

# Merrymeeting Bay

## A Self-Guided Nature Tour of Merrymeeting Bay

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A natural history introduction to Merrymeeting Bay for individuals, adults with kids, homeschoolers, and groups.

5 site guides of 2 pages each, for 5 public preserves along the Bay.

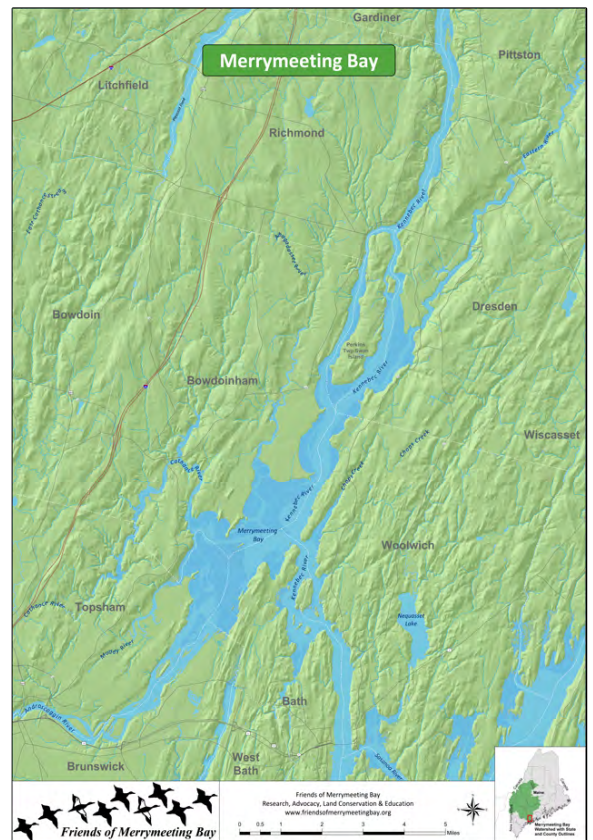
Download and print the set, or print just the two pages for any one site you wish to visit.



## Introduction: A Self-Guided Nature Tour of Merrymeeting Bay

Merrymeeting Bay is a fantastic natural area located in Maine's Cumberland, Lincoln, and Sagadahoc counties. It is an inland bay, where 6 rivers empty and combine with tidal seawater in a roughly 4 x 7 mile area (9,600 acres). This unique structure classifies it as an "inland delta," with tides that run up to 6'. While less than 3 bird's-eye miles from the ocean at its closest point, it is fully 17 river miles to its ocean outlet at Popham. It is truly a gem in our midst.

This series of five site guides offers an overview of the natural history of the Bay and record of human habitation, as seen from five viewpoints along the shoreline. Each site guide describes aspects of water and land life at that location, and has a hands-on, nature-based activity that people of any age can do there. Each one is designed for a fun half-day or day outing, and suitable for all ages.



## Merrymeeting Bay

Merrymeeting Bay is one of the largest and most important freshwater and tidal ecosystems in the country. It consists of vast, shallow mudflats that are rich in nutrients and habitat for many interesting and some rare species of plants, fish, animals, and migrating and resident birds. Its shores have a long history of human habitation, tracing back to indigenous peoples of at least 9,000 years ago, all the way forward to today.

Because of its shallow, muddy composition, the 4-6' tides leaving only mud at their ebb, and limited launch sites, boating access to the Bay is severely limited. There are, however, numerous public viewing points on the Bay shores, with conservation work and trail systems managed by several groups. Each site provides a different view and understanding of the Bay as a whole system, in quiet natural surroundings.

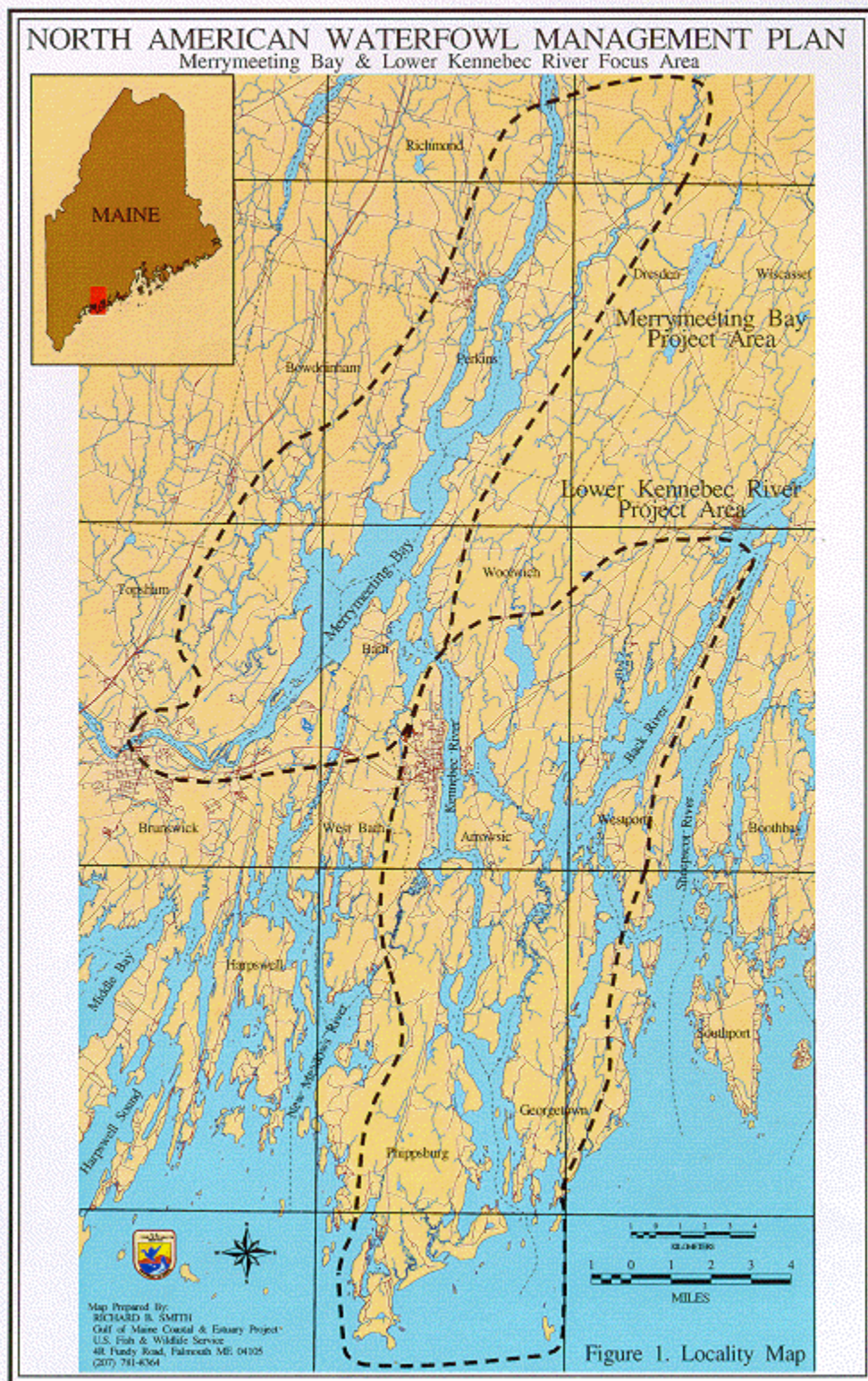
## Getting Started Activity: Find Your Home

Locate a map that includes your home, Merrymeeting Bay, and the ocean. There is a map on the reverse side, or use your own.

First, find your own home on the map and mark it. Now, find the Bay on the map. How many air miles is it from your home to the Bay? How many driving miles (about) would it be? Next, find the two large rivers that enter the Bay, the Androscoggin from the southwest, and the Kennebec from the northeast. Now, do you see the narrow opening on Bay's east side, about in the middle? This is "The Chops," the point where water exits the Bay into a continuation of the Kennebec River and out to the ocean. Trace the rough outline of the Bay with your finger or a pencil: this area is home to thousands of species of plants and animals, some of whom have no other home than this one. Is your home similar to theirs in any way?



# Introduction: Map of Merrymeeting Bay and Surroundings

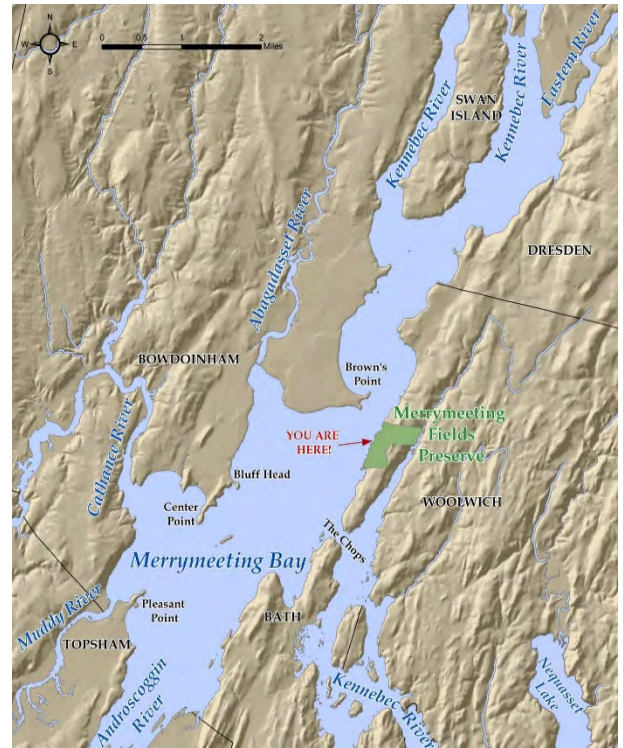


## Merrymeeting Fields Preserve

This beautiful preserve is managed by the Kennebec Estuary Land Trust (KELT). At 125 acres, it provides open space, forests and varied habitats for nesting birds and small mammals. A trail system runs through all these environments, including to an overlook where you can view the full length of the Bay and look across to Bowdoinham. It is the closest of the five sites in this guide to the Chops, the exit point of all Bay waters outward towards the ocean. The preserve is an excellent place for walking, snowshoeing and cross country skiing, where you may enjoy birdwatching and viewing wildflowers, ferns, and other kinds of plants. [Directions](#)



## Site #1: Merrymeeting Fields Preserve, Woolwich



Kennebec Estuary Land Trust map

## Bay Waters

Biologically, the Bay is classified as a freshwater tidal riverine system, denoting its combination of fresh and ocean waters. As you stand at the Preserve's bayside viewpoint, you will be looking up the Kennebec River to your right. It may be flowing left, towards the Chops, on an ebb tide, or right, upriver, on a flood tide. Toss a small stick into the water and see which direction it takes, being careful on the slippery rocks. The tides run as high as 6' in the Bay.

Farther to your left beyond the Chops, the second major river—the Androscoggin—enters the Bay. In addition, four smaller rivers drain here: the Eastern, Abagadasset, Cathance, and Muddy Rivers. In total, the Bay captures nearly 40% of Maine's runoff. Think of it—2/5 of the rain that lands on the whole state finds its runoff going into the waters in front of you.

Seawater occasionally enters the Bay through the Chops. While the overall proportion of salt water is quite low and varies by day and season, the intermixing results in extremely rich nutrient habitats for a great many species.

## Habitats

Habitats are the natural home environments for animals, plants, and other organisms. An associated group of habitats is called a community. Communities contain characteristic plants and animals, and the transition zones between them are yet another rich type of community. Merrymeeting Fields Preserve contains several different natural communities and transition zones, and much can be learned by the alert observer walking the trails there.

In addition to aquatic habitat, the surrounding land includes several different habitat types, including forests, meadows and fields, and human dwelling sites, all of which interact with each other, continually evolving.

Extensive development pressure has impacted the Bay, sadly resulting in much lost or endangered habitat. Endangered habitats lead to endangered species, which in turn threaten the health of human communities. This is why it's so important to protect these precious resources: habitat and species diversity are the key to sustainability, including our own.



## Merrymeeting Fields 2



Staghorn Sumac



Wolf Trees along a stone wall

## Activity: Habitat Transitions

If you start your walk at the Trott Homestead Loop trail (on the main road just past the preserve driveway) you will quickly come upon an old stone foundation. What do you suppose this place used to look like? We have some clues—do you see the old apple trees nearby? They suggest this was a dwelling place. The Staghorn sumac trees are also a clue, because they are among the first trees to fill in an abandoned open area. They suggest that this site was once free of all trees, a clearing for the house and its residents. Apples and Sumacs are not found elsewhere in the preserve.

Further along this same trail you will cross an old stone wall. Look carefully—are some of the trees larger than those away from the wall? These larger trees—called Wolf Trees—tell us that back when the area was open pasture the trees near the wall were allowed to grow. Now that the pasture has fully filled in, the trees with this big head start have grown bigger than their neighbors.

## Activity: Ferns

Ferns are a very interesting plant form. They are one of the earliest plants, having evolved around 360 million years ago, while flowering plants are only 130 million years old (only?!). They reproduce by releasing tiny “spores” into the air, which you may see in attached bundles on the underside of some species’ fronds. About 300 million years ago ferns were a dominant life form, sometimes reaching 100 feet in height! There are now about 380 species of ferns in North America, 81 in Maine, and 6 or more right here at Merrymeeting Fields.

Ferns are “eco-indicator plants,” meaning that you can tell the type and moisture levels of the underlying soils by the species present in a particular habitat. Keep an eye out for different shaped ferns on your walk. In general, do they prefer shady or sunny conditions? Two of the most common are Sensitive fern and Bracken fern. Sensitive fern likes moist, rich soils, while bracken does well in dry soils with fewer nutrients. Note the photos at right and see if you can find both species.

## Two Common Ferns



Sensitive Fern



Bracken Fern<sup>5</sup>

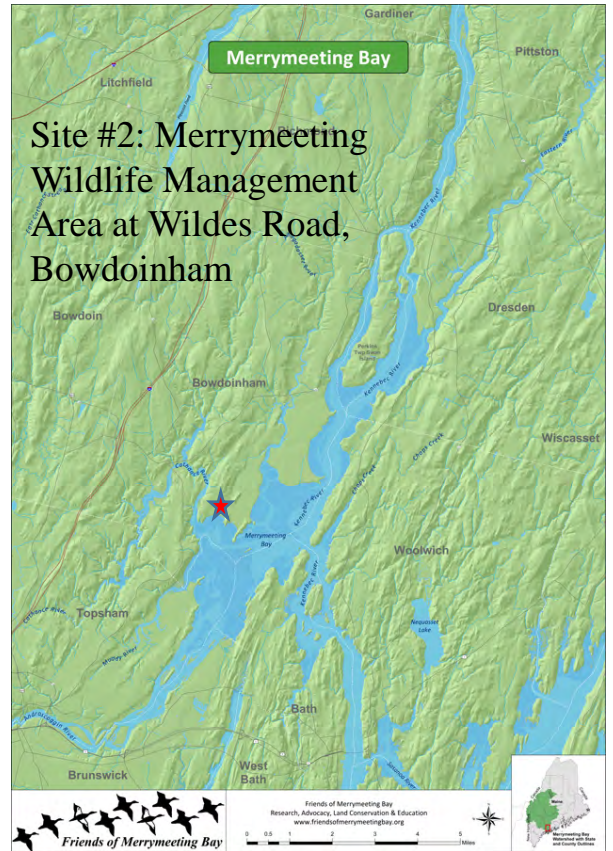


## Merrymeeting Bay Wildlife Management Area at Wildes Road

The Wildes Road tract of the Maine State Merrymeeting Bay Wildlife Management Area (MBWMA) includes 258 acres, a trail system, field and woodland habitats, an old homesite, and exceptional shoreline access. An easy walk of 1.5 miles roundtrip will take you to the shore, where you have an excellent view of the broad reach and huge size of the Bay. You will be looking directly across towards the mouth of the Androskoggin River.

From an aerial view, Merrymeeting Bay looks something like a giant kink in the Androskoggin River, where the Kennebec and four smaller rivers join it in a great inland bay. These waters don't flow directly into the ocean; their confluence creates an estuary-like system whose only exit is through the Chops and thence to the ocean.

Access the Wildes Road property is in Bowdoinham, with directions available [here](#).

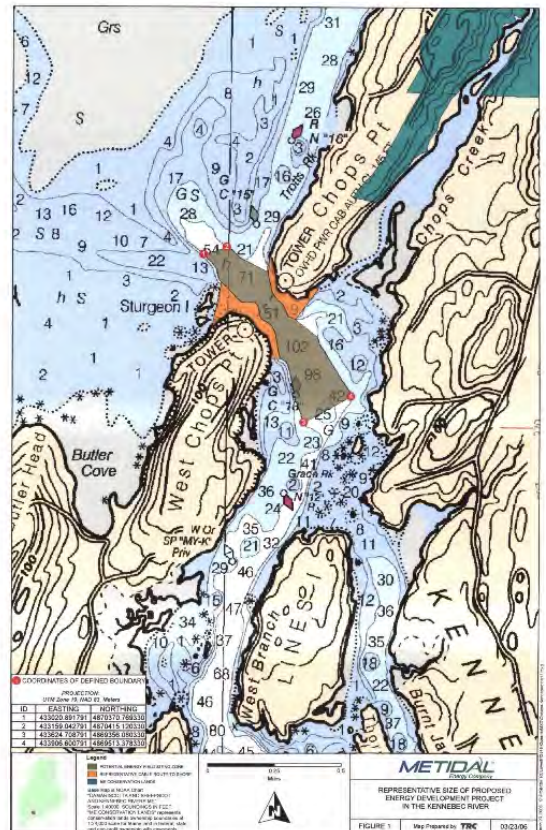


## Geology: How was the Bay Formed?

Merrymeeting Bay was most likely formed by the interaction of four great geological forces: ancient earth faulting, glacial action, deposits of river and ocean sediments, and changing sea levels. The most recent glaciers covered the whole area up to about 13,000 years ago, pushing the land lower by its sheer weight. When the ice eventually melted, the Androskoggin and Kennebec flowed separately into the ocean, depositing their silts into huge fan-shaped deltas. Later, rising sea levels and floods submerged the region such that the ocean was 230' above present sea level. As the land slowly rebounded, the Kennebec and Androskoggin met upriver, their ocean access blocked along an ancient faultline. This created the vast inland delta we see today, Merrymeeting Bay.

The map above shows how flat the land is around the Bay, especially on its west and south sides, where the ocean once covered everything. To the right is a map of the Chops, today's 600' wide exit channel. The Chops was actually a waterfall about 12,000 years ago, but this is now completely underwater.

## The Chops



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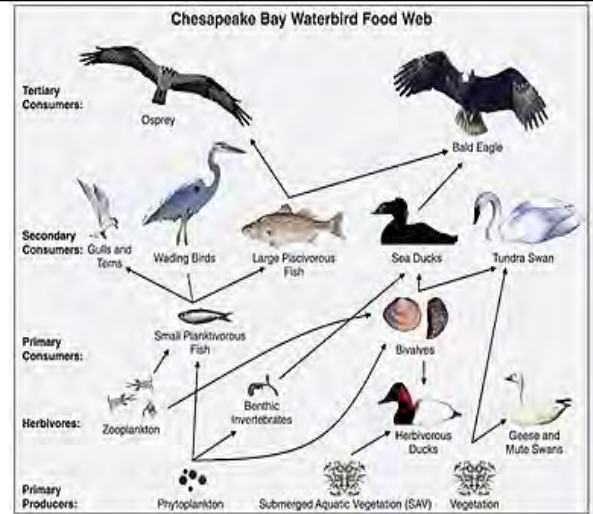
## MBWMA 2: What are Mudflats?

The Merrymeeting mudflats are the dark, silty layers of mud that surround much of the Bay. They consist of very fine particles of sand, dirt, clay, decaying organic materials, minerals, tiny bacteria and other organisms. If you were to step from the solid shore onto a mudflat, chances are you would squish down a few inches and maybe even lose your sneaker when you pull it out! Better perhaps to reach over and rub a little mud between your fingers.

The presence of mudflats doesn't mean that the Bay water is "dirty" or "impure"—quite the opposite. Mudflats are the reason for the incredible richness and productivity of the Bay for larger plants and animals, including us. They are "intertidal communities," home to many microorganisms that consume the mudflat silts, and are consumed by smaller insects and plants. These in turn are food for birds like ducks and eagles, and plants such as wild rice. We may harvest the rice or eat some of the fish or birds.

## Food webs

Mudflats are a type of ecosystem, or group of natural communities, the smallest inhabitants of which are bacteria and microorganisms. One thimbleful of the Merrymeeting "mud" can contain 10s of millions of these microorganisms! An ecosystem food web is a network of interconnected species that are linked in levels of production and consumption.



## Wild rice grows in the Bay mudflats

Where would you place wild rice in the food web diagram above?



Many wading birds depend on the fish that live in the Bay for their survival. Can you find the link between this Great Blue heron and fish in the food web picture?

## Activity: Mudflats and Food Webs

Walk down to the shore viewpoint at the Wildes Road site. Are the mudflats visible? If so, the tide is probably low and you can touch the mud to get a feel for it. If not, you can observe the mud in front of you under the water. What words would you use to describe this mud?

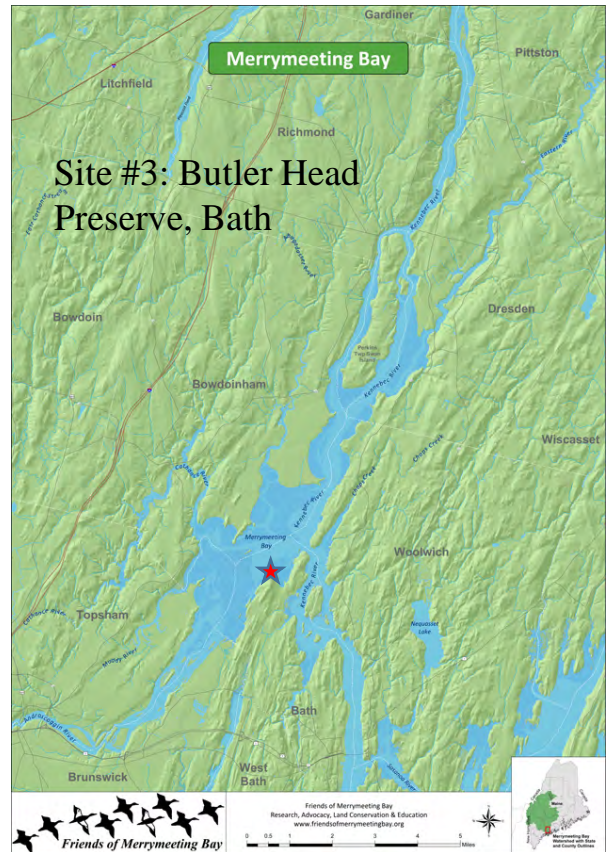
Study the diagram above, which depicts a food web similar to what you see in front of you. In the bottom row are the smallest plants that feed on the tiny microorganisms in the mud. These then support the next row up, larger plants, small water organisms, and some birds. Each arrow points to a larger organism that consumes the one before it. It takes many, many small plants and animals to support a large bird like an eagle or heron – Why would this be so? Where would humans be placed in this diagram? What arrow would lead to us? Do you see any species in front of you that are in the diagram? What species do you see that may not be in the diagram?



## Butler Head Preserve

Butler Head is managed by the City of Bath as a natural woodland preserve in Merrymeeting Bay. It is remarkable for its diversity of trees and forest communities, and for the wildlife habitat it provides on a rocky outcrop that juts into the Bay. A network of trails is maintained and open to the public throughout the year.

Along with the Kennebec Estuary Land Trust and Maine Audubon, the City of Bath enacted a management plan for Butler Head in 2007. Its priorities are maintaining the forest as wooded wildlife and shoreland habitat, providing recreational opportunities, and occasional light timber harvesting. Many of the forest habitats at Butler Head are now rare or endangered, including the “riparian zone” at the boundary of land and water, and the “early succession stage” of forest. This means that species that live there are rare too, so conservation areas like this are very important.



## Trees

Trees dominate the landscape at Butler Head, and make a good subject for observation on a walk through the Preserve.

Trees don't grow so much as isolated specimens, but more in communities of compatible species that are well adapted to the light, soil, and moisture conditions of different micro-habitats. The colored map on the reverse shows how small these habitat areas can be. Each type of tree community supports particular groups of plants, birds, and other animals.

Also, tree communities can be at various stages of “succession,” or maturity, ranging from early stage seedlings to mature old growth of 150 years or more. 70% or more of the tree stands at Butler Head are in the intermediate or late stage of succession, meaning that there are not many areas of young seedlings in the Preserve at all. You might notice whether this is true or not during your visit.



Trail maps available at the first parking area.



The second parking area at Butler Head.



## Butler Head Preserve 2



View northwest towards Bowdoinham



View east across Butler Cove

## Activity: Tree Communities

Start your walk at either of the two parking areas on the Preserve, paying attention to the types of trees you see. Hardwood areas include maple, beech, birch, oaks—all trees that lose their leaves in the fall. One special area of hardwoods is the “sugarbush” (shown on trail map), which is the farmers’ name for stands of maple that are tapped in spring for their sweet sap. Do you see the many lines of blue plastic tubing between maple trees here? These are sap collection lines that carry spring sap to a collection station at the bottom of the hill. It takes 30-40 gallons of sap to make one gallon of syrup.

The evergreen, or conifer, areas on the map include hemlocks, fir, white cedar and white pine. Did you know that hemlocks are the most shade-loving of all softwood trees? They comprise about 14% of the Butler Head forest. What does their prominence here tell you about light conditions? Mixed stands are dominated by oak and white pine, and constitute about 33% of the forest at Butler Head. Could you tap the oaks for syrup? No, because oak sap is not sweet.

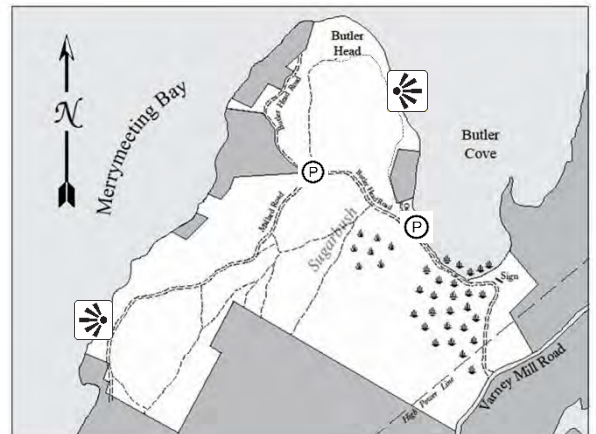
## Tree Types at Butler Head

The map below shows the location of the three main types of forest communities in the Preserve. The orange denotes hardwoods only (deciduous), the yellow softwoods only (conifer), and the red, mixed hardwood and softwood. The hardwood areas cover about 42% of the Preserve. Among the birds that frequent these woods are grouse, owls, woodpeckers, some warblers, and thrush. Snowshoe hares and other small mammals, and even an occasional fisher cat may live here as well.



## Butler Head Trails

The trail system is a well-marked network running through all three types of forest community, totaling about 3-4 miles. Note that there are two good views of the Bay itself, as marked below. On the east you’re looking into Butler Cove, beyond which is the Chops. To the west your view looks across the Bay towards Topsham, Bowdoinham, and the MBWMA preserve at Wildes Road (site 2).



## Bay Bridge Park

Bay Bridge Waterfront Park is managed by the Town of Brunswick. A four-acre multi-use park, it is located on the Androskoggin River just as it enters Merrymeeting Bay. A fully accessible 3/10 mile trail takes you along the river and around a marshy wetland, with two lovely viewing benches. There is also a hand-carry launch for small boats, which serves in winter for ice fishing access.

As you face the river you will be looking upstream to the left, towards Brunswick and Topsham. To the right you're looking downstream, directly into the *widest portion of the Bay*.



## Human Use

The most prominent feature at Bay Bridge is the rock jetty remains of a former bridge across the Androskoggin River. The half-mile bridge extended from Bay Bridge to Mustard Island and across to Topsham, and was a shortcut for farmers in the upland towns to get their wares to the expanding City of Bath during the decades around the Civil War.

The bridge was built in 1835 and operated as a toll bridge until destroyed by flood in 1896. The toll ranged from 3 cents for pedestrians to a full dollar for circus elephants. It was never profitable. Spring floods damaged the bridge and winter traffic simply bypassed the toll by crossing on the ice.

Today the jetty and park are excellent sites for birdwatching. The bridge landing area is unchanged from its early days and, because it extends into the river, offers unobstructed views up and down stream.

## Birds and the Bay

Bay Bridge offers two distinct types of bird habitats, the open river and the marshy wetlands that border both sides of the parking area. The trail offers excellent viewpoints for both.

Merrymeeting Bay is the largest staging area north of Chesapeake Bay for migratory waterfowl, and has the second highest concentration of bald eagles in the state. For many years, eagles have returned faithfully to a nest on Freyer's Island just downstream, easily visible through binoculars. In the fall you'll see the beautiful "V" formations of honking geese flying towards the Bay to gather before their journey south. Osprey are also frequently visible. The wetlands provide habitat for herons, ducks, egrets, and many songbirds. Migrating shorebirds in spring and fall are plentiful. All these birds depend on unpolluted water and rich feeding areas. Places like Bay Bridge help preserve this part of the food web.



## Bay Bridge Park 2

Directions: From Cook's Corner in Brunswick take US Route 1 north ¼ mile to Old Bath Road on the left. Before you get to the town line for West Bath, take a left onto Bay Bridge Road and then bear left at the T-intersection, going all the way to the end. If you cross the New Meadows River on Old Bath Rd., you've gone too far.



Looking upstream on the Androscoggin river



Hemlock trees along the trail



The rock landing and view across to Topsham

## Birds in flight

One way to enjoy our avian neighbors, the birds, is to keep an eye to the sky overhead. Either close in or far away, it's possible to see many species at Bay Bridge. It can be hard to tell them apart though, even with binoculars. Looking at the silhouettes below, can you identify the heron, eagle, duck and osprey? Notice how the front of the eagle and osprey wings differ—this is one way to tell them apart (osprey on right).



## Threats to our Feathered Friends

Merrymeeting Bay and surrounding waters are especially important to migrating waterfowl, who come here twice a year every year, and to the spawning and nursery habitat of key migratory fish. In truth, all Bay species are dependent on clean water. By the mid-20th century, however, human development pressure and careless industry practices led to serious pollution of the Androscoggin river before you, the Kennebec River, and the Bay itself. The eagles lost their ability to reproduce due to the pesticide DDT in their food web, and vast fish kills took place every summer due to poor water quality.

Fortunately, Maine senator Edmund Muskie and others introduced the Clean Water Act in 1972, and DDT was banned. Serious water treatment began and the eagles came back. While things are much better now, some of the environmental damage continues and remains to this day. Caring for the environment, so our plant and animal friends can stay healthy, is a job for all of us.

## Dresden Falls Archaic Preserve

The Dresden Preserve is located on the east side of the Kennebec River just upstream from Merrymeeting Bay in the town of Dresden. Now a 31-acre preserve, it is owned by the Archaeological Conservancy with additional protective easements held by Friends of Merrymeeting Bay and the Maine Historic Preservation Commission. The site is considered the most significant prehistoric archaeological site in Maine, inhabited at least seasonally between 4,500-9,000 years ago.

The river level at Dresden Preserve is much higher today than during its early human occupancy. Since about 12,000 years ago, water levels have risen to conceal what was a distinct elevation drop at this location, and experts suspect that a major falls once spanned the entire river. The falls provided excellent fishing, plentiful enough to support a semi-permanent native village. Today the early falls are under water, though you can still make out some quickwater passing by the rocks.



Parking area at Dresden Falls



Looking upstream on the Kennebec River

## Early Peoples at Dresden

The Dresden Falls archaic site is the largest and most intensively occupied early-to-middle archaic site in Maine. It has yielded more stone artifacts from this period than any other site in the state. The site was discovered about 30 years ago by artifact collectors who reported finding stone tools in a plowed field. A multi-year effort protected this site from becoming an eight home subdivision.

In 2008 Maine State Archeologist Arthur Spiess conducted the first professional excavations at the site. In addition to recovering projectile points and slate knife fragments, he found buried intact hearths and garbage pits that were radiocarbon-dated to 7,000 years ago. Spiess also recovered numerous fish bones, indicating that these falls were an excellent place to catch migrating fish, including striped bass, sturgeon, and salmon.

There is a small garage in the field, which was the home for working archeologists during their excavations.



## Dresden Falls Archaic Preserve 2

### Fish

Merrymeeting Bay is the only body of water in Maine that provides spawning and nursery habitat to all twelve diadromous fish species in the Gulf of Maine. Diadromous fish are fish that spend part of their lives in the ocean and part in fresh water. Historically, salmon, sturgeon, smelt, shad, alewives, herring and striped bass migrated into the Bay to spawn. Eel migrated in the opposite direction, from Bay to the North Atlantic to produce their young.

Overfishing, dams, and pollution have degraded the Bay waters for many decades. As a result, some fish species, like shortnose sturgeon and Atlantic salmon, are endangered, while others, such as Atlantic sturgeon, rainbow smelt and alewives, are threatened or species of concern. Fortunately, restoration efforts are under way; they deserve our ongoing attention and support.



Archeological dig at Dresden upper field

Directions: From Richmond take Route 197 to the east and cross the river to West Dresden. Turn right at the first 4-corner intersection onto Route 128 south. The preserve entrance is about  $\frac{3}{4}$  mile down 128 on the right. Just before it there is a Victorian style house on the right painted aqua/teal and a white house down off the road. The driveway is dirt/gravel and there is a cable across it about 50' down. Park here and follow the track to the large upper field and storage building. Follow the field to the river from there.

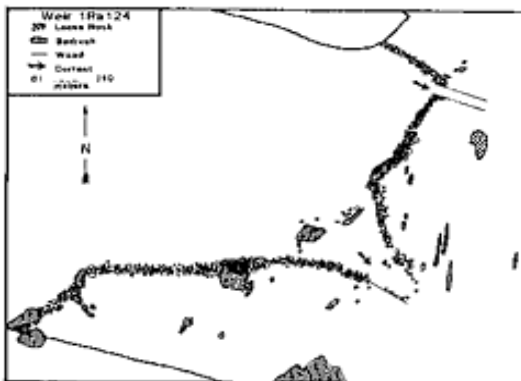
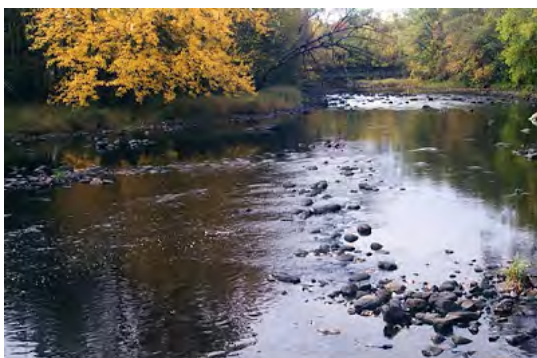


Figure 7

Schematic of a native American fish weir



A prehistoric fish weir on the Sebasticook River

### Activity: Native Americans

Find a comfortable spot to sit for a few minutes overlooking the Kennebec River. Let your mind relax and imagine what this place would be like with no boats, no dwellings, no extra noise, no disturbance at all. You and a small group of friends are living here, surviving on fish and some of the plants you know to be nourishing.

What would you see? Hear? Smell? Could you drink the water right from the river? Of course you could: there was no pollution then. How would you catch fish? Evidence suggests that these peoples used spears, brush weirs and nets of root or bark. Weirs are obstacles that are placed in a river channel to direct the fish to a narrow area where they can more easily be caught. If you lived back then, chances are you would have spent a lot of time watching the river and fish movements so your fishing would be more successful. Why? Draw a picture if you like, of what native life might have been like here 9,000 years ago.