



A NATURALIST RESOURCE GUIDE

May 2024
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A NATURALIST RESOURCE GUIDE

What is a Naturalist?

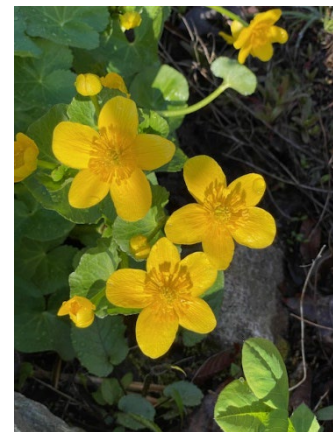
A naturalist is someone who takes a wholistic approach to understanding the natural environment. In other words, they want to understand biodiversity. They seek to recognize the biodiversity of a habitat and understand the connections, interactions and relationships within and between different organisms and ecosystems. Greater biodiversity allows an ecosystem to be more resilient against stressors, like climate change. For example, if certain insects get their cues from temperatures and the birds that eat them get their cues from sunlight, with climate change those warmer temperatures may no longer line up with hours of daylight, and that species of insect may not be available to the bird when the bird needs to eat it. With a variety of insects or a range of food sources, as well as a range of consumers of that food source, the greater the chances of species survival and balance in the ecosystem. Naturalists endeavor to understand these complex webs.



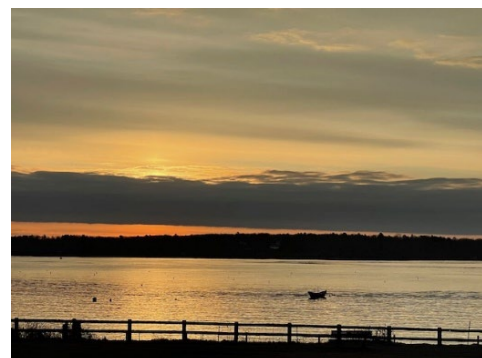
Beyond just providing a framework for understanding how the world works, a naturalist perspective can also play an important role in education and the development and implementation of strategies to protect threatened species and ecosystems. This is increasingly vital as habitats become more and more endangered by climate change, over development, invasive species and other threats.

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Marsh Marigold



Sunrise Overlooking Willard Beach

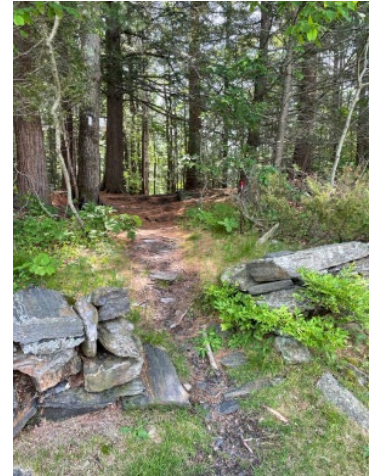
About this Guide

Purpose

Most of us who spend time outside may know the names of a few trees or wildflowers and be familiar with the songs of the birds we see in our backyards, such as chickadees, house sparrows or blue jays, and certainly recognize the caws of the crows who wake us up in the morning. We may have a basic understanding of trees in our yards and neighborhood and know that the Norway Maples we have in our yard are an invasive species. But if a tree comes down in a storm, what is the best species to replace it with? For many, the breadth or depth of our knowledge may be incomplete. The complex connections between different species and our natural environment or climate and our impact as humans, and what we can do about it, is new information we are trying to learn.

The purpose of this guide is to create a pathway for the lay person to help them obtain the information they are looking for. This guide includes resources and is a tool for those of us who want to expand our knowledge and learn a little bit more about the creatures and systems that make up the world, in our own back yards, local communities and beyond. It is designed to be a way to learn about the connections within and between species and ecosystems and the impact that we as humans have on the world. Or, if you are interested in just one topic, such as birds, it will give you a starting point for information and ways to get involved.

The resources discussed here are applicable generally. Some background information or examples are provided under each topic to help offer a context and illustrate the connections that exist in nature. This guide will use South Portland the surrounding area and Maine to provide a context or framework for the use of those resources.



Entrance Path to Dow's Woods

Information About Guide

Common vs. Scientific Names – Since this guide is designed for the lay person, in most cases, the common names that people may be familiar with are used for identification. Any other guides or apps you use for identification will include the scientific names so that information will be available to you.

Photos – Any photos in this guide, unless otherwise indicated, were taken by Sally Sutton. They were not intended to be professional photographs but were taken as a way to gather information and provide a record of what is out there. Phones can be a tremendous tool to help identify what we see and hear. They can provide directions, track our locations and the weather and keep an historical record of what we have seen. However, if we are waiting for that fox or bird to get close and stay still long enough to take the perfect photo, it likely will not happen. Additionally, while phones can be an incredible resource, it is important that they don't interfere with our ability to take time to observe and enjoy nature and what is going on around us and to make sure we are not always looking at things through the camera on our phones.

Guide's Creation - This guide was done by Sally Sutton, a student in the 2023 Spring [Mass Audubon Field Naturalist Certificate Program](#), (Mass Audubon, 2024) as a volunteer with the South Portland Land Trust to fulfill the volunteer component of the Field Naturalist Certificate Program.

[South Portland Land Trust](#) – A nonprofit organization with the following goals:

- “Creating and supporting a network of trails interlinking South Portland neighborhoods to each other and to the trails of adjoining communities.
- Engaging the community in park and trail use, open space protection, trail building and land stewardship.
- Encouraging and supporting acquisition of priority open spaces.” (SPLT, 2023)

Respect and Safety



Anytime we step out into nature it is important to understand how we relate to our surroundings: what impact do we have on them and how can they affect us. Most parks, preserves and trails will have signs with rules and trail maps that also identify the boundaries. Make sure you understand the trail map, or take a picture, and pay attention to trail markers to avoid getting lost.

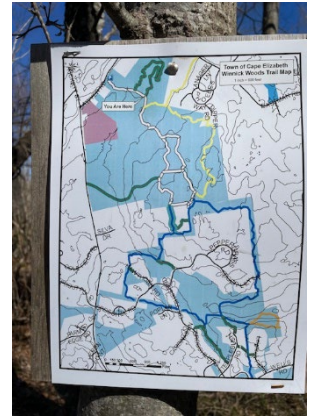
It is important to respect the rules both for your own safety and for the protection of the habitat you are in. If a sign says to stay on a trail, stay on it. If you go off it you might be trampling on some wild flowers, disturbing some nesting birds, or entering someone's private property. Besides damaging the habitat, going off a trail could potentially expose you to unsafe conditions or plants such as poison ivy, stinging nettles, ticks, unstable or wet ground conditions or thick underbrush that could be difficult or dangerous to walk through. If you find unsafe conditions on a trail, report it to the organization that manages the trail so that they can make sure it is safe for others.

It is important to be prepared for the terrain/area you will be in as well as whatever the weather conditions might be: clothing, shoes, bug spray, water, sun screen, etc. Be respectful of where you are going and leave it as untouched as possible.



Poison Ivy

Carry out whatever trash you have. If dogs are allowed, clean up after your dog and obey leash laws. If you turn over a rock to see what critters are underneath it, gently put it back so you disturb their homes as little as possible. If collecting specimens is allowed and you want to collect a mushroom or plant to take to identify, make sure you leave some behind.



Some General Resources or Tools

Here are some naturalist resources typically designed for or easily used by the lay person. When a resource is available, information specific to Maine and/or South Portland and regional resources are provided. Many parks, preserves or natural areas will post signs along a trail to help explain natural features or local wildlife. Taking time to read these signs when they are available is a great way to get a little background about what you are experiencing firsthand. The online resources provided are generally free. Other resources, such as books, will have costs. This resource guide is not intended as an all-inclusive list, but just a way to provide some information and connection to some resources to help get started on a naturalist path.

iNaturalist “iNaturalist is an online social network of people sharing biodiversity information to help each other learn about nature.....It’s also a crowdsourced species identification system and an organism occurrence recording tool. You can use it to record your own observations, get help with identifications, collaborate with others to collect this kind of information for a common purpose, or access the observational data collected by iNaturalist users.” Available online or as an app for your phone to record even without cell or Wi-Fi connection. (iNaturalist Network, n.d.)



Seek by iNaturalist an app to identify wildlife, plants and fungi
– family and kid friendly



[Maine Audubon](#) - In Maine we are very lucky to have Maine Audubon which does a wide range of work statewide including conservation projects, education for both adults and children – both in-person and online and through their Naturalist HQ, policy and advocacy, supporting native plants, and maintaining a number of sanctuaries around the state, community science and volunteer programs (Maine Audubon, 2024)

[Mass Audubon](#) – The largest nature based conservation organization in New England has a similar mission and programming as Maine Audubon. Easily accessible and a great way for Maine naturalists to learn, either online or in person, and connect to other naturalists and teachers who are experts in their fields. (Mass Audubon, 2024)

Maine Department of Agriculture, Conservation and Forestry (MADCF, 2021)

- [Maine Forest Service](#) – Information about forest trees in Maine, invasive species, District Foresters
- [Geology](#) – Information about Maine’s bedrock geology, erosion, floods, fossils
- [Animals and Plants](#) – Includes information about pests, invasive threats, Maine Natural Areas Program

[Maine Department of Inland Fisheries and Wildlife – Maine Wildlife](#) (MDIFW) – This department is a great resource for the State of Maine with a mission to “...preserve, protect and enhance all of Maine’s wildlife resources including nongame wildlife and the state’s endangered and threatened species.” (MDIFW, InforME, 2024)

- [National Wildlife Federation – Wildlife Guide](#) (National Wildlife Foundation, n.d.)
- [Naturally Curious with Mary Holland](#) – an online photographic resource and blog by Mary Holland (Holland, 2024)
- [NPR \(Cincinnati Public Radio\)– The 90-Second Naturalist](#) – podcast, (NPR 2024)
- [National Wildlife Federation](#), (NWF, n.d.)
- [Maine Master Naturalist Program](#), (MMNP, 2024)
- *Naturally Curious*, Mary Holland, 2010
- *Amateur Naturalist*, Gerald Durrell, 1982
- *Wildscape*, Nancy Lawson, 2023
- *Nature Anatomy*, Julia Rothman, 2015
- *Naturalist*, Edward O. Wilson, 2020
- *Readers Digest North American Wildlife*, Readers Digest, 2012
- *A Practical Naturalist*, Audubon, 2010
- *Maine Nature Set*, Field Guides to Wildlife, Birds, Trees & Wildflowers of Maine, Kavanagh/Leung
- *These Trees Tell A Story*, Noah Charney, 2023



Kimball Brook Pond in Dow’s Woods - July

Additional resources are provided throughout this document under the different headings or specific topics they cover.

From the Ground Up – Geology and Ecology

Glaciers and Maine’s Geologic History

It is only necessary to look back as recently as about 2.5 million years to get an understanding of Maine’s current geology and geography. From then until about 12,000 year ago, Maine was covered by continental glaciation. During this time period glaciers were advancing and retreating, causing changes in sea level, scraping and carving and placing tremendous pressure on the land with their great weight and creating hills, mountains, valleys and other geologic features. Rocks and

boulders, called erratic, (glacially deposited rock different from rocks where it is deposited) were deposited amongst the sand, gravel, clay and silt that was left behind. As the glaciers melted, the tremendous amount of water that they contained was deposited in Maine's lakes and streams and rising seas, changing the Maine coastline. For information about Maine's glacial period, check out [Surficial Geologic History of Maine](#) (MACF, 2021)



Mt. Katahdin formed by Glacial Ice

Stone Walls

When early European settlers arrived in New England they needed to clear their farmland of all the rocks left by the glaciers. These rocks became the stone walls we see today throughout Maine. In the mid 1800's New Englanders realized that there was rock-free farmland in the Midwest and migrated to the central part of the country where farming did not involve the labor intensive effort of clearing rocks off the land. This resulted in abandoned farms in Maine which then reverted to the woodlands we see today and why we will find stone walls in the middle of the woods.



More Information About Maines Geology and Stone Walls

- *Glaciers and Granite, A Guide to Maine's Landscape and Geology*, David L. Kendall, 1993
- [Paleoecology – Natural World Keeps Detailed Records of Ecological Past](#) – (BDN, Our Changing World, 1/12/2006)
- *Natural Landscapes of Maine, A Guide to Natural Communities and Ecosystems*, Susan Gawler and Andrew Cutko, 2018
- *Stone be Stone: The Magnificent History in New England's Stone Walls*, Robert M. Thorson, 2004
- [Maine Geological Survey – Explore Maine Geology](#) (MACF, 2021)
[Stone Walls of Maine](#), (Presentation, Cheryl Laz, Maine Master Naturalist) Blue Hill Heritage Trust, July 2020



Stone Wall, Cape Elizabeth

Aquatic Environment – An Ecosystem Example

Understanding Ecosystems

Ecology is the study of the physical environment (land, water, air) and the living organisms that interact with that environment. For the purpose of this guide, an aquatic environment will be discussed as an example of an ecosystem.

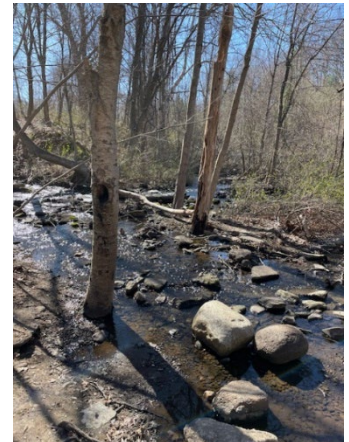
What is a Watershed? Why is a watershed concept important?

A watershed is an area where all the streams, rivers, rainfall and melted snow drain towards a common outlet. For example, most of South Portland is in the Casco Bay watershed. Geologic features determine how the water drains into other bodies of water and bring together smaller watershed areas, reservoirs and aquifers into a larger watershed area which could flow into a lake, bay or ocean. Watersheds also take into consideration development factors that impact water quality such as stormwater runoff, sewage systems and potential pollutants that are in the watershed area.

The watershed concept provides a water focused framework for not just protecting water quality but also habitats and other natural resources and defining ecosystems as part of a natural drainage basin. An action taken in one part of the system will affect water quality and the ecosystems in other parts of the watershed area. For example, most of South Portland is part of the Casco Bay Watershed which includes 985 square miles, 41 communities, 1,356 miles of rivers and streams and includes 5 sub-watersheds ([South Portland 2012 Comprehensive Plan](#)). Additionally a small part of South Portland is part of the Nonesuch River and Gamblers Arm Brook watersheds. (South Portland, 2006 – 2024)



South Portland is the last community in these watersheds before the water runs into Casco Bay and it is impacted by whatever happens upstream. South Portland is divided into 15 stream watersheds, with 5 of these streams not meeting water quality standards and designated as urban impaired stream watersheds, due largely to the high level of residential development in the watershed area and stormwater runoff. The City of South Portland has a stormwater management plan that determines the city’s responsibilities and actions it plans to take and its cooperative arrangements with other local communities in its watershed areas. ([City of South Portland 2022 Stormwater Management Plan](#)) (S. Portland, 2006 – 2024)



Trout Brook - Spring



True Sedge

What is a wetland – How do you know if you are standing in or near one?

Wetlands are distinct ecosystems and can include: vernal pools (isolated and temporary – i.e., could dry up during the year), marshes (include non-woody plants – edges of lakes and ponds), swamps (wetland with woody trees, thick shrubs – water level can vary), fens (peat forming and rely on groundwater) and bogs (wet, spongy areas). They are covered or saturated with water either part or all of the year. The water can include groundwater. Wetlands are made up of hydric soils such as peat, sand, clay or silt and can support aquatic plants, such as True Sedges, which grow along the edge of a pond or lake and are adapted for living in low oxygen or water saturated areas and could have shallow roots.

Seasonal Changes in a Vernal Pool, Small School, South Portland



Vernal Pool, Small School – April



Vernal Pool, Small School – June



Vernal Pool, Small School – November

Some Aquatic Environment Resources

- *Pond Life, A Guide to Common Plants and Animals of Noth American Ponds and Lakes*, George K. Reid, 2001

- [Where Rivers are Born: The Scientific Imperative for Defending Small Streams and Wetlands](#), (American Rivers, 2024)

Good or Bad for Ecosystem? - Cattails are a familiar aquatic plant, but whether or not they have a positive or negative impact on a wetland ecosystem is debatable. This short video posted by USGS, shows the [Importance of Cattails in Wetlands](#) and raises some of the issues to be considered. (Department of the Interior, USGIS, n.d.)

See adjoining pictures of a single cattail plant and a second picture of how cattails have overtaken half of the Kimball Brook Pond at Dow’s Woods.



Herpetology - Reptiles and Amphibians

Herpetology, from the Greek word *herpeton* is the study of creeping animals – reptiles and amphibians. This includes reptiles (snakes, lizards, turtles, tortoises, alligators, crocodiles,) and amphibians (frogs, toads, salamanders, newts). These are cold blooded vertebrates that use external heating sources like burying themselves in the ground or basking in the sun, such as a turtle on a log in a pond or a garter snake in the grass along a path on a sunny day. Most are born from eggs, except for a few species of snakes. While they may share similar habitats, amphibians are much more dependent on wetlands, even if they only live in them part of the time. Salamanders are considered an indicator species. This means they are good predictors of the health of the ecosystems they inhabit. Their permeable skin requires that they remain moist. This makes them susceptible to droughts, overdevelopment, pollution, and habitat fragmentation i.e., they can’t get to a pond to mate and lay eggs. The health of Maine’s aquatic environments greatly impacts the health and survival of Maine’s reptiles and amphibians.

We may be more likely to hear amphibians than we will be able to see them. To figure out what amphibians you might be hearing at night, you can use the voice recorder on your phone to record their sounds and then using Google or iNaturalist or other identification tools, you can look up who is making the sound that you are hearing. Below is a link to how some Spring Peepers and Wood Frogs sound on an early spring night as well as some pictures of several species of salamanders we have in Maine. If you are really interested in learning more about reptiles and amphibians, Maine Big Night has information as well as ways you can get involved as a volunteer.



Eastern Newt (Juvenile Red Eft)



Spotted Salamander



Red Eft and Eastern Red Backed Salamander



Eastern Red Backed Salamander



**Peeper-Wood Frog
Recording**

Resources on Reptiles and Amphibians

- [Maine Reptiles and Amphibians](#) (MDIFW, InforME, 2024)
- [Calls of Frogs and Toads of the Northeast](#) (Lang Elliott, Music of Nature, 2021)
- *Reptiles and Amphibians*, Herbert S. Zim and Hobart M. Smith, 1956
- [Maine Big Night](#) – Be a volunteer scientist. Maine Big Night is an amphibian migration monitoring and protection project where trained and certified volunteers sign up to document and assist the migration of amphibians across roads by protecting them from becoming road kill on rainy nights in spring when they come out of the ground and make their way to their breeding habitats. (MBN, n.d.)

Ornithology - Birds

We may be more familiar with birds as another family of species than any other as we share our yards with them, encourage them with our bird feeders and gardens, see them flying overhead and most often hear their songs and calls even if we can't see them. Their sounds are part of the background noise we hear every time we step out our front door. We are also fortunate to live in a coastal community which opens up for us the world of coastal birds. This includes those birds that use Casco Bay as either their winter (loons) or summer (osprey) migratory habitat.

Some birds, like the American Robin, visit our yards and are easy to identify. For others, because of their fast movements or the fact that they live in the tops of trees or other inaccessible habitats, identification can be more difficult. Fortunately, there are many tools that are now available to help us not only identify (by sound or sight), but also better understand the lives of birds: when they are migrating, the plants we can grow in our yards that will produce the berries or attract the insects they eat, and the type of habitat or natural environment we must maintain to help their species not only survive but thrive.

Birds in the Neighborhood



Male Downy Woodpecker



Osprey Family



American Robin



Cardinal (left) - Mourning Dove (right)

Resources to Learn About Birds and How to Protect Them

[Cornell Lab of Ornithology](#) (Cornell University, 2024) - One tremendous online resource is the Cornell Lab of Ornithology. Here is information about just a few of the tools they provide information about on their website:

- [Seven Simple Actions to Help Birds](#) – These actions include such tools as how to make your windows safer, growing native plants, and reporting your observations to help track birds and if their numbers are declining.
- [Bird Academy](#) – A range of online, self-paced courses for both beginners and advanced birders are offered including: how to attract and learn about backyard birds, understanding birds and how to paint birds.

- [Merlin](#) – A free app that is described as a “free global bird guide with photos, sounds, maps and more.” This is a great tool for bird identification. The sound ID is a tremendous way to identify the birds that are around you and to learn their calls and songs. It is often much easier to identify a bird by its sound than visually, particularly those that are hiding in the bushes or the treetops that you can’t even see. Just turn it on to record the sounds and it will tell you who is there. It can identify a bird with a photo and can also take you through a number of steps to identify a bird without a photo or sound. Your Merlin app can work hand in hand with [eBird](#) as a way for you to track your birds.
- [eBird](#) – eBird is an app that lets you track the birds and manage the lists of the birds you have seen and heard. When you share your sightings through this app you are also participating in the largest birding community in the world, as well as with local birders through [eBird Maine](#). If you need help here is a link to [eBird Essentials](#) a free course on how to use eBird.
- [BirdCast Migration Dashboard](#) – This tool used to track nightly migration data at the state or county level was developed by a cooperative of researchers to provide radar based information on patterns in the spring and fall migrations. We can see how many birds are crossing over Cumberland County in a night as well as how fast and how high they are flying. While it doesn’t identify individual species, it does provide a list of the most likely birds who will be migrating. This information can be useful to see which birds might have stopped to rest and eat and who could be in our area for a day or two. (Cornell University, 2024)



Wild Turkey

[Maine Audubon – Birding in Maine](#) – The Maine Audubon website contains lots of bird related information from around the state including regional birding guides, Maine Birding Trail, bird walks, information on the website about where to bird, what to look for if you are along the coast, in a marsh or in a forest. Their information is geared toward all ages and skill levels, and what to expect at various times of the year. (Maine Audubon, 2024)

[Maine Department of Inland Fisheries and Wildlife - Birds](#) - MDIFW is a tremendous resource for the State of Maine. Their website provides a comprehensive list of Maine’s birds and their habitats, which ones are endangered, threatened or of special concern. As part of their work they do a State Wildlife Action Plan, in which they develop specific plans for species in need of some conservation effort, including [plans for individual species of birds](#). A recently completed project of MDIFW related to birds is the [Maine Bird Atlas 2018 – 2022](#), which involved input from over 5,000 volunteers and millions of records to complete [Maine’s 2nd Breeding Bird Atlas](#), which confirmed 233 species breeding in Maine including 33 new species. [Maine’s 1st Winter Atlas](#), which documented 240 species of birds wintering in Maine was also completed. (MDIFW, InforME, 2024)



Woodpecker Home



Female Downy Woodpecker



Wild Turkey Feather

Some Additional Resources on Birds

- *Peterson Field Guide to Birds of Eastern and Central North America*, Roger Tory Peterson, 2020
- *Sibley Field Guide to Birds of Eastern North America*, David Allen Sibley, 2016
- *Birding by Ear Eastern/Central*, 3 Compact Discs from Peterson Field Guides, Richard K. Walton, Robert W. Lawson, 1989

- *The Bird Way*, Jennifer Ackerman, 2020
- *Birds of Maine*, Peter D. Vickery, 2020
- [Bird Observer: The New England Birding Journal](#), (Bird Observer, 2024)

Ways to Be Involved

- Big Sit Bird Count, (Maine Audubon, 2024)
- Christmas Bird Count, (Maine Audubon, 2024)
- [Great Backyard Bird Count](#), (Cornell University, 2024)

Mammalogy - Mammals

Maine is home to 58 mammal species, from the largest moose and black bear to the tiniest ones such as a masked shrew. Maine Inland Fisheries and Wildlife provides extensive information about these [mammals](#) on their website (MDIFW, InforME, 2024). They have also produced a very useful poster [Mammals of Maine](#) (MDIFW, InforME, 2024) that will help you with your identification of any that you encounter.

Mammals in Our Neighborhood



Raccoon



Eastern Chipmunk



Red Fox

We may be familiar with those mammals we see in our backyards and neighborhoods, such as chipmunks, squirrels, woodchucks and foxes. Many of Maine's mammals, however, are nocturnal, or like the raccoon in the picture, they try to be. They come out only at night, so we may never see them. But, if we take time to look closely, we will see the signs they leave behind.

Along a trail you might see some scat. Here is a resource to help you figure out which animal it belongs to. [New Hampshire Scat Identification Card](#) (NHFGD, n.d.) In fresh snow or on a muddy trail, you may be lucky to see some animal tracks. Here is a [Pocket Guide to Maine Animal Tracks](#) (MDIFW, InforME, 2024)



Fox or Coyote Scat?



Animal Tracks



Left Over Pine Cone Scales



Signs of Deer Eating Bushes

Entomology - Insects

Insects play a number of important roles in their ecosystems. 95% of all animals are insects, with over a million species identified and millions more still to be discovered. They have an exoskeleton and are cold-blooded. They are a major food source for other animals as well as consuming other species of insects themselves and eating more plants on earth than all other species combined.

The Future of Insects and the Roles They Play

Insect numbers have been declining over the last few decades. The windshield test, showing fewer dead insects on your windshield than in previous years, is a simple way to document this decline. These losses could be due to development, habitat fragmentation, the industrialization of agriculture and greater use of pesticides. In terms of climate change, fluctuations in precipitation and changes in type of precipitation, i.e., more rain rather than snow, and more intense storms; changes in seasonal and average temperatures; and the timing of seasonal events will contribute to the insect's disconnection to the plant they rely on for food.



Monarch Butterfly

Pollinators - The critical role as pollinators and seed dispersers that bees and butterflies play is a familiar one, but we need to understand their reliance on native plants, such as the Monarch reliance on milkweeds, and the impact that pesticides, habitat removal and climate change may have on their ability to carry out that role; and the steps we can take to help them to be successful in that role.

Predator and Prey – Insects play a vital role as both predators and prey, throughout their distinct stages of life, in the air, ground and water. If certain predatory insects, those that eat other insects, are not around to eat or control the numbers of the prey insects, then the numbers of the prey insects may increase to a point where the ecological balance is thrown off and other species of plants, mammals or insects may be at risk of defaunation (the destruction or loss of animal life in a region or habitat). The reverse is also true, if the prey insects are not available for the predatory insects to eat, the status of the predatory insects is at risk.



Flying Ants



Common Eastern Bumble Bee

Decomposers – Insects are important decomposers and scavengers, eating forest litter and returning the fallen leaves, downed trees and branches to help create healthy soil that benefits other organisms.



Log Devoured by Flying Ants

[BugGuide](#) - A resource developed by an “online community of naturalists who enjoy learning about and sharing observations of insects, spiders and other related creatures.” BugGuide has developed a clickable guide to identification and also provides assistance with identification of insects. (Iowa State University, 2003-2024)

[Songs of Insects](#) -This website is a tremendous resource about insects and the types of sounds they make, why and how they make them. Most insects' sounds are males and their calls to attract or court a female, and her response. Songs can be of a single insect or sometimes males will all join together to coordinate their songs. Songs of some can also change based on temperature. The website includes a [Thumbnail Guide to Species \(with sounds\)](#). (The Song of Insects, 2024)

Other Resources

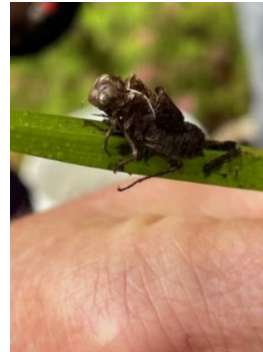
- *Insects of New England & New York*, Tom Murray, 2012



American Dagger Moth Caterpillar



12 Spotted Skimmer Dragon Fly



Shedded Dragon Fly Exoskeleton

Dendrology - Trees and Forests - From the Top Down

A Race to the Sun

Sunlight is necessary for a forest to start – first with quick growing plants that are less shade tolerant and that will try to take in as much sunlight as possible. This will include shrubs and saplings, some of which have the potential to make it into canopy trees. Others which don't are either shade tolerant, like hemlocks, and which will survive as the canopy expands to block their sunlight, or others such as birches, which will ultimately die as sunlight is reduced.

Forests are not static. Over time they will be overtaken by shade tolerant, slower growing trees. Disturbances are necessary for ecological succession to occur in an older forest with a full canopy. These can be wide spread, such as a fire, which could clear an entire forest. Or it can be more limited with the falling of several trees due to a storm, which will open up the canopy. This will allow more slow growing trees, such as pines and oaks, which become more shade intolerant as they get older, the opportunities they are waiting for to take advantage of any opening while it exists, to grow at a faster rate. These disturbances will once again allow the less shade tolerant plants opportunities for growth.



Factors that Influence the Composition of a Forest Community

- Sunlight/shade – how dense is the canopy, are there open patches where sunlight can get through for understory or shrub layer growth and for less shade tolerant, fast growing trees
- Moisture – precipitation, groundwater or water logged soil
- Topography – elevation/landforms, geology, type of soil and nutrients
- Disturbances that remove older trees that make up the canopy, such as fire, wind, rain, storms – (see photos of canopy tree, White Pine, brought down by a storm; and birch trees, the first to enter a new habitat), for example, where a fire has occurred, or an older tree has come down to open up the canopy and allow sunlight into previously shady spots.



Forest Structure and Composition

The greater the diversity in the structure and composition of a forest community, the greater the diversity of the wildlife it will be able to support. For example, some birds spend their time up in the canopy, while others may be living in tree cavities or eating insects from snags, and still others building nests on the ground, such as ovenbirds. These birds are able to take advantage of different parts of the forest structure and are not in competition with each other. Different plants are dependent on different birds, mammals or insects for seed dispersal or pollination. Being able to take

advantage of more than one creature’s method of seed dispersal could provide a tree or shrub with greater opportunities for reproduction, or if for some reason, such as climate change, one type of insect is no longer present in the habitat, there are other options for dispersal.

Trees – Maine’s trees can be broken into two different types:

- Broad Leaf Trees, known as deciduous trees, such as maples and oaks, which drop their leaves every fall and give us our wonderful fall color and Leaf Peeping Season.
 - Play an important role in Maine’s forest’s since the glaciers receded, Red Oaks are a keystone tree in Maine, supporting dozens of species of wildlife, and will likely continue to play a significant role as temperatures rise as a result of climate change.
 - [*Mighty Oaks of the Northeast*](#), *The Outside Story, Northern Woodlands*, Susan Shea, 11/30/2020, (Northern Woodlands, n.d.)
- Evergreen Trees, which are conifers, such as the Blue Spruce and Eastern Hemlock, that have needles as leaves, which fall throughout the year, and cones instead of fruit.
 - The Eastern White Pine is the Maine State Tree. It has played an important role in Maine and US history dating back to the mid-1600’s when the British saw the value of the trees for the masts on their ships and claimed them for the king, setting off some pre-revolutionary war conflict between early New England settlers and the British Royal Navy.
 - [*Where are the Last of Maine’s Historic King Pines?*](#), *Atlas Obscura*, Emily Cataneo, 7/1/2021, (Atlas Obscura, 2024)

What features to look for to identify a tree or shrub?

Identification - Following are a number of features to use to identify a tree or shrub. These include traits on the plant itself, as well as the conditions under which it is growing:

- | | | |
|--------------------------------------|---|------------------|
| • Leaf/needles – shape and structure | • Twigs | • Moisture |
| • Bark | • Buds | • Sunlight/Shade |
| • Flowers | • Fruit/nuts | • Habitat |
| • Cone/seeds | • Type of soil – mesic, xeric, hydric and nutrients | • Climate |

[Forest Trees of Maine](#) is a publication of the Maine Department of Agriculture, Conservation & Forestry Service and is a tremendous information resource and guide to identifying Maine trees. A link to the publication, which is downloadable, is provided on their website. (MDACF, 2021)

[South Portland Tree Protection Ordinance](#) (South Portland, 2006 – 2024)

In 2023 the City of South Portland passed a Tree Protection Ordinance which took effect 1/1/2024. Protected trees are:

- Not invasive species with a 10” diameter
- Heritage Trees that are 90 + years old, 60” diameter and on “Maine’s Big Tree List”
- Historic/Cultural/Program Trees (none yet identified)

If you have questions about the ordinance or want to know if you need approval to remove a tree and the steps you need to take, contact the South Portland Planning Division’s Administrative Assistant – planningadmin@southportland.org

Climate Change Impact on Trees/Forests

Changes in temperature, growing season length, sea level rise and stronger storms are all elements of climate change that affect forests and the trees in our neighborhoods and local parks and preserves. Forests are already being impacted by climate change: there is an increase in pests and pathogens, invasive species, greater drought, shorter winters, and

increased wildfire threat. Recent storms (Winter 2023 – Spring 2024) have made it clear that we are already experiencing the effects of climate change. Downed trees, (see photo), and branches and extensive power outages have shown just how susceptible the trees in our region are to these changing conditions with more ferocious storms. Species that have done best in the more northern climates of Maine may not be able to survive as weather patterns shift, and those that currently do better in warmer climates may be able to expand their range northward to southern and coastal Maine.



What Can Be Done?

- The Nature Conservancy and the Northern Institute of Applied Climate Science (NIACS) have produced [Healthy Forests for Our Future: a Management Guide to Increase Carbon Storage in Northeast Forests](#) which provides management strategies to increase carbon storage. (NIACS, 2024)
- [Climate Change Response Framework](#) – Amongst other resources, CCRF has produced regional assessments on the potential adaptability of individual species of trees to climate change. Their assessments also include trees that are not currently in our region that might have the potential to migrate to a new habitat. (NIACS, 2024)
 - [Climate Change Projections for Individual Tree Species – Eastern and Coastal Maine](#) (NIACS, 2024)
 - [Climate Change Projections for Individual Tree Species – Southern and Coastal Maine](#) (NIACS, 2024)

[Northern Woodlands](#) – A resource for both online and print publications (some with costs) - Published by the Center for Northern Woodlands Education – “mission to advance a culture of forest stewardship in the Northeast and to increase understanding of and appreciation for the natural wonders, economic productivity and ecological integrity of the region’s forests.” (Northern Woodlands, n.d.)

- [Climate Change Impacts on Northeastern Forests](#), Northern Woodlands, Alexandra Kosiba, Spring 2024 (Northern Woodlands, n.d.)



Florida State Park Sign

Some Additional Resources

- *Eastern Forests: North America, Peterson Field Guides*, John Kricher/Gordon Morrison, 1998
- *Around the World in 80 Trees*, Jonathan Drori, 2018

Botany

Botany is the study of plants, which can be divided into 4 major classifications. For the purpose of this guide, we will cover mosses, ferns and flowering plants under this section. Conifers and deciduous trees have been covered under Dendrology - Trees and Forests.

Mosses

Mosses are non-vascular spore producing plants that absorb water through their leaves. They do not grow in porous areas and do best on hard surfaces such as hard packed soil and rocks. They grow in the shade or partial sun and near bodies of water. They are “stemmed” plants lacking true leaves, growing in clumps to support each other and be more effective at collecting water. Moss can stay green year round, and in the winter, if there is access to the sun because of bare trees and temperatures above freezing, it can photosynthesize. Because of their small size, identification may be difficult and may require a magnifying glass. Mosses play an important role in an ecosystem’s succession – minimizing

erosion and assisting with air purification. They have a symbiotic relationship with fungus and algae and are considered an indicator species for air quality.

Some Common Mosses in South Portland



Pincushion Moss



Broom Forkmoss



Ciliate Hoarmoss



Grey-cushioned Grimmia

Resources to Identify Mosses

- [Moss Identification for 9 Most Common Mosses](#) (YouTube, Plant House & Garden, 2022)
- [30+ Different Types of Moss \(And Most Common Moss Species\)](#) (PlantSnap, 2024)
- [Five Backyard Mosses, Coastal Maine Botanical Gardens](#) (Coastal Maine Botanical Gardens, 2024)
- [Illustrated Glossary to the Field Guides of the Mosses & Liverworts of Minnesota](#) (Minnesota DNR, 2024)

Ferns

Ferns are a vascular plant that does not have flowers or seeds and reproduces through spores. They have roots, stems and fronds, through which nutrients are distributed. Ferns require some sunlight and generally grow in a moist shady forest, often making up a significant amount of the ground cover.

Some Common Ferns in South Portland



European Royal Fern



Sensitive Fern



New York Fern



Sweetfern



Common Bracken Fern



Ferns Blanketing the Forest Floor

Resources to learn more about Ferns and How to Identify Them

- [Elementary Connections: Ferns](#), Maine Audubon, (Maine Audubon, 2024)
- [Ferns](#), US Forest Service, (USDA, n.d.)
- [ID Card Common Ferns of the Northeast](#), (Maine Guide Supply, 2024)
- [Friends of Acadia – A Quick Guide to Common Ferns of the Wild Gardens of Acadia](#) (Friends of Acadia, 2024)
- [Identifying Ferns the Easy Way](#), Women Owning Woodlands, (National Woodlands Owners Association, 2020)
- [American Fern Society](#), (American Fern Society, 2020-2021)

Flowering Plants - Plant Identification

Apps such as iNaturalist, Seek and others make it very easy to click a picture and identify a plant. This can be useful in so many different ways. For the purpose of this guide, however, information is being provided about how to use a Key System to identify a plant. Using this more hands on approach will allow you to become much more familiar with the plants you are identifying and their different parts. You will understand what makes them unique or similar to others. Using a Key System approach in conjunction with any phone app will help you to check one identification method against the other so you can be more certain about the accuracy of your identification.

The Key System used here is from *Newcomb's Wildflower Guide* which starts off the identification process with five seemingly simple questions:

- “Flower Type
 - Is the flower regular ...or irregular, or are the flower part indistinguishable?
 - If regular, how many petals or similar parts does it have?
- Plant Type
 - Is the plant a wildflower or a shrub or a vine?
 - If a wildflower, is it without leaves, or if it has leaves, are they all at the base..., or are they arranged singly on the stem, (alternate), or are they opposite in pairs or whorls?
- Leaf Type
 - Are the leaves entire (with even and unbroken margins), or are they toothed or lobed or divided?”

(Newcomb, Lawrence, *Newcomb's Wildflower Guide*, Little Brown Company, New York, 1977, pg. x – xi)

Once you have answered these questions, the Key System will determine the group classification of your plant based on the type of flower, plant and leaf, and you will be directed to a group of plants with those similar characteristics. With the provision of a more detailed description of the plant, you will be able to determine whether

or not it is your plant, or if the data you gathered from our plant was incorrect, i.e., it had lobed and not toothed leaves. With some practice, a Key System identification process such as this becomes very straight forward.

Some Maine Wildflowers with the Month They Bloomed

Below are some Maine wildflowers, with some blooming as early as April and others not until fall. The insects, flies and bees, butterflies and moths that might pollinate the earliest plants, such as the skunk cabbage, are long gone by the time the goldenrod blooms in the fall. As one of the latest blooming plants for pollinators, goldenrod is considered an important keystone species, playing a significant role in the ecosystem by stretching the food opportunities for some pollinators as late into the season as possible.



Skunk Cabbage - April (Katie Paret photo)



Red Trillium – Late April/Early May



Yellow Trout Lily – Late April/Early May



Wild Geranium - May



Pink Lady Slipper - May



Forget-Me-Nots - May



Northern Starflower and Canada Mayflower – May



Common St. John's -wort – June



Ghost Plant or Indian Pipe - Aug



Aster - Parasol White Top - Sept



Goldenrod – A Keystone Species - Sept

Fruits



Wild Strawberry Flower – May



Blueberry Fruit - July



Blackberry Fruit - September

Some Additional Resources

- *BioExplorer.net*. (2024, April 21). *Types of Plants: The Four Major Classifications of Plants*. *Bio Explorer*. <https://www.bioexplorer.net/plants/>.
- *Newcomb's Wildflower Guide*, (quick identification of wildflowers, flowering shrubs and vines), Lawrence Newcomb, 1977
- [Native Plant Trust – Go Botany](#) (Native Plant Trust, 2024)
- [Maine Audubon Native Plant Sale & Festival – Bringing Nature Home](#) – (Maine Audubon, 2024)
- [Wild Seed Project](#) – Mission to increase the presence of native plants grown from, (Wild Seed Project, 2023)

Mycology - Fungi

Mycology is the study of fungi. Fungi are not part of the plant kingdom. They do not have chlorophyll like plants and are not able to produce their own food. There are 1.6 million species of fungi compared to roughly 270,000 species of flowering plants.

Role of Fungi – Fungi play a complex role in the ecosystem, but there is still much that needs to be learned. They act as decomposers, being responsible for the decomposition and recycling of dead material and replenishing CO₂. In some cases they can be carnivores, attacking insects and nematodes. Some fungi are symbiotic with vascular plants. Most plants are associated underground with fungi. By connecting to the plant roots and through hyphae, fungi can extend the plants root system and can assist the plant in getting a broader and greater variety of nutrients and water. Acres of trees can be connected underground by fungi, which act to transfer nutrients to areas where they may be deficient. This brief explanation of the role of fungi in the ecosystem is provided to illustrate the complexity of their relationships with other life forms.



Fomitopsis mounceae

Ecological Roles Fungi Play in Forests

- **Saprotrophs** – Fungi work as decomposers of woody matter and recyclers in the forest obtaining nutrients from dead organisms. They also are critical in unlocking carbon, nitrogen and phosphorus and replenishing CO₂ in the soil and the air.

- Mycorrhiza – Fungi have a symbiotic relationship with vascular plants which, by connecting to the plant roots and through hyphae, can extend the plants root system and can assist the plant in getting a broader and greater variety of nutrients and water. This happens through:
 - a mutualistic relationship where both the tree and fungi benefit from their relationship with each other. Most vascular plants have a relationship with fungi
 - a parasitic relationship where the tree or host organism is harmed or attacked until it is dead and decomposers or saprotrophs take over, or
 - a commensal role where the fungi benefits with no effect on the host
- Carnivores – Attacking and eating insects and nematodes
- Lichens - Break down rocks and contribute to soil production. Also growing on trees, they are partnerships between fungi and algae and can be good indicators of the level of air pollution since they do not have roots and receive all of their nutrition and water through the air. In some ecosystems lichen are considered keystone species.

Lichen



Common Lichen



Shield Lichen



Crumpled Rag



Spindles and Structured Lichens

Mushrooms – Mushrooms are the fruiting bodies of fungi which reproduce through single celled spores. These spores are held in the mushroom cap until they are ready to be released. Mushrooms hold the spores in gills, pores or teeth lined basidia in the underside of the mushroom cap until they are ready to be released into the soil where they germinate with the mycelium. The color of the cap and these structures and the color of the spores that are produced, which can be identified by taking a spore print, are all factors to consider when determining the species. For example, with gilled mushrooms, how the gills are attached to the stalk, and whether or not the gills are crowded, distinct, bladelike or thick, in ridges or folds are all factors to consider.



Spore print for a gilled mushroom

Resources for Identification and to Learn More about Fungi - Mushroom identification is an interesting pastime for many people. There are many aspects of a mushroom, and where it is growing, that must be taken in to consideration to be certain about its identity.

There are a number of different online apps specific to mushrooms that might be a useful resource, such as *Book of Mushrooms*, *Shroomify*, *ShroomID*, *Rogers Mushrooms*. iNaturalist and its Seek feature is an app that could be used not just for mushrooms, but any other organism you find as well. Also, if you are not sure what something is, by posting it on iNaturalist you can get help from others to identify it.

In addition to online apps, you might also consider a field guide book that you can take with you or consult once you have gathered some mushrooms. Many guides, such as the *Peterson Field Guide* listed below include good teaching tools that will take you through a step by step process based on the different features of the mushroom to correctly identify it. *****Caution***** The only way to protect yourself and others from eating toxic or poisonous mushrooms is to be able to accurately identify them. This takes experience beyond just correct identification, but also experience in the practice of

proper collection protocol for mushrooms to be eaten, understanding the toxicology (lethal dose amounts) and symptoms of poisoning, and appropriate cooking of the mushrooms.

Several Resources and Guides

- *Mushrooms in Maine Identification Record Book: A Simple Take Along Book to Identify and Track Mushrooms*, 2022
- *National Audubon Society Field Guide to Mushrooms*, National Audubon Society, 1981
- *Peterson Field Guide to Mushrooms of North America*, Karl B. McKnight, Joseph R. Rohrer, et. al., 2021
- *Welcome To Mushroom Hour – Podcast*
- *Entangled Life*, Merlin Sheldrake, 2021

Fungi



Tapinella atrotomentosa (Velvet-foot 7/30/23 and 8/10/23)



White Coral Slime Mold



Berkeley's Polypore

Invasives

Understanding nature involves knowing which species are beneficial and support each other and which ones are considered invasive and could cause harm. Maine defines an invasive species as: "A species is considered invasive if it is not native to the ecosystem in question and its introduction causes or is likely to cause economic or environmental harm or harm to human health." (Maine Executive Order 13112) (MDACF, 2021) Maine is already seeing the impact of a number of invasive species.

The Maine Forest Service provides some very useful information about which invasives, insects and diseases are a threat to Maine, what they look like, how best to treat or remove them, and when to report them to the state. [Invasive Threats to Maine's Forests and Trees](#) The MDACF Maine Natural Areas Program information also includes information about invasive plants, and maintains an [advisory list of invasive plants](#) and also has an [Invasive Plants](#) brochure. (MDACF, 2021)

The University of Maine Cooperative Extension maintains the [Maine Invasive Species Network](#) which brings together professionals, organizations, and other interested stakeholders to develop and implement strategies for controlling invasive species in Maine. (University of Maine, n.d.)

South Portland has a [Landcare Management Ordinance – Pesticide Use](#) (South Portland, ME 2006 – 2024) that needs to be taken into consideration as attempts are made to eradicate any invasive species. The purpose of this ordinance is to "...safeguard the health and welfare of the residents of the City and to conserve and protect the City's waterways and natural resources...)

Below are pictures of several invasive species that you can find in the woods in South Portland and maybe even your own backyard. Links are provided to specific species information on the MDACF Natural Areas Program website to provide more information about impact and methods of control. (MDACF, 2021)

Several Invasive Plants to Watch Out For



[Glossy or Alder Buckthorn](#)



[Multiflora Rose](#)



[Bittersweet](#)



[Japanese Knotweed](#)



[Hemlock Woolly Adelgid](#) (photo - NYSDEC, n.d.)

Climate Change

What are the main causes of climate change?

Humans and the emission of greenhouse gases they cause to be released into the atmosphere have been the primary cause of climate change for the last 150 years. The burning of fossil fuels such as coal, oil and “natural” gas aka methane are the primary ways that CO₂ is released into the atmosphere. The gases that remain trapped in the atmosphere cause the planet to heat up which then has an impact on water and air temperatures and all life forms that may not be able to survive under the changed conditions at these new temperatures. While climate refers to atmospheric conditions over a longer period of time and involves the entire planet, climate change conditions also impact the weather leading to seasonal changes, more violent storms, droughts, forest fires, etc.

Climate Change Resources

[One Climate Future](#) – Portland and South Portland Collaborative - At the municipality level the cities of South Portland and Portland have come together to develop a plan for the two communities [One Climate Future Plan](#) which includes “68 strategies across four focus areas for how our two cities will address climate change. These ‘six big moves’ encapsulate the plan, summarizing how we – the communities of Portland and South Portland – will create thriving, inclusive, low-carbon cities over the next thirty years.”

- Build better buildings
- Connect people to places, to opportunity
- Power everything with clean renewable energy
- Grow circular economy
- Nourish ecosystems, which nourish us
- Build collaborative capacity to create this future

In addition to working together, each town also tracks and publishes the progress it is making toward its goals in four areas: Building and Energy, Waste Reduction, Transportation and Land Use and Climate Resilience – not yet started, in progress and complete. In each of these areas, opportunities exist for community engagement and coordination with other national state and local organizations, such as the Climate Ready Casco Bay which is a project managed by Greater Portland Council of Governments with support from the National Fish and Wildlife Foundation National Coastal Resilience Fund. (One Climate Future, 2024)

[City of South Portland Sustainability Office](#) – Through the policies and practices works to promote a healthy environment in South Portland (South Portland, 2006 – 2024)

[Adaptation Workbook – Explore Climate Impacts for Region](#) (Northern Institute of Applied Climate Science NIACS, n.d.)

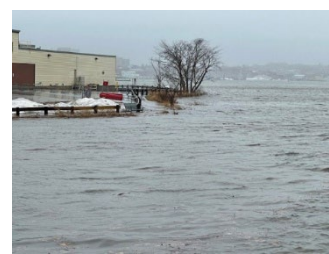
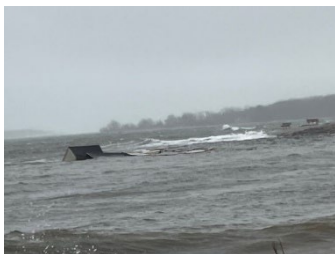
[Project Drawdown](#) – “Project Drawdown is a nonprofit organization that seeks to help the world stop climate change as quickly, safely and equitably as possible.” (Project Drawdown, 2014-2024)

[University of Maine Cooperative Extension](#) (University of Maine, n.d.) – The Cooperative Extension covers the full spectrum about how individuals can respond to climate change, such as providing information about when and how to mow your lawn in the spring to protect the bees that are living in the ground; collecting data on the signs of the seasonal changes and when they occur to document climate change; and publishing a workbook on steps for collective climate action and community resilience.

- [No Mow May](#)
- [Ask the Expert FAQs: Habitat Gardening](#)
- [Natural Resources](#)
- [Maine Community Resilience Workbook](#)
- [Signs of the Seasons: A New England Phenology Program](#)
- [Phenology in a Changing Climate](#)
- [Signs of the Seasons Volunteer Interest Form](#)
- [Maine Climate Change Adaptation Providers Network](#)
- [Maine Climate Office News](#)

Statewide Programs Working on Climate Change

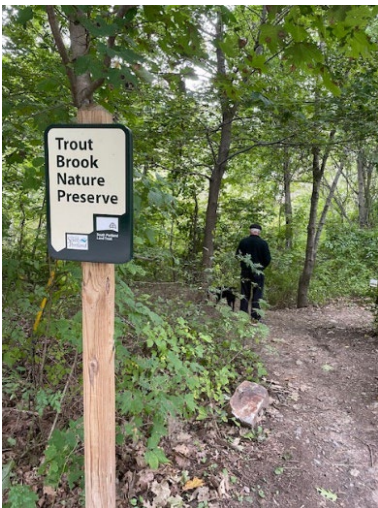
- [Citizens’ Climate Lobby – Portland Maine Chapter](#) – Works to get climate laws passed (Citizens’ Climate Lobby, 2024)
- [Natural Resources Council of Maine](#) – Works through a range of programs to protect Maine’s environment (NRCM, 2024)
- [Nature Conservancy – Maine](#) – Has as a priority to tackle climate change. (The Nature Conservancy, 2024)
- [Friends of Casco Bay](#) – Focus is on improving and protecting the environmental health of Casco Bay (Friends of Casco Bay, 2022)



High Tide, January 13, 2024 Storm

A Naturalist Resource Guide
May 2024

Prepared by Sally Sutton



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