

Bombay Hook

National Wildlife Refuge

Auto Tour Stops



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Welcome to the Bombay Hook Wildlife Auto Tour!

In 1937, the federal government purchased 12,000 acres along Delaware Bay to create a national migratory bird refuge to provide feeding and resting places for birds migrating along the Atlantic Coast. Today, that refuge provides 16,251 acres of diverse habitats for many species of birds, mammals, reptiles, and amphibians and supports a great variety of plant life. It also offers recreational and educational opportunities for 100,000 visitors each year.

Although 80% of the Bombay Hook Refuge is a tidal salt marsh, the wildlife drive will take you through upland areas of fields, forests, and freshwater impoundments, with frequent views of the tidal marshes. This brochure corresponds with 18 numbered signs posted along the 12-mile drive.

You may borrow binoculars and field guides from the visitor's center for the tour. Lists of bird, reptiles/amphibians, fish, mammals, trees and wildflowers found on the refuge are available at: https://www.fws.gov/refuge/Bombay_Hook/visit/brochures.html. As this is a National Wildlife Refuge, collecting, disturbing, feeding, injuring or damaging animals and plants is prohibited.

DRIVING DIRECTIONS: Turn right following the sign at the first intersection. You are now on a one-way road.

STOP #1 – A Mix of Habitats

Note some of the various habitats found on the refuge. To the left you will see a small marshy area leading to Raymond Pool, one of four freshwater impoundments in the refuge.

The area of the refuge in the vicinity of our office and maintenance complex is fragmented by the road system, and divided into relatively small tracts of habitat of 10-50 acres. This landscape lends itself to early successional management fostering the growth of grasses, forbs, shrubs or small trees. Various methods are used to encourage diverse plant communities and habitat structure, including mowing, varied by season, herbiciding, and prescribed burning. These areas are favored in the winter by various species of sparrows, raptors and [juncos](#). During the breeding season you can see courting [turkeys](#), the bright colors of the [blue grosbeak](#), the aerial display of the [yellow-breasted](#)

[chat](#) and [woodcock](#), and hear the call of the northern [bobwhite](#).

The forested area ahead represents a 2.5-acre fragment wooded habitat. Throughout the refuge you will see other wooded areas less than 250 acres. These areas are favored by edge species such as northern [cardinals](#), [bobwhite](#) and other resident songbirds. In the fall look also for the softball sized fruit of the [Osage orange tree](#), named for the Osage Indians who used its wood to make bows.

STOP #2 – Civilian Conservation Corps

On your right is a brackish pond fed by the tidal salt. The term 'brackish' refers to a mix of fresh and salt water. The water in this pond is about one-fourth as salty as the ocean.

This pond was created in 1938 as a borrow pit for construction of the dike and roadway just ahead. Freshwater impoundments or ponds were built by constructing dikes through the salt marsh and wooded swamps. This was one of the tasks undertaken by a special unit of the [Civilian Conservation Corps](#) (CCC), a company of 160 African-American men who were assigned to Bombay Hook from 1938 to 1942.

The CCC enrollees also planted 34,000 seedlings to reforest portions of the refuge; they built a headquarters building and shops, homes for the manager and his assistant, and a boathouse and marine railway; and they assisted in mosquito research and saltmarsh bird surveys. Their most difficult task was clearing swamps and building dikes to create the impoundments for waterfowl and other migratory birds. By late 1939, Raymond Pool was enclosed and a dike was completed separating Shearness Pool from Finis Pool.

STOP #3 – Raymond Pool

On your left is Raymond Pool, the smallest of the refuge's freshwater impoundments, covering just 95 acres. As you drive from here around Shearness and beyond Bear Swamp Pool, all of the water on the left side of your vehicle is freshwater and all of the water on your right is brackish water.

Water levels in Raymond, Shearness, and Bear Swamp Pool are carefully managed. Water is allowed to drain from the pools in the spring and summer to provide mud flats and shallow puddles sought by migrating shorebirds that feed on aquatic

invertebrates living in the bottom of the pools. It also allows [millet](#), [sprangletop](#), [beggarticks](#), bulrush and other plants to thrive, providing food for the fall migrations of ducks and geese. In the fall, rains fill in pool to a depth of 6 to 12 inches, just the right depth for dabbling ducks and geese, with tails up, to feed on seeds and plants on the bottom.

To your right, toward the salt marsh, you may see egrets and herons on the banks of the tidal stream (called a gut) during spring, summer, and early fall months. Look also for [double-crested cormorants](#) swimming in the gut. Further out, you can see the trees on George's Island; a small wooded upland area or hammock in the marsh.

STOP #4 – Far Across the Salt Marsh

If you look carefully to your right across the salt marsh to the horizon, you may see a ship on Delaware Bay about two and a half miles away. Closer in the gut next to the road you might catch a glimpse of a [belted kingfisher](#) perched on a snag or swooping over the water to grab a fish.

The salt marsh is a rich, supportive habitat and comprises the largest portion (13,000 acres) of habitat on the refuge, although much of it is not in view. Aquatic invertebrates feed on the detritus. Many small fish, including [sheepshead minnows](#), [mummichogs](#), [Atlantic silversides](#), and [killifish](#) spawn in these marshes. The marshes serve as nurseries for the young, providing food and hiding areas among the grasses. [White perch](#) and [striped bass](#) can be found feeding in the waterways. Herons and egrets patrol the banks stalking fish and eel. [Marsh rice rats](#) and [meadow voles](#) hide in grassy tunnels, feeding on plant material and insects. They in turn are prey for [northern harriers](#) and [short-eared owls](#).

On your left at the north end of Raymond Pool is a favorite hangout for [American avocets](#). Bombay Hook is one of the few places in the east where this beautiful bird is found and you might be lucky enough to see them Spring through early Fall.

DRIVING DIRECTIONS: Bear right (follow sign). Be careful - you are now entering a two-way road.

STOP #5 – Shearneck Pool

This is Shearneck Pool, the largest of the four freshwater impoundments. It covers an area of 560 acres and the water level is carefully managed for

the different species that use the impoundment throughout the year. Shearneck has several small islands and deeper pools that retain water when most of the impoundment is drained, providing a greater diversity of conditions for a variety of species.

Inside the small fenced area are water control structures that help maintain water levels within the impoundments.

The greatest wildlife spectacle at Bombay Hook occurs just before sunset in November and December when tens of thousands of [snow geese](#) return from fields to the west to settle on the pools and salt marsh for the night. They come in waves and cover the sky, and the sound of their calling is incredible.

STOP #6 – Leatherberry Flats

On the right is an area known as Money Marsh and Leatherberry Flats. As you look out over the marsh you see that it is not a single habitat and much more than just a sea of grasses. What is called the "tidal salt marsh" is made up of mud flats, natural and man-made ditches, streams, creeks, rivers, tidal pool, as well as vast areas of cordgrass.

Some parts of the marsh are high marsh, meaning that they are flooded only during storms and around the spring and fall equinoxes. Most, however, are low marsh at a slightly lower elevation. At low tide, this area is a vast exposed mud flat that attracts shorebirds, yet at high tide it is completely covered by shallow open water – a dramatic change taking place twice a day.

Salt marshes produce more total vegetation per acre than most any other habitat, even more than the rain forests. At the end of the growing season each fall, marsh plants turn brown, die off, fall down, and begin a decaying process. One result is the familiar smell of marsh gas. Another is detritus, a combination of dead plants and decomposing organisms, which forms the base of the estuarine food chain. Special species of the salt marsh include: [seaside sparrow](#), [marsh wren](#), [clapper rail](#), [northern diamondback terrapin](#), [fiddler crab](#), [blue crab](#), [muskrats](#), and [river otters](#).

DRIVING DIRECTIONS: Turn right toward Bear Swamp Pool. You are now on a one-way road.

STOP #7 – Fields

The fields you see on either side of the road are not cultivated and native plants and grasses are allowed to flourish. We mow some fields to prevent the growth of woody plants. Others are allowed to develop naturally in a process called natural succession. The field ahead has not been mowed and woody plants and shrubs have been allowed to grow. These saplings are mostly winged sumac and sweet gums.

As you drive farther down this road you will pass some of these trees that have grown into mature trees and shrubs, mostly [sweet gums](#). This is known as the first stage of forest succession. Subsequently, these woodlands will change again, with [maple](#), [black cherry](#) and [locust](#) trees replacing the sweet gums and other first succession species. After this second stage, there is a mature forest stage where [oak](#), [tulip](#) and [hickory](#) trees dominate.

You might find a [red fox](#) as you proceed around Bear Swamp Pool - they are one of the most commonly seen mammals on the refuge. Foxes are most active at dawn, dusk and at night, feeding on small animals, insects, berries and other fruit. Remember not to feed the foxes, since not only is it illegal, but it also endangers their life (they become dependent on humans for food, might be hit by a vehicle, and people food is unhealthy for them.)

STOP #8 – Bear Swamp Pool

On your left is Bear Swamp Pool that covers 240 acres and was built in 1961. Like the other ponds, the water level is lowered during the spring and summer to allow plant growth and provide mud flats. It also retains area of deeper water for the several bird species that nest here. [Pied-billed grebes](#) are small duck-like birds often seen here during the warmer months. They are known to breed here, anchoring their floating nests to vegetation along the banks. [Common moorhens](#), [blue-winged teal](#), [black-necked stilts](#), and [Canada geese](#) also nest in Bear Swamp. Also look for [green-winged teal](#) feeding in the flat across the road from Bear Swamp Pool.

STOP #9 – Bear Swamp Islands

Canada geese nest on the large grassy islands on this end of Bear Swamp Pool. Terns, gulls, and cormorants rest on the smaller islands. [Black-necked stilts](#), attractive black and white birds with long red legs, build nests of mud just above the

water line on these islands. They adjust the height of the nest to meet rising or falling water levels. On warm days in spring and summer this also is a good spot to view turtles on a log, basking in the sun. Look carefully for [black-crowned](#) and [yellow-crowned night herons](#) in the trees around you.

STOP #10 – Owls

The round wire structure is an abandoned corn crib. The structure mounted near the top of the corn crib is a nest box for [barn owls](#).

Seven owl species are found on the refuge. [Barn](#), [eastern screech](#), [barred](#), and [great horned owls](#) are common and nest on the refuge, while [long-eared](#), [short-eared](#), and [northern saw-whet owls](#) are occasionally seen in the winter. Also, in the winter you may occasionally see a [snowy owl](#) on the refuge.

The concrete slab next to the corn crib is all that remains of the mess hall used by the CCC while they worked here in the refuge.

STOP #11 – Wood Ducks

The box on your left is a [wood duck](#) nesting box, one of 138 installed on the refuge. Wood ducks prefer wooded swamps where they feed on acorns, seeds, and aquatic insects. They are the only duck breeding on the refuge that nest in cavities. At one time, they used large holes made by [pileated woodpeckers](#). As the availability of these holes decreased, conservationists began installing these nest boxes.

In an average year, about 65% of the boxes on the refuge are used by wood ducks. Together, they lay a thousand or more eggs and hatch five hundred or more ducklings. The ducklings jump (or are pushed by the mother) out of the holes in the box, land in the water, and swim away! The metal cone below the box is a predator shield to keep [raccoons](#) and snakes from climbing up to the box and getting the eggs or ducklings.

Further ahead and on your right, you will see a [bluebird](#) box; there are around 42 bluebird boxes on the refuge. The eastern bluebird is a cavity nester, and these boxes augment natural nest cavities. A little less than half are used by bluebirds; the remainder by [tree swallows](#) and [house wrens](#).

DRIVING DIRECTIONS: Turn right toward Finis Pool and the Allee House. Use caution - you are now on two-way roads. After a short distance turn left following the sign to Finis Pool.

STOP #12 – Turtles

Here you get your first view of Finis Pool, and you can see that it is quite different from Raymond and Bear Swamp Pools. The portion of this 240-acre pool that can be seen from the road is a shrub and wooded swamp. There are also open waters, many created by beaver dams. The pool is fed by run-off and a small stream, Finis Branch, and is a source of freshwater for Raymond and Shearneck Pools.

On warm days, beginning in the spring and continuing into the fall, turtles usually can be seen basking on logs and mud banks here. Seven species of turtle are found on the refuge. Those basking here are likely [eastern painted turtles](#). Common [musk turtles](#), also known as stinkpots, and [eastern mud turtles](#) also inhabit the pool.

The [eastern snapping turtle](#) is the largest species found on the refuge, and it can be seen in both fresh and brackish water. Snapping turtles are most often observed in the late spring and early summer when the females come out of the water to lay eggs in the soft earth on the edges of fields.

Neither turtle nor tortoise, the [northern diamond-backed terrapin](#) is the only terrapin species on the refuge and it lives exclusively in brackish water. It inhabits creeks and guts in the salt marsh, and is most often seen in June and July when the female climbs up the banks of the dikes to lay her eggs. Although it is common now, the population was severely depleted in the early twentieth century when it was hunted for a popular dish: terrapin soup.

STOP #13 – Finis Pool

This is a freshwater habitat study site for school children participating in environmental education programs conducted by refuge staff and volunteers. Using dip nets, students catch and identify a variety of aquatic insects, tadpoles, crayfish, and mud minnows.

Often mistaken for algae, the green mat that covers large areas of the pool in warm seasons is [duckweed](#), a small floating plant. It is a favorite food for waterfowl. Many other aquatic plants can be

seen here including [smartweed](#), [cattails](#), [bur marigold](#), [wild millet](#), [water lilies](#), and [marsh mallows](#). The green balls on the higher branches of trees in this area are [mistletoe](#).

This road is on top of a dike, or causeway, built by the CCC in 1939. It separates Finis Pool from the freshwater swampy area at the north end of Shearneck Pool.

STOP #14 – Warbler Woods

The woods ahead and to the right are favored by bird watchers, who search for wood warblers in the spring and colorful passerines in the summer.

These woods are also used for the refuge's environmental education program. Using trowels to dig through leaf litter and peering under logs, students put specimens in jars for identification and study. The inhabitants of the forest floor are many and varied. They include ground beetles, [centipedes](#) and [millipedes](#), worms, grubs, plus [green treefrog](#) and [eastern wormsnake](#).

The best finds, however, are the salamanders. Two species are common in these woods: [eastern red-backed](#) and [marbled](#). Red-backed (in our area they often are dark gray or black rather than red) are members of the lungless family of salamanders. Oxygen exchange occurs through the skin. These salamanders have no larval stage as do most other amphibians.

DRIVING DIRECTIONS: Turn around and return to the intersection. Turn left to the Allee House.

STOP #15 – Big Woods Pond

Big Woods Pond, a natural depression, was deepened to provide fill for construction of the dike at Finis Pool. It has been greatly enlarged by a beaver dam. [Beavers](#), a mostly nocturnal animal, live only in freshwater and build lodges and dams with logs they cut from nearby trees.

The pond is fed by run-off from the surrounding area, and although it is near Finis Pool, it supports somewhat different fish population. The predominate fish in Finis is the [mud minnow](#), and Big Woods Pond hosts the beautiful [pumpkin seed](#), a member of the sunfish family, and the [brown bullhead](#), a member of the catfish family. It is thought that eggs of these fish were carried to the pond on the legs of wading birds.

STOP #16 – White-tailed Deer


This is a good spot to observe [deer](#) as they move along the edges of the forest to graze on adjacent fields. They are most often seen early in the morning or at dusk. The abundance of food and shelter at Bombay Hook has resulted in a steady population growth. In 1941, only four deer were found on the refuge.

Hunting has been a successful way to maintain the deer and snow goose populations at the present level. Since its introduction in 1934, sale of the [Federal Duck Stamp](#), which serves as a hunting license and entrance pass to all national wildlife refuges, has generated more than \$800 million. These monies have been used to purchase or lease over 6 million acres of wetland habitat in the US. An estimated one-third of the nation's endangered and threatened species find food or shelter in refuges established using Federal Duck Stamp funds. Bombay Hook National Wildlife Refuge land was purchased with Federal Duck Stamp funds.

STOP #17 – Reforestation

Historically, much of the inland areas of the Delmarva Peninsula were dominated by forest. Gradually over time humans carved the habitat up into a patchwork quilt of towns, agricultural fields, fencerows, lawns and roads. Here on Dutch Neck, settlers had largely denuded the land of natural cover and constructed over 8 miles of ditches, lowering the water table and draining our non-tidal wetlands.

Today, the refuge has a unique opportunity for native forest restoration. The ditches that drained Dutch Neck have been restored, without impacting neighboring private lands. Some land is permitted to reseed itself in trees, while other areas are planted with a diversity of native forest species according to reforestation plans. Some areas undergo periodic prescribed burns and herbicide application. [Prescribed fire](#) rejuvenates grasslands and controls species not adapted to burning. [Herbicides](#) are used strategically to control invasive plants.

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Full restoration of the forested landscape will take decades, if not centuries. But as succession in the native plant community progresses, consider the succession of the bird community as well. Where today sightings of [red-winged blackbirds](#) may dominate, in time, the song of the [scarlet tanager](#) and [wood thrush](#) will return.

STOP #18 – The Allee House (past gate)

Abraham Allee built the [Allee House](#) around 1753. It is an example of a mid-eighteenth century vernacular Delaware architecture, and in 1971 it was placed on the National Register of Historic places. The house is the oldest building currently standing on any national wildlife refuge. Modifications to the structure have been minimal since it was built, although a one-story kitchen was added to the south end around 1790.

The Allee House is in need of restoration. The first phase of restoration to stabilize the foundation and structure was completed in 2017. The next two phases to restore the interior have not been funded. At this time, it is unknown when the restoration will be completed.

DRIVING DIRECTIONS: Turn around and follow the signs to "Refuge Exit". Remember you are on a two-way road. Continue to follow signs to the end of Wildlife Drive. Please return loaned binoculars and consider recycling your Wildlife Auto Drive brochure as you exit.

If you are a frequent visitor, you may want to purchase one of the several entrance passes available in the visitor center. The refuge store is also located in the visitor center and all proceeds from the store support the refuge. The store is operated by the Friends of Bombay Hook, Inc., a volunteer organization.

THANK YOU FOR VISITING BOMBAY HOOK NATIONAL WILDLIFE REFUGE!

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U.S. Fish & Wildlife Service
1 800/344 WILD
<http://www.fws.gov>