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April 2007



# Bombay Hook

*National  
Wildlife Refuge*

*Bear Swamp Trail*

American woodcock  
USFWS

## Welcome



This goose, designed by J.N. "Ding" Darling, has become the symbol of the National Wildlife Refuge System.



Welcome to Bombay Hook National Wildlife Refuge and the Bear Swamp Trail.

Bear Swamp Trail is accessible to the physically challenged. The trail leads from the parking lot through a wooded area bordering Bear Swamp Pool to a thirty-foot observation tower and a floating observation platform that accommodates wheelchairs. It then returns through a forest setting to the parking area. The trail has a wide, hard surface and boardwalk section.

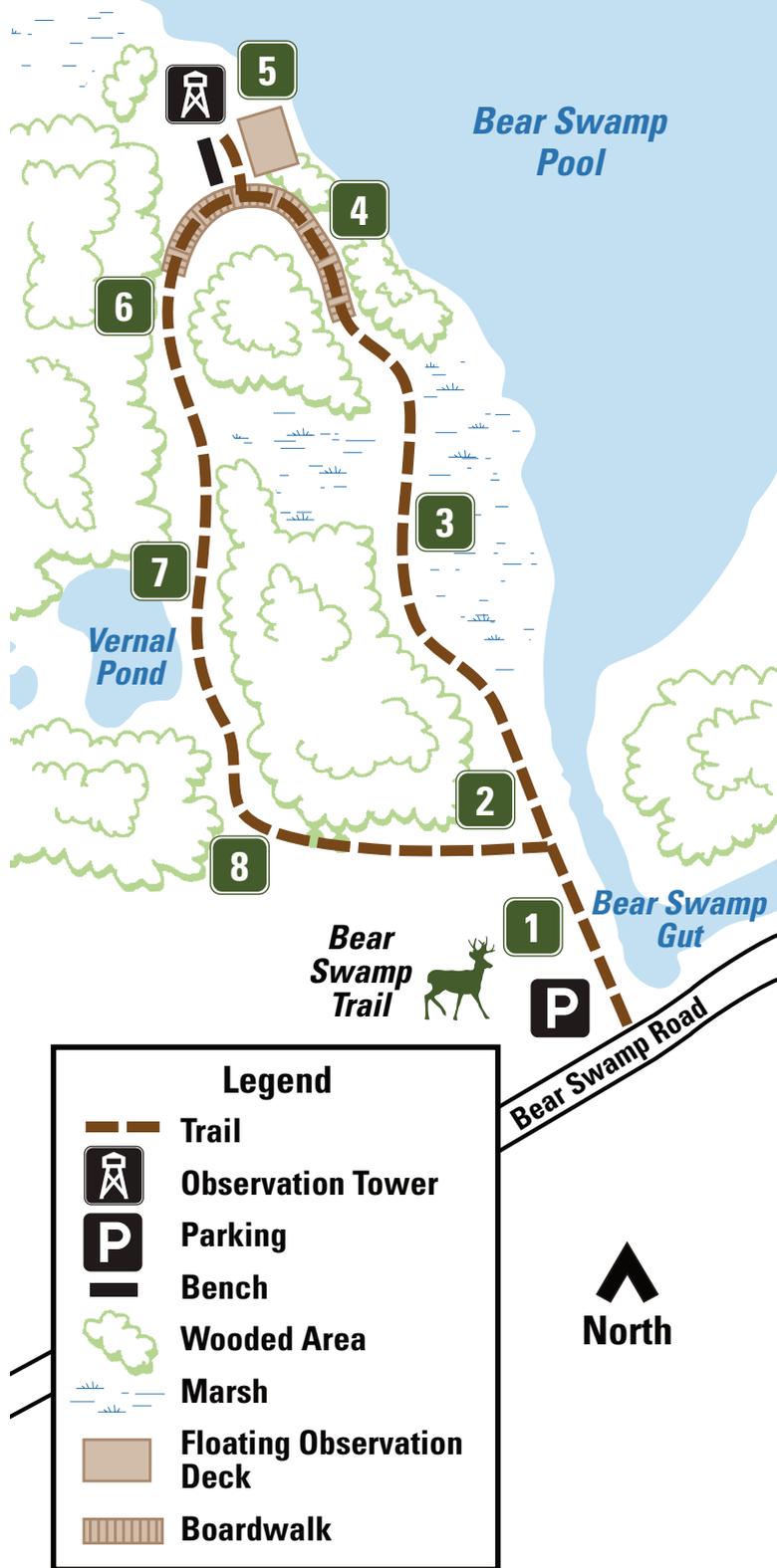
Total distance of Bear Swamp Trail is approximately one quarter of a mile. Eight numbered guideposts are located along the trail corresponding to descriptions in this brochure.

Bear Swamp Pool and Bear Swamp Trail were built in 1961. The area was known historically as Bear Swamp, although bears no longer inhabit Delaware – the last recorded sighting was in 1905.

Some portions of the trail are bordered with poison ivy, so it is best to avoid brushing against the vegetation. During warm months it is advisable to use insect repellent and wear protective clothing to help deter ticks.

Binoculars and birding field guides are handy tools to view wildlife. Binoculars are available on loan at the visitor center and the refuge store carries a full line of field guides. The visitor center also has lists of amphibians and reptiles, birds, and mammals at Bombay Hook NWR.

Further information about birds, other animals, and plants that inhabit the refuge is available in the visitor center.



**1**

Forest succession is the gradual change in vegetation that occurs when cleared fields are abandoned. Grasses and herbaceous plants are first replaced by woody plants, then by shrubs and trees such as winged sumac and sweet gums. Following this first stage, maples and beech trees gradually replace this initial growth. This is known as the second stage of succession. Over time, oaks and hickorys predominate as the third stage or mature forest is achieved. All three of these stages can be observed on Bear Swamp Trail.

These woods along the parking area and at the beginning of the trail are in the first stage of succession. Clusters of red fruit identify the winged sumac, a shrub that attains a tree form. The predominate sweet gum trees have five-pointed leaves that turn red, yellow, and orange in the fall; rough, gray bark with deep fissures; and a brown seed pod in the shape of a prickly golf ball that provides food for small seed-eating birds.

In the spring and fall this is a good place to look for wood warblers high up in the treetops.

**2**

A careful look here reveals that there is a change in the forest. Red maples indicate that this area is in the second stage of forest succession. The red maple, also known as the swamp maple, grows in moist soils and is identified by circular shaped leaves with clefts forming three and sometimes five lobes.

On the right side of the trail along the water's edge evidence of beaver activity has been observed from time to time, indicated by the stumps of small trees that have been chewed

off in a conical shape. Beavers use the trees they cut down for food (they eat tree bark and small twigs) and for construction material to build their homes, called lodges. The lodges, built in the water, are large, cone-shaped structures with only the top showing above the water. The entrance is under water. Beavers are nocturnal animals, so they are seldom seen in the daytime. They also are freshwater animals, living in the large impoundments at Bombay Hook. Sometimes beavers are confused with another rodent, the smaller muskrats that live in tidal salt marshes as well as in freshwater impoundments. Muskrat houses are made of mud and marsh grasses and can be seen in the nearby salt marsh where they appear as brown-colored mounds.

Also on the right side between the trail and the water are large growths of phragmites. This plant, which reaches thirteen feet in height, has stiff wide leaves, a hollow stem, and a feathery plume like top. It grows where dredging, ditching, or some similar activity has disturbed the soil. Phragmites has little value for wildlife and crowds out more desirable wetland vegetation. Therefore, in freshwater environments, efforts are made to control it by manipulating water levels, chemical treatment, and burning.



*Sweet gum*

Robert Savannah



*Beaver*

3

At this point of the trail there are ideal growing conditions for many species of ferns. Fourteen species of ferns are found growing at Bombay Hook, and seven of those can be seen here.

Ferns are delicate, flowerless plants usually found in moist, shady areas. They reproduce by spores that are enclosed in small, brown cases found on the backs of leaves or on separate stalks. When the spores ripen, the cases burst open, and the spores fall to the ground where they develop into tiny green heart-shaped plants. These plants then develop a female sex cell, an egg, and a male sex cell that fertilizes the egg. This fertilized egg then grows into a mature fern.

The leafy branch of a fern is called a frond; the small leaflets that make up the frond are called pinnae.

The seven ferns found here are:

- Bracken – large, triangular fronds, grows 3-5 feet in height
- Cinnamon Fern – spores are on separate fertile cinnamon-colored fronds, grows 2-5 feet in height
- Lady Fern – spores on the underside of frond, grows 2-3 feet in height
- Marsh Fern – leaf edges slightly rolled, grows 18 to 24 inches in height
- New York Fern - frond tapers toward the base, grows 1-2 feet in height
- Royal Fern – spores on fertile pinnae at ends of fronds, grows 2-5 feet in height
- Sensitive Fern – coarsely divided fronds, spores on bead-like structures, grows 18-24 inches in height

In summer this is a good place to stop and listen for the beautiful, clear, flute-like song of the wood thrush. The wood thrush and its cousin, the veery, often are found here in the understory.



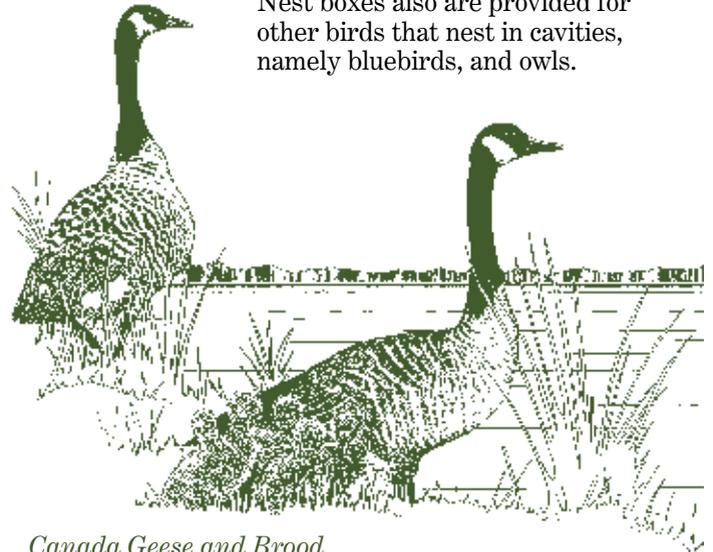
*Ferns*

4

Bear Swamp Pool was constructed in 1961 and is the last of the four freshwater impoundments at Bombay Hook. It covers 240 acres. Water levels in the pool are controlled and are lowered in the summer to promote growth of aquatic vegetation, while still maintaining deeper pools to serve as nesting sites for waterfowl. The water levels are raised again in the fall and winter.

Pied-billed grebes build floating nests in the open water of Bear Swamp Pool, around stands of reeds. Common moorhens may build their nests over the water in heavy growths of reeds, often with ramps down to the water. Least bittern, blue-winged teal, and northern shovelers nest in the grasses and other vegetation along the banks of the impoundment. Non-migratory Canada geese favor the grassy islands, and black-necked stilts build mud nests on the exposed islets at the north end of Bear Swamp Pool.

Wood Ducks nest in nest boxes located along the wooded edges of Bear Swamp Pool. Two hundred sixteen wood duck boxes are located on the refuge, and in a typical year about half are used by the ducks. Nest boxes also are provided for other birds that nest in cavities, namely bluebirds, and owls.



*Canada Geese and Brood*

5

The thirty-foot observation tower offers an excellent view of Bear Swamp Pool. The mix of habitats becomes apparent from this perspective: some mud flats and muddy islets, small grassy islands, areas of deeper water, and shorelines that vary from marshy grasses to woods. It's little wonder that Bear Swamp is so attractive to wildlife.

The floating observation deck with a mounted binocular scope at wheelchair height affords a somewhat similar view, but also provides an opportunity to get close up to nature. Particularly in the fall when Bear Swamp is teeming with waterfowl, the ducks sometimes are almost within arms reach.



*Egret*

In the summer Bear Swamp Pool is a magnet for the larger wading birds. Great blue, little blue, and tricolor heron, great and snowy egrets, black-crowned night heron, and glossy ibis flock here, many from their heronry on Pea Patch Island, about thirty miles north on the Delaware River. These birds all nest in colonies. Frequently they are joined by black-necked stilts, American avocets, and greater yellowlegs. Some shorebird species such as dunlin and short-billed dowitchers also use the shallows.

In the fall and winter Bear Swamp Pool attracts many waterfowl. Migratory and non-migratory Canada geese, greater snow geese, and tundra swans can at times nearly fill the pool. Ducks more than fill in what's left. Northern pintails, black ducks, mallards, northern shovelers, green-winged teal, widgeon and gadwalls are the common dabbling ducks, while ruddy ducks, buffleheads, and ringed-neck ducks are the divers. Added to this mix in the fall are common moorhens, coots, pied-billed grebes, and cormorants.



*Dragonfly*

Bear Swamp has other animals as well. For example, turtles can be seen basking on logs or mud banks. The most common are eastern painted turtles, but others might include the eastern mud turtle, redbelly turtle, and the common musk turtle. Common snapping turtles inhabit Bear Swamp Gut, the stream that runs along Bear Swamp Road.

On a hot late summer day look for dragonflies and damsel flies as they skim over the water in search of mosquitoes, the mainstay of their diet. With its three-inch wingspan and broad white tail, the white tail dragon fly is hard to miss, but look also for slim, bright-colored damsel flies as well.

6

Bear Swamp Trail has now entered an area in the third stage of forest succession, the mature forest of oaks and hickories. Look here to find acorns from the oak trees. Look also for eastern gray squirrels whose major food source is these acorns. Ten species of oak are found on the refuge.

Sometimes in this area the forest floor is covered with mushrooms and fungi. They have been called Mother Nature's House Cleaners because these non-flowering plants break down dead vegetation and animal products, supplying minerals to other plants.



*Jack-in-the-pulpit*

The understory here has many plants beneficial to wildlife. In late summer blackberry, wild raspberry, and wild strawberry plants provide food for many songbirds. Jack-in-the pulpits, which bloom in the spring, later develop clusters of berries that also provide food for wood thrushes and others.



*Spring Peeper*

7

This small vernal pool is flooded in some seasons and is simply a wet spot in others. Similar areas are found in many of the woodlots in Bombay Hook. These areas are important because they support a large and varied amphibian community.

There are two common salamanders on the refuge. The redback salamander is a member of the lungless salamander family, meaning that lungs are absent and respiration is through the skin and lining of the mouth. It has two color forms, one with a red stripe down the back and the other (called lead backed) that is overall dark. The latter is usually found at Bombay Hook. This salamander lays eggs in damp logs or moss, but they do not have an aquatic larval stage as do most other salamanders.



*Marbled Salamander*

8

The woods in this area attract a number of woodland birds. Listen to hear the drumming of woodpeckers. Downy and red-bellied are common, as are northern flickers.



*Flicker*

Owls also are common in the area, although because they are nocturnal they are rarely seen. Of the seven owls found on the refuge, the most common are eastern screech-owl, great horned owl, and barred owl.

We hope you have enjoyed your visit to Bear Swamp Trail. There are four other walking trails on the refuge. Parson Point Trail is one mile round trip in length and goes through mixed habitats from freshwater marsh bordering Sheariness Pool to mature forest. It is the most isolated of the three trails. The Saltmarsh Boardwalk Trail is a half mile in length and gives the visitor a close up look at the tidal salt marsh that makes up more than eighty percent of the refuge. Walking trails to the observation towers at Raymond and Sheariness Pools go through edge habitats that often have interesting bird life.

The other common salamander is the marbled salamander. This is a member of the mole salamander family. Marbled salamanders have lungs. Eggs are laid in depressions in the forest floor and hatch with the next rain.

Northern spring peepers, New Jersey chorus frogs, southern leopard frogs, pickerel frogs, and wood frogs also are likely inhabitants of this pond when it is flooded.

In summer look for Fowler's toads. They often sit on the pathway until they are approached, and then hop into the greenery.