around the trail and they use their senses of touch, smell, and sound to explore the environment and try to guess their route.

### **Sound Mapping**

Grades: 3-6

Location: outdoors

Students sit quietly and observe the sounds around them. They record these sounds on a map they create.

## **Birds**

### **Lesson on Using Binoculars**

Grades: All Ages

Location: outdoors

Students learn the parts of binoculars and how to use them. Additional lessons from the same source can be found at: <http://www.klamathbirdingtrails.com/ed/kits.shtml>

### **Migration and Migratory Stopover Sites**

Grades: K-12

Location: indoors or outdoors

Students learn about migrating shorebirds by completing various activities appropriate to different grade levels. Some involve a large amount of movement and others are more research and math based.

### **Variety of Bird Activities**

Grades: K-6

Location: indoors and outdoors

Nine lessons using bird behavior to teach elementary physical setting and living environment concepts. It includes multimedia components and both a teacher and student manual.

### **Bird Adaptation and Behavior**

Grades: 3-5

Location: indoors and outdoors

Introduction to bird characteristics, habitats, and behaviors. Some activities can be used on a field trip and others are classroom based.

### **Bird Observation Activity Sheet**

Grades: 2-6

Location: outdoor

Worksheet students complete while using their sense to describe and draw birds that they observe in the wild.

### [Pre-visit Birds and Beaks](#)

Grades: 3-6

Location: Indoors

Students use common tools to explore the types of bird beaks and how this affects their choice of food.

Additional materials must be provided by educator

### [Pre-visit Coloring Pages](#)

Grades: 4-8

Location: Indoors

Students color scientifically drawn bird outlines and answer questions about each species. Field guides or online research is needed to accompany this activity.

### [Migration Game](#)

Grades: 3-5

Location: Indoor s

Students roll dice and move through stations to find the fate of their bird during migrations. This lesson teaches the benefits birds receive and obstacles they encounter when migrating.

## **Wetlands**

### [Pond Discovery](#)

Grades: K-8

Location: Ponds outside Missisquoi Visitor Center

Students use nets, containers, magnifying devises, and macroinvertebrate photos and information supplied by the refuge to collect and identify pond life.

### [Fish and Their Habitats](#)

Grades: 4-8

Location: Indoors and outdoors

A workbook provides students with activities to learn about fish biology and the health of water habitats.

### [Extension of Fish and Their Habitats](#)

Grades: 4-8

Location: Indoors and outdoors

These activities address differing learning styles and offer added depth of information. They include activities such as games, role-playing, art and stream studies.

### [Wetland Health](#)

Grades: 6-12

Location: Outdoors

Students use materials supplied by the refuge to test the quality of a stream or pond including things like dissolve oxygen, pH, and nitrates. Student worksheets included in lesson.

## **Habitat/Succession of ecosystems**

### [Beaver Demonstration](#)

Grades: K-12

Location: trail near beaver habitat

Using a Refuge provided beaver pelt, a skull, and a stick used by a beaver the leader will talk about the adaptations of beaver and how they create and maintain habitats for many plants and animals.

### **Scavenger Hunt For Habitats**

Grades: PreK-8

Location: Outdoors

Students use scavenger hunts to identify how different habitats support different organisms. Photo scavenger hunt is provided for younger grades.

### **Microhike**

Grades: PreK-5

Location: Trail

Students use a magnifying lens to go through a “hike” at ground level looking at what they could find if they were the size of an ant. This activity helps students understand the habitat of varying organisms.

### **Habitat Lap Sit**

Grades: K-5

Location: Indoors or outdoors

Students will understand the components of a habitat and understand the interrelationship of organisms. This is done by having students sit on each other’s laps while standing in a circle.

### **Predator/prey**

Grades: K-5

Location: Outdoors in a flat area

Students simulate bat echolocation to find their prey. This activity is done with a group of students and one student being the predator and another being the prey. This is a high energy game.

### **Outdoor Wildlife Scavenger Hunt**

Grades: 2-6

Location: Trail

Students use a scavenger hunt to find human and wild objects in nature.

### **Soil Recipe**

Grades: 3-6

Location: Outdoors

Students understand the components of soil and how soil is formed in this hands-on activity.

### **Oh Deer**

Grades: 3-8

Location: Outdoors

The components of habitat: food, water, and shelter, are matched with the habitat needs of deer habitat in a running activity. Graphs and tables can be created to talk about carrying capacity and fluctuation in resources.

## **Biodiversity and Preservation**

### **Shapes of Nature**

Grades: PreK-2

Location: Indoors and outdoors

Students cut shapes and hang them on necklaces to use outdoors. They identify objects in the environment that are the same configuration as the shapes. For example, a tree might be a triangle.

### **Find Francesca**

Grades: preK-3

Location: Outdoors

Using their sense of sight, students spot a hidden object in the environment. This can lead to a discussion about camouflage.

### **Color Swatch Camo Match**

Grades: PreK-5



Location: Outdoors

Students come to understand the diversity of colors in a natural environment by matching paint chips to outdoor environments.

**[Who am I?- use cards](#)**

Grades: PreK-12

Location: Indoors or Outdoors

Using photos of animals, students pair up to play 20 questions to identify their hidden animal. Students use vocabulary such as types of animals, colors, sizes and others to identify their animal.

**[Migration and Migratory Stopover Sites](#)**

Grades: K-12

Location: Indoors or outdoors

Students learn about migrating shorebirds by completing various activities appropriate to different grade levels. Some involve a large amount of movement and other activities are more research and math based.

**[Web of Life-Basic](#)**

Grades: K-2

Location: Outdoors

Through a story format, students act out the interactions of organisms in an environment.

**[Meet a Tree](#)**

Grades: 1-6

Location: Trail with trees

Students use their sense of smell and touch to learn more about the diversity of trees.

**[Leaf and Bark Rubbings](#)**

Grades: 2-6

Location: Outdoors near trees and bushes

This activity reinforce knowledge about the parts of a plant, and helps students recognize that different plants have different characteristics. Students make leaf and bark rubbings from four different plant species in a habitat.

**[Shrinking habitat](#)**

Grades: 4-8

Location: Outdoors

Students learn the consequences of the destruction and creation of habitat in the lives of animals through this interactive story.

**[Web of life-Complex](#)**

Grades: 3-8

Location: Outdoors

Students become a part of the environment or an animal and pass around a ball of string to create a food web. This teaches the interdependence of all things.

**[Sampling plants for habitat diversity](#)**

Grades: 5-12

Location: Outdoors in varying habitats

Students sample areas in various habitats to determine the number and diversity of plants. They use this to compare and contrast habitats.

## Appendix A: Detailed Trail Information

### Discovery Trail

Round Trip Length: 1 mile

Time: 45 minutes to 1 hour

Bathroom At Trailhead: Yes

Trailhead: Refuge Visitor Center

Suggested age: PreK-3<sup>rd</sup> Grade

This trail provides good opportunities to talk about habitat as it moves through three different habitat types: pond, swamp, and meadow. Many birds can be seen along the way and you may encounter small mammals or see tracks in the mud. Much of the trail is on narrow boardwalks with limited ability to conduct any group activities. Start at the visitor center and follow the trail left.

**Before starting on the trail, complete the following activities as an introduction to the hike:**

[Sharp Eyes- Pre-K and Kindergarten](#)

[Who Am I?- grade 1-3](#) (students can keep their animals and try to figure out if they can live in various locations as you stop along the trail)

### **Ponds**

These ponds are created from water being pumped out of the headquarters building.

Geothermal cooling is used to cool the building. Water is pumped from the ground at about 55 degrees and is moved through the headquarters building providing cooling during the summer. Water is returned to the ponds at the end of the cooling cycle and slowly seeps into the ground. The ponds are used by ducks, frogs, muskrats, invertebrates.

On the ponds, you'll notice the presence of [Red Winged Blackbirds](#). What does it tell you about the habitat that these birds prefer to nest in? Does the pond provide any additional benefits to survival of the nest and young? (Answer: Difficult for many predators to gain access to the nest because they are on the water). You'll also notice that the second pond is a muddy color. Who might be stirring up the mud? Who lives in the water? This pond has a family of muskrats living here. They dig up plants and slide into the pond creating muddy water.

*Activity:*

[Scavenger Hunt: Pre-K and Kindergarten](#)

Go left on the trail to head into the woods

### **Swamp**

The boardwalks you are standing on are comprised of composite materials which are essentially recycled plastic and recycled wood fiber that are compressed to form the decking boards. The composite material has a potential life expectancy of 50 years. The jug you poured your milk from might have turned into our boardwalk! Recycling materials helps us protect this land by cutting down fewer trees.

As you walk into the center of the boardwalk you come to an open area. You may be able to spot or hear some birds here. Look for the round woodpecker holes in dead trees around the area. These birds use their sharp beaks to drum into these trees and extract insects that are moving under the bark.

*Activities:*

[Shapes of Nature- Pre-K and Kindergarten](#)

[Sound mapping- Who Am I?- grade 1-3](#)

Right after you leave the boardwalk you will encounter a trail counter. We use this to count how many people use this trail. This is part of the science that we do at the refuge. We do surveys to count animals and plants but we also count people. Seeing how many people use an area can help us make sure we are doing a good job of protecting animal's homes.

Stop at the cattails which are on the left side of the trail. These are very good material for building nests for birds including the Red Wing Blackbirds, Marsh Wrens, some species of waterfowl. Some songbirds also use the soft, dry cattail material from last year's cattail heads to line their nests.

*Activities:*

[Find Francesca- Pre-K and Kindergarten](#)

[Scavenger Hunt for habitats- grade 1-3](#)

As you arrive on the second boardwalk notice the tree trunks that have green [moss](#) and [lichen](#). Have students gently touch the tree trunks. How do they feel? Does the moss feel different from the lichen? Both of these can create an environment for new plants to grow. Lichen can also be eaten by animals like deer in the winter and moss doesn't get eaten by much.

After the boardwalk you'll arrive in an open forest. Do you see a lot of acorns on the ground? [Swamp white oaks](#) are common along this trail but do not make up a large component of the lowland hardwoods on the refuge. Red and especially silver maples are far more common. Swamp white oaks are "mast" trees which means they produce an acorn or nut or other hard shelled fruit. Take a look around for acorns on the ground. The acorns of the white oaks are generally smaller than those of the red oak family and are sweeter. Whitetail deer, turkeys, wood ducks, squirrels and many other species of wildlife use the acorns as a food source. The tree is long lived, 200+ years and often creates numerous cavities that are used by birds and mammals.

*Activities:*

[Color Swatch Camo Match- Pre-K and Kindergarten](#)

[Micro-Hike- grade 1-3](#)

As you enter the third boardwalk look for round flowers or seed heads. [Buttonbush](#) is a shrub that produces a round blossom that is fragrant and sought by pollinators. The seeds are used by waterfowl such as wood ducks, mallards and black ducks. Shrub usually growing in water provides very good cover for young waterfowl. In the fall you may also notice the red berries of [Winterberry Holly](#). The leaves often remain green well into the fall and the red berries continue to ripen well into the fall. They remain on the stems of the plant through most of the winter providing food for white tail deer and many resident birds. Holly adds red color well into the winter when everything else is grey and white!

As you leave the forest and head back towards the meadow, walk quietly and you may see a rabbit hopping along the trail up ahead!

## **Meadow**

This field is an important habitat for ground nesting birds like bobolinks and savannah sparrows. These birds will only nest in the tall grass. This makes it more difficult for predatory birds like hawks to spot their young. The entire 9 acre field was infested with [knapweed](#), an invasive perennial species, that completely took over the field out-competing the native grasses and forbs for food and water. The refuge



cultivated, limed, fertilized and seeded the field to winter rye, which created a vegetative cover that will out compete the knapweed. There is always a battle with keeping invasive plants out of the fields and the refuge applies herbicides to invasives on a yearly basis. These fields are hayed in mid-August, after our ground nesting birds such as bobolinks have completed their breeding season.

Activities:

[Who Am I?- Pre-K and Kindergarten](#)  
[Predator/prey- grade 1-3](#)

As you walk next to the field the trail is undercut by white pipes. These pipes allow water to move under the trail so that the trail does not flood.

On your left as a building comes into view you will also see a blue bird box in the field. In the 1900s invasive non-native birds like eastern starlings were introduced into areas where blue birds lived. These birds outcompeted bluebirds for habitat. This caused [blue bird numbers to fall](#). In the 1970s people started installing these blue bird boxes that stopped eastern starlings from being able to enter the boxes. The bird populations greatly increased and now are no longer of concern. Currently, [tree swallows](#) are often residents of these nests. These are native birds that should also be using this area.

As you reach the fork in the trail there will be [common milkweed plants](#) to the right of the trail. These plants are highly useful to many insects. Bees use the nectar and pollen from the flowers for food and many insects eat the leaves. The plant contains a poison. Some animals like monarch butterflies are immune to the poison but their predators, such as song birds, are not. When a bird tries to eat a monarch caterpillar or butterfly, it quickly finds that it does not taste good because of the poison and spits it out.

As you head back to the visitor center you may notice the solar panels on the roof and the wind turbine to the left. Green energy is used to provide electricity to the headquarters/visitor center building. Together they provide 33% of our energy needs.

Once back in the clearing by the visitor center, finish up by completing the following activities:

Activities:

[Predator Prey- Pre-K and Kindergarten](#)  
[Web of Life- Simple- grade 1-3](#)

## **Stephen J. Young Marsh Observation Platform and Trail**

Round Trip Length: 1.25 miles

Time: 1 to 1.5 hours

Bathroom At Trailhead: No

Trailhead: Refuge Trails Parking Lot off Tabor Road

*Pre-Visit Activity: Bird Adaptations*

Suggested age: 4-6 grade

Stephen J. Young Trail is named for a US Fish and Wildlife biologist from Vermont, who died in a plane crash on a moose counting survey in Alaska. This is a freshwater managed wetland trail that takes the hiker through 49 acres of northern hardwood forest, aspen, birch, alder, and managed woodcock cuts, next to a vernal pool, past an 11 acre grassland field and around the eleven acre marsh allowing for the opportunity to observe many different habitats. This area benefits American woodcock, ruffed grouse, white-tailed deer and many migrating songbirds of conservation concern. There are a variety of birds that use these diverse habitats. They have specific adaptations that make them suited for using different areas.

Before starting:

Activity: [Sharp eyes](#)

At the trail head, bear right as you skirt the field. The refuge manages this field to provide habitat for nesting song birds. There is always a battle with keeping invasive plants out of the fields, and the refuge applies herbicides on a yearly basis to invasive plants which can out compete the native plants. These areas are hayed in mid-August, after our ground nesting birds such as [Bobolink](#) have completed their breeding season. Bobolink will only nest in tall uncut pastures and overgrown fields. Haying helps to keep large plants like bushes and trees from invading the area and turning it into a forest.

You can also use this as an opportunity to talk about food chains. Other birds found in the grasslands such as northern harriers, sharp-shinned hawks, and American kestrels fly very low over the grasses looking for rodents, insects, and other birds (such as bobolinks) to eat.

Follow the trail from the parking lot as it goes through a field and crosses the road. Vehicles don't have a stop sign so proceed with caution. Once across the road, turn right on the trail.

Stop soon after arriving on the trail to look down on the marsh. Marshes are defined as a wet area free of trees. You'll note the tall bushes along the edge and the trees in the background. The marsh is home to a variety of birds and other wildlife. Water birds land in this area to rest and search for food. Predatory birds like hawks may rest in trees looking down on the area. They use their superior eyesight to spot prey that gathers on or near the water. While we can't have a hawk eye, we can mimic this adaption with binoculars. Review the idea of [habitats and adaptations](#).

Activity: *Using Binoculars*

Continue along the trail and stop as you find a few birds. Have student observe in one area for several minutes.

Activity: *Bird Observation Sheet*

You're approaching an open marsh on the left. Marshes are characterized by water with grasses and sedges but no trees. You'll likely see the presence of Red Winged Blackbirds. What does it tell you about the habitat that these birds prefer to nest in? Does the marsh (wetland) provide any additional benefits to survival of the nest and young? (Answer: Difficult for many predators to gain access to the nest). On the marsh you'll also see [cattails](#) with both old and new growth. This is very good material for building nests for birds including the [Red wing blackbirds](#), marsh wrens, and some species of waterfowl. Some songbirds also use the soft, dry cattail material from last year's cattail heads to line their nests.

Before heading into the woods, notice the [wood duck](#) metal nesting box. They are located near the water control structure on the north side of the marsh. You can discuss cavity nesting birds such as wood ducks, hooded mergansers that use natural cavities and the boxes. These birds only nest in trees and boxes, not on the ground. Other species such as owls, squirrels, and bees use the boxes occasionally as well. What might be an advantage for nesting off the ground? The purpose of the water control structure is to maintain water levels in the marsh so wildlife such as ducks, geese, muskrats, beavers, can have the marsh to rear their young.

Head into the woods.

Stop by the bench and wayside sign. The vernal pool often has frogs and occasionally green herons are found near the pool. Vernal pools are essential for 3-4 frog species and 4-5 salamander species in Vermont. There usually are no fish in vernal pools, and that is important because fish often are significant predators on frog/salamander eggs and young. Vernal pools are seasonal and dry up mid-summer. They get their water from rain and snow melt. They are important to many frog and salamander species that breed and lay their eggs in these pools. These pools generally dry up completely by the end of July or August so the eggs of the frogs and salamanders must hatch and the young grow large enough to survive before the pool dries up.

Stop in the area after the boardwalk. Forest succession can be observed where short oaks and white pine and beech trees are growing under the existing canopy. This growth is moving the forest community toward its climax Northern Forest community. In a typical area, bare ground would progress from a grassland, to being covered in shrubs, then maple trees, and then these would be replaced by beech, pine, and oak trees. This would be considered the climax forest as these trees don't allow any new trees to grow in because they shade the forest floor so much nothing else can grow. Mature forests with open space between trees and a tall canopy are sought by scarlet tanagers. They can be found high in the branches using their great eyesight to search for insects below.

#### *Activity: Sensory Walk*

[Beech trees](#) are nut producing trees that have smooth grey bark. Some people refer to the trees as elephant legs because of the color and smooth texture of the bark; Beech nuts are produced by the trees and these fruits are readily consumed by many wildlife species such as chipmunks, squirrels, grouse, turkeys and deer.

You will come to a sign about the American woodcock. The refuge manages this forest by clearing some areas of trees every few years so that new types of trees can grow in the area. This new growth provides habitat for woodcock. They need clearings in the woods to perform their mating ritual and young forests in which to nest. It's been many years since this area was cut so it has regrown to look almost the same as the surrounding area. Different sections are cut over many years so that the mature forest remains intact while still allowing for new growth.

A slight downhill in the trail takes you to an area where you may spot ferns under the trees in the spring. These ferns provide good cover for small animals like ruffed grouse. They can also be used as food by people. The Ostrich fern, (shuttlecock fern) *Matteuccia struthiopteris*), one of our largest ferns is noted for its plume shaped leaves of rich dark green and its edible fiddleheads. The edible fiddlehead is the state vegetable of Vermont. Fiddleheads may not be picked on the refuge.

Look for [pileated woodpecker](#) activity on the south end of the trail as it crosses the marsh again. Dead trees along the trail have [holes from woodpecker activity](#). Pileated woodpeckers excavate large holes in trees looking for insects and as nesting sites. What type of adaptations do these birds need to be able to do this? Other animals such as wood ducks, squirrels, and owls use the abandoned holes in following years to build their nests.

As you head out of the forest you'll come to the [sugar house](#). We use the sugar house to store materials rather than for its original use. This stop provides an opportunity to talk about how humans can also get their food from wild areas (like tapping trees for maple syrup) and how trees produce their food. We've used our ability of making tools and creating fire to tap the maple trees and then use the sap to create sugar.



As you enter the grass covered area of the trail look for [bush honeysuckle](#) blooming in May and June and its red berries in the fall. Invasive plants like the bush honeysuckle have a detrimental impact on native vegetation by out competing native species. [This non-native honey suckle is also detrimental to birds.](#) While it does provide berries that birds can use as food, these berries contain less nutrients than native plants. It's like the difference between bacon and turkey bacon. They are similar but there are far more calories in regular bacon. Birds can spread these invasive plants as well because often the seeds pass through their digestive tract and get deposited in new areas as they defecate.

To the left of the large wayside sign is a boardwalk. At the end on the observation deck you will see a [Beaver](#) Lodge and an [osprey](#) nest. Ospreys are migratory birds and often return to the same nest over many years. Like the bald eagle, ospreys numbers were previously very low. Platforms like the one in this area were put in place for them to nest on. They can use this vantage point to hunt for fish. They have a special adaptation where they have 2 toes in front and 2 in back which is unlike other birds that just have one in back. This helps them grip fish better. There is a beaver lodge just off to the side of the platform. It is an active lodge and sometimes in the late afternoon or early evening the beavers can be seen from the deck. They are most active during the evening and build their dams and lodges usually at night. Check for other wildlife from the deck such as waterfowl, turtles, small fish in the marsh, large bullfrog tadpoles, etc.

Return to the fork in the trail. This is a good place to tie together the different bird habitats you've seen. Complete the activity in this area.

*Activity: Food Web- Complex*

Follow the trail back across the road to return to parking lot.

### **Black Creek & Maquam Creek Nature Trails**

Round Trip Length: 2.5 miles but a shorter loop can be done

Time: 1.5 to 2 hours

Bathroom At Trailhead: Yes, one pit toilet

Trailhead: Parking Lot off Vermont Route 78

[Please travel to this link for a detailed brochure about the trail](#)

### **Old Railroad Passage Trail**

Round Trip Length: 3 miles

Time: 1.5-2 hours

Bathroom At Trailhead: no

Trailhead: Refuge Trails Parking Lot off Tabor Road

The trail begins on Tabor Road at the Old Railroad Passage Trail parking area. It is an abandoned railroad bed that begins in a grassland, goes by the edge of a bog and then ends in a forest.

The grasslands provide habitat for nesting song birds. It is always a battle with keeping invasive plants out of the fields and the refuge applies herbicides to invasive plants on a yearly basis to invasive plants which can out compete the native plants. These fields are also given a longer time before the grass is cut and dried to become hay at a later date. Haying occurs in mid-August, after our ground nesting birds such as [Bobolink](#) have completed their breeding season. Bobolink will only nest in tall uncut pastures and overgrown fields. Haying helps to keep large plants like bushes and trees from invading the area and turning it into a forest. Keep an eye out for Virginia rail, American woodcock, meadow larks,

You can also use this as an opportunity to talk about food chains. Other birds found in the grasslands such as Northern Harriers, Sharp-shinned Hawks, and American Kestrels fly very low over the grasses looking for rodents, insects, and other birds (such as bobolinks) to eat.

The trail then passes through the southern corner of Maquam Bog which is the largest bog of its kind in Vermont. Virginia chain fern (a Vermont endangered plant) rhodora, pitch pine and fewseeded sedge, all rare and unique plant species, are found here and are listed as rare plant species.

The bog is a diverse peatland of regional and national significance. No other peatland in New England grows pitch pine. It supports six known species of sphagnum moss and a species of hair cap moss, along with several species of sedges and scattered pitch pine, red maple and gray birch saplings. The central part of the bog includes diverse oak uplands underlain by shale. Short-eared owls and northern harriers may nest in this bog. Surrounding the bog is the alder swamp where speckled alder, huckleberry, highbush blueberry, shrubby willows, dogwood and mountain holly live. The trail passes through this alder swamp and is surrounded by water most of the trail length. Blueberry bushes are also prevalent in this area. Many song birds enjoy feasting on the blueberries during the summer. Visitors are permitted to pick them during July and August with a permit

The trail ends in a forest near Maquam Bay. It is often difficult to see the bay from the end of the trail. To return to the trailhead, return the same way you came.

### **Jeep Trail (Open August 1—April 1)**

Round Trip Length: 4 miles

Time: 2.5-3 hours

Bathroom At Trailhead: yes, pit toilet on gravel road ½ mile from trailhead

Trailhead: Louie's Landing Parking Lot off of Vermont Route 78

The Jeep Trail is accessed from Louie's Landing on US 78. Drive through the gate and on the Mac's Bend Road for the first mile. The Jeep Trail begins near the bench. It is a 4 mile round walk in total, following the Missisquoi River. The trail is only open from August 1 through April 1. The rest of the year it is closed to allow for bird nesting and fledging. It is also closed during rifle hunting deer season.

If you walk quietly, you might see a deer, raccoon, mink or osprey. Along the shoreline fish, frogs and tadpoles make tasty snacks for the great blue herons wading in the shallow water. This same shoreline may have tracks of the various wildlife that call this part of the refuge home.

You will be walking through the floodplain forest and lakeshore wetland. Lakeshore wetlands provide foraging and resting habitat for migrating waterfowl, nesting areas for black terns, American bittern and other marsh birds, as well as basking sites for spiny softshell turtles. You may spot spiny softshell turtles which are on the Vermont threatened and endangered list. The lakeshore wetlands are an important staging area for thousands of migrating waterfowl. Green and blue-winged teal arrive first, around the end of August. Fall migration brings the greatest numbers of birds. Expect thousands of mallards, large numbers of black ducks and hundreds of American widgeons depending on seasonal water levels.

The semi-colonial nesting black terns fledge by the beginning of August. They and the American black duck, blue-winged teal, mallard, American and least bittern are high-priority species.

## Appendix B: Detailed Lesson Plans and Activities

Some lessons and activities have been adapted from those used by Glacier National Park

### Beaver Demonstration

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Materials needed: beaver skull, pelt, and stick (all available from the refuge)

Time: 5 minutes

Procedure:

Share with students the following:

1. Beaver pelt: the beaver fur has two layers. The outer layer, or guard hairs are a water proof layer like a raincoat that keeps the beaver dry as it goes under water. The hair closer to the skin is a soft, warm layer called the guard hairs. These keep the beaver warm even when it goes into the water in the winter.
2. Beaver skull: The beaver has long incisors (front teeth) that constantly grow. As beavers cut down trees by chewing through wood, their teeth get filed down. They use these trees to build dams and to build their homes called lodges. The dams create a pond with deep water where the beavers can build their lodges and have entrances under the water. Entrances under the water make it harder for predators to enter the lodge. As beavers modify the environment by creating dams in place, they create habitat for lots of other animals like water birds, fish, and frogs.
3. This log has had the bark and the outer wood layer chewed on by a beaver. Beaver don't eat the bark, they eat the cambium, the wood just below the bark. This layer is where the tree moves its sugary food. The beaver basically eats syrup for every meal.

4. [Learn more to share with students](#)

### Build a Tree

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Overview: Students act out various parts of a tree to form the whole tree

Time: 15 minutes

Materials needed: none

Procedure:

1. Students will act out parts of the tree: taproot, lateral roots, heartwood, sapwood, phloem/cambium, and bark. The heartwood section pantomimes providing strength and support for the tree. The roots anchor the tree in the ground and draw up water and trace minerals. The sapwood carries water up to the branches and leaves. The cambium is the growing part of the tree. The phloem carries food from the leaves to the rest of the tree and the bark protects the tree.
2. Heartwood: Choose two or three tall, strong looking people and ask them to play the heartwood. Have them stand with their backs to each other. Tell the rest of the group, "this is the heart wood the inter core, the strength of the tree. The heartwood's job is to hold the trunk and branches upright so the leaves can get their share of the sun. The heartwood has been around for a long time, so long that it's dead; but it's well preserved! The heartwood used to be alive, but its thousands of little tubes that carried water up and food down are now all clogged with resin and pitch." Tell the heartwood players that their job is to "stand tall and strong."
2. Taproot: Ask several people to play the taproot. Tell them to sit down at the base of the heartwood, facing outward. Tell them: "you are a very long root, called a taproot. Plant yourself deep in the ground- about 30 feet. The taproot enables the tree to get water from deep in the earth, and also anchors the tree firmly to the ground. When storms come, the taproot keeps the tree from being blown over by high winds." Be sure to say that not all trees have a taproot (e.g. redwoods) but this one does
3. Lateral Roots: Choose people with long hair who look as if they won't mind lying on the ground. Ask the "lateral roots" to lie on their backs with their feet up against the trunk and their bodies extending away from the tree. Tell them: "you are the lateral roots. There are hundreds and hundreds of you. You grow



outward all around the tree, like branches but underground. You also help hold the tree upright. At your tips are tiny root hairs. “

At this point, kneel beside one of the lateral roots and spread their hair out around their head. Continue your narrative: “Trees have thousands of mile of root hairs that cover every square inch of soil into which they grow. When they sense that there is water nearby, the cells grow toward it and suck it up. The tips of the root hairs have cells as tough as football helmets. I want the lateral roots and taproot to practice slurping up water. When I say ‘Let’s slurp!’ you all go like this (make a loud slurping noise.) Okay, let’s hear you slurp!”

4. Sapwood: Now ask a small group to play the sapwood. Choose enough people to form a complete circle around the heartwood. Have them circle the heartwood, facing inward and holding hands, being careful not to step on any roots! Tell the: “You are the part of the tree called the sapwood, or xylem. You draw water up from the roots and lift it to the trees highest branches. You are the most efficient pump in the world, with no moving parts. You’re able to lift hundreds of gallons of water a day and you do this at speeds of over 100 miles an hour! After the roots slurp the water from the ground, your job is to bring the water up the tree. When I say ‘Bring the water up’ you go like this: ‘Wheeee!’ (as they do this they throw their arms up into the air.) Let’s practice. First we’ll have the roots slurp. Let’s slurp!” Follow this immediately by commanding the sapwood, “Bring the water up! Wheeee!”

4. Cambium/Phloem: Select a group to play the cambium/phloem. Have them form a circle around the sapwood, also facing inward and holding hands. Tell them: “Toward the inside of the tree from you is the cambium layer, the growing part of the tree. Every year it adds a new layer to the sapwood and phloem. A tree grows outward from its trunk, and also from the tips of its roots and branches. It doesn’t grow like your hair does.” (push the fingers of one hand upward through the horizontal fingers of the other hand.)

“Behind you, toward the outside of the tree, is the phloem. This is the part of the tree that carries food manufactured by the leaves and distributes it to the rest of the tree. Let’s turn our hands into leaves.” Have them stretch their arms upward and outward so that they intersect each other’s arms at wrists and forearms, leaving their hands free to flutter like leaves.

“When I say ‘Let’s make food!’ raise your arms and flutter your leaves and absorb the energy from the sun and make food. And when I say ‘Bring the food down ,you go Whooooo!” (Make the ‘Whooooo! A long, descending sound while you bend at the knees and drop your arms and body toward the ground.) “

5. Have all the sections practice their parts in this order “Let’s slurp!” “Lets make food!” “Bring the water up!” “Bring the food down!” (Notice that the cambium/phloem ring makes food before the sapwood brings the water up. Make sure also that they don’t raise their arms and flutter their leaves until you say “Let’s make food.” This way their arms won’t get tired.)

6. Ask the remaining people to play the bark. Have them circle round the tree, facing outward. Tell them: “You are the bark. What kind of dangers do you protect the tree from?” Suggest fire, insects, extreme temperature changes, and little boys and girls with pocket knives. Tell the bark how they protect the tree: “Raise our arms like a football blocker with both elbows out and both fists closed to the chest. (pause) Do you hear that high-pitched sound? It’s a feisty and very hungry long snouted pine-borer. I’ll go see if I can stop it. If I don’t come back, you’ll have to stop the pine-borer yourself.”

Disappear behind a tree and come out as a pine-borer. Ham it up by scowling, using branches for your antennae, and turning your head back and forth. Zero in with our antennae and point your long borer-snout toward the tree. Now run or walk quickly around the tree, pretending to try to penetrate the bark’s protective layer. The “bark” people should try to find you off.

7. While you are going around the tree, lead the rest of the tree groups in their parts, shout the commands for all the parts in sequence. Go through the sequence three or four times. The commands for the tree parts are as follows: “Heartwood, stand tall and strong! and Get tough, Bark! Roots, lets slurp! Leaves, lets make food! Sapwood, bring the water up! Phloem, bring the food down!”

After the first round, just shout the commands without giving the names of the tree parts. When you finish, have the players give themselves a big hand for being such a wonderful tree. And help the roots up off the ground.

### **Color Swatch Camo Match**

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Materials needed: paint swatches

Time: 5 minutes

Procedure:

1. Clearly state the boundaries where students may move about freely. Remind students that when they find something neat they may touch and look at it, but must leave it where they find it.
2. Ask a student to tell you what “camouflage” means.
2. Give each student one set of color cards
3. Instruct students to pretend that they are an animal or insect of that color.
4. Have each student look for a place to hide/exact match.

Further discussion:

What Color is the Forest?

Missisquoi’s wetlands, forests, and grasslands contain more colors than we realize. Use the color cards and try to find something natural that matches your color exactly. Hold your color next to the object. Are they the same color? How many of the colors from the cards could you find in Missisquoi? How many colors do you think there are in Missisquoi? How many colors do you think you have in your neighborhood?

### **Eye Spy**

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Materials: bandana or a folded blanket, and some small natural objects (pine cone, acorn, leaves, rocks, ect.) Time: 5 minutes

Procedure:

1. Have the class gather around the bandana under which you have hidden a collection of small objects. Be sure that everyone can observe the objects. Explain that they will now have the chance to test their memory and observation skills with a game of eye spy.
2. Explain to the class that they will have 30 seconds to observe the collection of objects. Their goal is to remember as many objects as possible and to guess the relationship of the objects to one another. Once the time is up, have the students describe all the objects they remember.
3. Have the class observe the same collection objects. Have them close their eyes and remove one or more of the objects. Have them open their eyes. Can they guess what is missing?

### **Find Francesca (A Camouflage Game)**

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Overview: Students will look for a hidden item to grasp the idea of camouflage as a useful survival technique or adaptation in many animals.

Materials: something that will blend in with the surrounding area. It can be a rubber insect, a cutout of a person, ect.

Time: 5 minutes

Procedure: Tell students they must use their best listening skills to hear your instructions (This game takes some repetition on the instructions).

- Show students the item you are hiding, aka Francesca (can use large rubber insects, etc. Something that will blend well with the surroundings).

- Instruct students that you will be hiding Francesca and it will be their job to find it. Tell them that you will hide Francesca while they are closing their eyes, and you will tell them the general area of where you hid it.
- **IMPORTANT TO EMPHASIZE:** When each student finds Francesca, they must keep it a secret. They must not touch, point to, or tell someone else where Francesca is. They must silently go back to a spot designated by you, so you know they have found Francesca. This will give each child a chance to find it.
- **Note:** If the last few students who have not found Francesca are having a difficult time, help give them obvious clues so they don't feel embarrassed.

Each time you hide Francesca, hide it in a more difficult spot, finding areas that it will blend in well with. After a few rounds of this game, discuss with students the idea of camouflage as an adaptation to aid in survival. "Was it easier to find Francesca when she was against something of a different color or something of the same color? Why would it be important for Francesca to blend in with her habitat? Who would it offer Francesca protection from?"

### **Habitat Lap Sit**

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Overview: Students will understand the components of a habitat and understand the interrelationship of organisms

Time: 10 minutes

Materials needed: none

Procedure:

1. Have the students count off from one through four. Before having them count off designate areas for each number to go and have them go to that spot after they say their number.
2. Assign each group a concept as follows: ones=food, twos=water, threes=shelter, fours=space
3. Now it's time to form a circle. This is done by building a circle in chains of food, water, shelter, and space. A student from each of the four groups walks toward the clearing. The four students stand next to each other, facing in toward what will be the center of the circle. Four more students- one from each group-go in the circle. Keep adding to the circle in sets of four until all students are in the circle.
4. All the students should be standing shoulder to shoulder, facing the center of the circle. Ask the students to turn toward the right at the same time taking one step toward the center of the circle. They should be standing close together, with each student looking at the back of the head of the student in front of them.
5. Ask everyone to listen carefully. Everyone should place their hands on the waist of the person in front of them. At the count of three, you want the students to sit down... on the knees of the person behind them, keeping their own knees together to support the person in front of them. They should then say what their role is in the form of: food, water, shelter, space, habitat is a wonderful place.
6. Tell them that a drought happened or something happened to another component of the habitat. Have the water students remove themselves from the circle. It will collapse or suffer. Talk about what this means for the habitat and the animals utilizing this habitat.

### **Meet a Tree**

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Overview: helps students to hone observation skills and see individual parts of a forest

Materials needed: one blindfold for every 2 or 3 students

Time: 10 minutes

Procedure:

1. Have students find a partner(s) and give each group a blindfold.
2. Explain that one student will be blindfolded and the partner(s) will lead the blindfolded student to a tree he or she likes. The blindfolded student must feel and maybe smell that tree. The blindfolded student

- is then led back to the start location on a different route than was taken to get to the tree. The blindfold is taken off and he must try to find the tree
3. Before students start the activity, do a demonstration of how to make observations about a tree. Go to a tree and say aloud questions like: Is the tree still alive? Can you put your arms around it? Can you touch the top of it? Can you find plants growing on it? Is the bark smooth? Does it have leaves or needles?
  4. Allow students to complete the activity and then have them switch roles.

### **Micro-hike**

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Overview: students use their observation skills

Materials needed: magnifying glass for each student (ring of rope optional)

Time: 10minutes

Procedure:

1. Explain to students that they are going to take a hike in a very small area using their eyes.
2. Set boundaries lines so the students do not wander away from the group. Have each student choose an area to place a ring of rope or have them clasp their hands together and create a circle using their arms and chest on the ground. Then have them look within the area they created.
3. Using the magnifying glass, each student can look closely at the area and discover the natural wonders that small creatures of the forest may experience. Ask each student to imagine shrinking themselves down to the size of an ant. "What kind of world are you traveling through? Who are your neighbors? Are you finding any homes for other small creatures?"

Variations: if conducting a habitat program, students can look for the parts of a habitat supporting ants or spiders.

### **Pond Discovery**

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Materials: Dip nets, large tank in which to place macroinvertebrates, macroinvertebrates identification cards, collection containers, magnifying lenses (all supplies available at the refuge)

Time: 30-45 minutes

Procedure:

1. Set up needs to be completed before students go outdoors. You may want to set up this station outside by the visitor center doors. Put the magnifying lenses, ID cards, and the tank in a common area. Fill up the tank with water. Next put the collection containers and dip nets in a spot for students to select. Group students so that each group will have access to all the tools.
2. Provide students with background information about what they are going to do and what they are looking for. Instruct students that they will be looking in the ponds for macroinvertebrates which they can think of as larger insects that begin their life in water. They will work in pairs or groups to collect insects in nets and then put them in a bowl for viewing. As a first step, they must get water from the pond into their bowl where they will place the macroinvertebrates. Remind them that these animals need water to live so once they are caught in the net, they must be placed into their bowl of water.
3. To use the nets, they should find an area that is mostly dry around the pond. They should look for areas with rocks or a harder surface so they don't sink into the mud. Next they should use their nets to skim the top of the water. They should never dig their net into the bottom of the pond as they will find few animals there. It also stirs up the dirt in the water making it hard to see and find organisms.
4. Once they collect an organism and put it in their bowl, they should then bring it back to the area where the magnifiers and identification cards are located. It is helpful to have an adult stationed here to help students with identification. Once identified, students can then put their macroinvertebrates into the tank or return them to the pond.



5. After 30-45 minutes have students return all the organisms to the ponds and clean the nets and containers. Ask staff in the visitor center for the key to turn on outside water faucets and use these for cleaning.

### **Predator-Prey**

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Materials needed: 1 blind fold

Time:

Procedure:

1. In an open clearing, have the children form a circle with their toes touching. Pick one student to be the predator (bat) and one to be the prey (insect). Blindfold the students who is the bat and put both students in the center of the circle.
2. Explain that the predator will try to catch their prey by listening for it, then tracking it down and tagging them (you can have the predator make a sound that the prey has to mimic as though it were a bat using echolocation. The bat makes a sound and the insect has to make the same sound back).
3. If either animal goes too near the edge of the circle, the children tap him twice. Stress the need for silence when the game is in progress.

Variations: include more than one predator or prey, have the predator or prey take on characteristics of the animals they are portraying.

### **Sharp Eyes**

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Materials needed: None

Time: 5 minutes

Procedure:

1. Explain that scientists used observation skills to learn more about the world around them. Tell the students that in this activity they will each be a scientist
2. Divide the class into two equal groups. Have them stand in two lines facing each other.
3. Explain that they will all get a chance to make a small change to their appearance. Make suggestions and demonstrate a few examples. Have all the students observe you, and then ask them to close their eyes while you make a change. You might untie a shoe, push up your sleeve, or take off a watch. Can they guess what you have changed?
4. choose one side to be the scientists first. Tell the scientists that it is their mission to observe everything about their partner's appearance. Explain that they are to study their partner very carefully for one minute or less and then the scientist will hide their eyes and the partner will change one small thing about the way they look.
5. When all the partners are ready, have the scientists turn back and try to determine how their partner has changed. Have the group switch roles.

B. A second option is to have everyone in the group be the scientists and you are the only one that changes.

### **Sampling plants for habitat diversity**

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Materials needed: rope or string tied in a knot for every 2-4 students, recording sheet for each group, magnifying lenses (optional), plant identification guide (optional)

Time:10 Minutes

Procedure: As you go on your hike, stop in different habitats such as woodland, grassland, marsh, and even parking lot. Students will put down their ropes in each area and count the number of different species of plants they find.

They can then compare how many different plants they found in each area. You can talk about why this might be and why having a [diverse number of plants is important for ecosystems](#).

### **Shrinking Habitat**

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Overview: Students will participate in an activity to see how changes in the landscape of Missisquoi National Wildlife have created and destroyed habitat for wildlife.

Materials needed: A large rope or a tarp

Time: 15 Minutes

Suggested Procedure: As a group, discuss mission of Missisquoi National Wildlife Refuge. If the habitats change, how will the plants and animals be affected?

- Lay down the rope in a circle or spread out the tarp. Have students stand within the circle of the rope or on the tarp. Make sure they have plenty of room.
- Tell the students that this roped in area signifies Missisquoi.
- Instruct each student to think of one plant or animal that lives inside Missisquoi. They will be that living thing during the game. They may keep that identity a secret until asked.
- Tell them the story of how the habitat of the refuge has changed at different times.

Early in history European settlers found the outlet of the Missisquoi river and built a store on some of the land so the area where the animals and plants could live shrunk (pull the rope closer or fold up part of the tarp. Then upstream people decided to dam the river to run a sawmill. This meant that less water was flowing downstream to Missisquoi so the water habitat shrunk. (decrease the size of the rope or tarp. Students should be getting closer together now.) Ask students how they are feeling and how plants and animals might feel with less space.

Then on the islands in the Missisquoi River people found that they could raise a lot of turkeys. This took up land for other plants and animals so our habitat shrinks again (at this point students should be almost out of room.

People began farming the land when they found that the soil was rich and good for growing near the river. First it was just a few farms (shrink the habitat a little more but still let everyone fit). Then more farms were created (shrink the habitat so that some students are no longer able to fit). What happened to some of you? You either had to move somewhere else or you died.

Then in 1943 Missisquoi National Wildlife Refuge was created and it bought up some of the land and some of the farms and put them back into their natural state so our area for wild animals and plants increased (make the habitat a little bigger so that some students can come back.)

Over time they were able to make the refuge a little larger and provide more space (make the habitat back to close to it's original state). Can we all fit now? So why do you think it's important that we have some places like Missisquoi?

You can follow this up with a discussion on development and setting land aside. You can talk about the benefits of having some lands developed and some lands farmed and some lands set aside for protection.

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## Scavenger hunt for habitats

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Materials needed: Scavenger hunt cards from refuge staff

Time: 5-10 minutes

1. Explain to students that they will be able to find the items on these cards in different areas of the trail. Stop in 2-3 different habitats and hand the cards out. As you finish with one area, collect the cards and take them out and your next habitat. After the 2<sup>nd</sup> or 3<sup>rd</sup> habitat ask what items they found in that habitat but not in others. Ask them why they think this is. Lead a discussion about diversity in habitats and why that diversity is important.

\*Two sets of cards are available, one with pictures for younger students and words for older students.

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## Shapes of Nature

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Grades:PreK-2

Materials needed:

Time: 30 minutes to 1 hour

Location: indoors and outdoors

Students cut shapes and hang them on necklaces to use outdoors. They identify objects in the environment that are the same configuration as the shapes. For example, a tree might be a triangle. A flower might be a circle.

[Use this page as a template](#) and have students trace and cut out these shapes on construction paper.

Punch a hole through the shapes and use yarn to string them into a necklace. Make sure the necklace is long enough so they can hold up each shape and see it. Ask students to hold up one shape and look around them for something they see that matches that shape. Try doing this in different areas of a trail like in the forest or by a pond. Talk about how there are a variety of shapes in nature.

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## Soil Recipe

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Overview: students will learn that soil is composed of many things and will understand that time is important in the formation of soil.

Materials needed: large sheet, water, area with leaves, rocks, and other organic matter,

Time: 10 Minutes

Procedure:

1. Invite students to help you make soil. Explain that you have forgotten your recipe and you hope that they can create a special class recipe for soil. Stress that you need soil and not dirt and ask if they know the difference. (Dirt is what is under your fingernails and gets washed off before meals. Soil is a living entity that grows the food we eat.)
2. Ask students to raise their hands if they have ever cooked before using a recipe. Compare making soil to baking a batch of cookies. Explain that they are both a mixture of different ingredients in certain proportions. The final product is made by combining these ingredients according to a recipe.
3. Tell the students that their first job is to gather the necessary soil ingredients to have on hand. Spread out the sheet and have each student bring you something they think would be found in soil and put it on the sheet.
4. Close up the magic sheet and have kids come up with magic words
5. Open the sheet. Say it doesn't really look like soil does it? Maybe we have to break it up. Have all the kids jump on it and say magic words.
6. Say its starting to look like soil what else do we need? Add water to the mixture, stomp on it.
7. Open and say it still doesn't look totally like soil what else do we need? Time!

## **Who Am I?**

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Overview: Students will play a “guess who” game of animals and plants (20 Questions)

Materials Needed: who am I cards

Time:10-15 minutes

Procedure:

Give each student a plant or animal “Who Am I” card. Do not let them see the card. Put the string over their head so the laminated card hangs on their back.

Instruct the students to work with a partner and ask the other students “yes” or “no” questions about their species. (Suggest that a good first question is “Am I alive?” Perhaps demonstrate yourself.)

After the students have asked their questions, have them guess what species they are. If they guess correctly, they may move the laminated card to their chest.

Conduct a wrap-up discussion that introduces terms such as “living,” “non-living,” “animal,” “plant,” “predator,” “prey,” etc.

## **Visitor Center Scavenger Hunt**

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Materials needed: printed copies from visitor's center staff

Answers can all be found in the visitor's center displays:

Name two habitats in Missisquoi

What lake does the Missisquoi River empty into?

What tool can you use to look more closely at birds? What

trail on the Missisquoi Refuge goes through a forest?

Why is this called a "green building"?

What are 3 activities you can do in the Refuge?

What people used the Refuge in the past?

How do we know they were here?

What can you do to protect wildlands?

How many layers of fur does a beaver have?

What does a leopard frog sound like?

What are two reasons that wetlands are important? Where

does the Bobolink migrate to in the winter?

## **Outdoor Wildlife Scavenger Hunt**

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Materials needed: printed copies of written scavenger hunts can be obtained from visitor's center staff

[Picture scavenger hunts can be downloaded depending on the season.](#)

Items can be found as you walk along trails. You may not find every item

Feather

A leaf that has been partially eaten

Bird's nest

Insect with wings

Singing bird

Animal tracks

Cocoon

Spider Web

Something a squirrel would eat

Hole in a tree

Something a bird might eat

Animal that has fur

Animal on a building



Animal under something

Animal that likes to be near water

## Appendix C: Yearly Refuge Activities

### Junior Waterfowl Hunter Training Program

The Missisquoi National Wildlife Refuge Junior Waterfowl Hunter Training Program is offered to young hunters who want to learn more about the sport of waterfowl hunting and experience a high quality waterfowl hunt. The program is offered to youth 12 to 17 years of age who have an adult waterfowl hunter to serve as a mentor.

The Junior Waterfowl Hunter Training Program is a joint educational effort of the U.S. Fish and Wildlife Service at Missisquoi National Wildlife Refuge, the Vermont Fish and Wildlife Department, the Vermont Chapter of Ducks Unlimited, and volunteers to teach young hunters about waterfowl hunting. The program instructs beginning hunters in the knowledge and skills necessary to become responsible, respected individuals who strive to learn all they can about the species being hunted and to become knowledgeable in firearms safety, hunter ethics and techniques, and wildlife conservation. Registration is required. The training takes place at the end of August and is limited to 50 enrollees.

### Junior Duck Stamp Contest

The Junior Duck Stamp Conservation and Design Program is a national program administered by the U.S. Fish and Wildlife Service. It is an active, arts curriculum designed to teach wetland and waterfowl conservation to students in kindergarten through high school. This program links scientific and wildlife principles into a hands-on art project.

Each spring students submit their artwork, according to contest design guidelines, to the coordination site for their state contest. Students are judged in four groups according to grade level: K-3, 4-6, 7-9, and 10-12. The “Best of Show” artwork for each state goes to the national contest where the single winning entry is used to create a Junior Duck Stamp for the following year. The stamps are sold by the U.S. Postal Service and the refuge. The proceeds support conservation education as well as awards and scholarships for the students, teachers, and schools that participate in the program. To learn more and obtain an application form visit: <http://www.fws.gov/juniorduck>

## Appendix D: Additional Resources

### Ranger Rick’s Naturescope

Ranger Rick’s Naturescope is a creative education series filled with great ideas and activities. The series is dedicated to inspiring in children an understanding and appreciation of the natural world while developing the skills they will need to make responsible decisions about the environment. Naturescope is produced by the National Wildlife Federation and is targeted to the following grades: K-2, 3-5, 6-8.

Issues include:

- Incredible Insects, Wild about Weather, Birds! Birds! Birds!, Discovering Deserts, Astronomy Adventures, Amazing Mammals I and II, Geology: The Active Earth, Endangered Species, Diving into Oceans, Rain Forests: Tropical Treasures, Pollution: Problems and Solutions

### Issue Pacs

Grades 4-7. Issue Pacs are educational units developed by the U.S. Fish & Wildlife Service. They provide factual information as well as activities and posters about wildlife and habitat. Some topics include:

Migratory Birds, Wetlands, Conservation, Hunting and Wildlife Management, Rivers and Streams, Urban Areas, Endangered Species, Estuaries and Tidal Marshes.

**CLIMATE CHANGE, WILDLIFE, AND WILDLANDS: Toolkit**

This toolkit for teachers and interpreters was developed by the U.S. Environmental Protection Agency to provide information on climate change and its potential impacts on wildlife, national parks and wildlife refuges. It includes a short video, CD-ROM with four case studies, a hand-held global warming wheel, and a set of 12 trail cards that highlight the potential effects of climate change on individual wildlife species and ecosystems.

**RACHEL CARSON: *Instilling a Sense of Wonder Education Kit***

The Rachel Carson Centennial Education Kit includes a number of items to assist in the development of programs recognizing the 100<sup>th</sup> birthday of Rachel Carson in 2007. Among items included in the kit is the book, “*Sharing Nature with Children*”, which provides great ideas for exploring the outdoors with children, small magnifying hand lenses (25), and a CD which provides lessons and activities for possible activities.

**[Video Library](#)**

The Missisquoi National Wildlife Refuge maintains a film library on a wide variety of subjects concerning wildlife, plants, conservation, global awareness and native American cultural heritage. Each video in the library is available on loan, free of charge to Vermont schools, organizations or individuals. [For a complete listing of materials please visit the refuge website.](#) When ordering videos please observe the following procedures:

1. Call 802-868-4781 to reserve videos at least two weeks in advance. Please specify the date of showing to ensure its arrival.
2. Identify the video titles that you would like so that we may check on the availability of your request.
3. Videos will be shipped from The Missisquoi National Wildlife Refuge by USPS.
4. Videos can be loaned for up to two weeks.

## Appendix E: Education Trip Request Form

Please complete the following form if you would like to use Missisquoi Refuge for an educational trip. Once completed please email to [missisquoi@fws.gov](mailto:missisquoi@fws.gov). For questions call (802) 868-4781. Our education ranger will respond to your request in April. If you would like a ranger guided program please be aware that we have a limited amount of programs we are able to provide due to staffing levels. We will take reservations on a first come, first serve basis. Please read the Missisquoi Educators Guide to get more details about the options below.

<b>Name</b>
<b>Date Submitted</b>
<b>School</b>
<b>Grade</b>
<b>Requested date(s) for Program</b>
<b>Number of Students</b>
<b>Number of Chaperones</b>
<b>Time of Arrival</b>
<b>Bus or Private Vehicles</b>

Please Circle:

Self-Guided Visit: Complete Section A

Request for Ranger Guided Visit May through October : Complete Section B

### Section A

Do you want use of the classroom for instruction or to use as a lunch area?

What resources do you need to borrow?

Do you want a 10 minute ranger introduction?

Would you like to have students view the 5 or 15 minute Missisquoi video (if yes which length)?

What trail do you plan to hike?

Do you plan to use the visitor center ponds or Stephen J Young Marsh for macroinvertebrates/water quality?

What time do you plan to leave?

### Section B

Please choose from the following programs:

**Pre-K and Kindergarten**

Students will hike the Discovery Trail using their senses to discover shapes, colors, sounds and textures in nature. Activities will focus on learning about refuge animals.

**1-3 grades**

Students will learn about habitats through hiking the Discovery Trail and completing a pond study.

**4-6 grades**

Students will explore the Stephen J Young Marsh Trail to learn about bird habitats and bird adaptations.

**7-12 grades**

Students will conduct water quality testing in the Stephen J Young Marsh and hike the trail to learn about watersheds and water quality.

**Other Program**

If you would like something different please describe your request.



Contact Information:

Missisquoi National Refuge

29 Tabor Road

Swanton, VT 05404

(802) 868-4781

<https://www.fws.gov/refuge/missisquoi/>