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U.S. Fish & Wildlife Service

# Bombay Hook

## National Wildlife Refuge

### Mammals

#### Introduction

Bombay Hook National Wildlife Refuges is located in coastal Delaware. The 16,251-acre refuge is relatively flat with most elevations less than ten feet above sea level. The major habitat type, consisting of 13,100 acres, is tidal salt and brackish marsh intersected by winding rivers, guts, and creeks. Landward of the marsh are freshwater impoundments, timbered swamps, mixed deciduous woodlands, brushy thickets, and grassy fields.

This variety of habitats provides essential food and cover requirements for an interesting combination of mammal species. Those most frequently seen, especially in the early morning and the late afternoon, are the cottontail rabbit, woodchuck, gray squirrel, red fox, and white-tailed deer. Less commonly observed are the raccoon, skunk, opossum, and muskrat. Because of a combination of small size, secretive habits, or nocturnal activity, many mammals are seldom seen. However, the careful observer will see tracks, trails, tunnels, burrows, nests and other signs that reveal their presence.

Common Name ( <i>Latin name</i> )	Description
Virginia Opossum ( <i>Didelphis marsupialis</i> )	The only marsupial (young carried in a pouch on belly of female) found in North America. Commonly found in all sheltered habitats. Normally active only at night; therefore, while present, seldom seen on the refuge. Eats fruit, vegetables, nuts, meat, eggs, insects, and carrion. The size of a large cat, has a pointed snout, naked tail, and opposable thumbs on its hind feet.
Cinereus Shrew ( <i>Sorex cinereus</i> )	Also known as the Masked Shrew. In our area, the most common member of the Shrew family. Inhabits all land areas. Hunts for insects and other small animals day or night; eats more than its own body weight each day. About 3½ inches long with a tail 40 percent of its total length. It is brown above and grayish-white below.
Northern Short-tailed Shrew ( <i>Blarina brevicauda</i> )	Most abundant in damp woods with thick leaf mold. Saliva has a toxic poison that allows it a more varied diet than other shrews. Feeds on insects, worms, snails, other invertebrates, and small vertebrates, some larger than itself. Has no external ears and short tail. Velvety fur can be black, brown, or gray. Largest shrew species in our area. Can be found in Finis Woods.
Least Shrew ( <i>Cryptotis parva</i> )	Found in open, grassy areas and marshes. Distinguished from other shrews by cinnamon color and short tail. Eats insects, spiders, and earthworms. More sociable and less aggressive than other shrews.
Eastern Mole ( <i>Scalopus aquaticus</i> )	Inhabits moist, upland soils where it tunnels its way under the surface. Active day and night in burrows where it eats worms, other insects, and some vegetable matter. Has naked tail, no external ears, and eyes covered with thin skin.
Star-nosed Mole ( <i>Condylura cristata</i> )	The only mammal with nose surrounded by finger-like, fleshy projections giving appearance of a star. Prefers low, wet ground where it burrows for insects, many of them aquatic. Often appears above ground.
Little Brown Myotis ( <i>Myotis lucifugus</i> )	Also known as the Little Brown Bat its color ranges from dark brown to golden, reddish, or olive brown. Present during the warm months. Seen in flight at dusk near the woods and over the pools of the refuge. Finds prey by echolocation and feeds on insects on the wing; flight is erratic. Migrates to hibernation sites in winter.
Silver-haired Bat ( <i>Lasionycteris noctivagans</i> )	Found in swamps, flying among flooded trees, and in forested areas in search of flying insects. Look for it at Finis Pool. Flies high and fairly straight. Distinguished by blackish-brown color. Solitary, hibernates in tree cavities although may migrate in winter.
Eastern Pipistrelle ( <i>Pipistrellus subflavus</i> )	Appears early on summer evenings and early mornings. Flight is slow and erratic. Feeds on small insects. One of the smallest bats in this area. Yellowish to drab brown in color. Migrates to caves where thousands hibernate together.

Common Name ( <i>Latin name</i> )	Description
Big Brown Bat ( <i>Eptesicus fuscus</i> )	Distinguished by dark brown color and large size. One of our most common bats. Active on warm evenings. Feeds on insects, especially on flying beetles.
Eastern Red Bat ( <i>Lasiurus borealis</i> )	A common woodland bat that roosts in trees until deep dusk. Flight is steady and rapid. Usually feeds in pairs, flying over the same area and following the same route over and over. Rusty-red in color.
Hoary Bat ( <i>Lasiurus cinereus</i> )	The largest eastern bat, it is found in woodlands; flies late and high in solitary flight. Feeds on flying insects; prefers moths. Hangs in trees during day. Migrates south in winter. Color is yellowish to mahogany brown.
Northern Raccoon ( <i>Procyon lotor</i> )	Common in the woodlands, along the field edges, around the freshwater impoundments, and in the salt marsh. Most active at night, but also seen in the daytime. Identified by black mask over eyes and ringed tail. Omnivorous; eats anything available. Often dunks food in water (as a lubricant to aid swallowing). Look for evidence (scat) on Boardwalk Trail over the Salt Marsh.
Long-tailed Weasel ( <i>Mustela frenata</i> )	Chiefly nocturnal, but also may be active during the day. Feeds mostly on small mammals, some larger than itself. Has a long slender body with a long neck and a black-tipped tail as long as its body. A few are present in the upland areas of Bombay Hook that are near water.
American Mink ( <i>Mustela vison</i> )	An excellent swimmer. Feeds on small mammals, including muskrats, but also frogs, and fish. Mostly nocturnal. Known for its thick, glossy dark brown fur. An occasional mink may be found in the marsh or along the streams in the refuge.
Northern River Otter ( <i>Lutra canadensis</i> )	A large weasel-like animal with small ears and a broad snout, rich brown in color. An aquatic mammal; feeds on fish, frogs, and crayfish. Makes dens in banks with entrance below water. Playful, likes to slide down mud banks; families play together. Lives in the refuge impoundments but can be seen also in Raymond Gut along the Boardwalk Trail.
Striped Skunk ( <i>Mephitis mephitis</i> )	Common in the upland areas at night. Recognized by its odor and its black body and white stripe. Omnivorous, feeding on insects, grubs, eggs, mice, berries, and carrion. Active shortly after sundown and to near sunrise.
Red Fox ( <i>Vulpes fulva</i> )	One of the most commonly seen mammals on the refuge, usually along the edges of the road, but most active at dawn, dusk, and at night. Feeds on small animals, insects, berries, and other fruit. Found in upland areas of the refuge as well as in the salt marsh. Usually reddish brown with black legs and feet and a white tipped tail, but there are many color variations including gray and black.
Gray Fox ( <i>Urocyon cinereoargenteus</i> )	A very rare inhabitant of the refuge; is almost totally nocturnal; and is found only in limited habitats - mixed hardwood forests, old fields, and heavily wooded swamps. This species is very secretive and generally avoids cultivated fields and inhabited areas. Readily climbs trees to avoid danger, the only dog species to do so. Varied diet includes small mammals, insects, birds, fruit and grasses. Color is overall gray with a black stripe down its tail.
Harbor Seal ( <i>Phoca vitulina</i> )	Occasionally sighted along Delaware Bay at Port Mahon and at the mouth of the Leipsic River. This is the common seal seen along this part of the Atlantic Coast. Color variable; light with dark spots or dark with light rings. Diet consists of fish.
Woodchuck ( <i>Marmota monax</i> )	Abundant. Also known as the Groundhog. Lives in deep burrows excavated in fields, woods, and along the impoundment dikes on the refuge. Thick-bodied, short-legged, brown colored. This mammal is a vegetarian, feeding on grasses, weeds, and garden crops. In our area, hibernates from October to February.
Eastern Chipmunk ( <i>Tamias striatus</i> )	Lives among logs and stumps in the hardwood areas. Look for it in Finis and Bear Swamp woods. Solitary and feeds on seeds, bulbs, fruits, nuts, insects, and eggs. Runs with tail straight up. Has a reddish rump, black and white stripes on back.
Eastern Gray Squirrel ( <i>Sciurus carolinensis</i> )	Inhabits the oak and hickory woodlands that are most accessible to the public on the Bear Swamp Trail and at Finis Woods. Arboreal, rarely venturing far from trees; although it stores nuts and acorns in small holes in the ground, some of which germinate and grow into trees. Diet also includes flowers, birds' eggs, fungi, and carrion. Usually gray above, whitish below with brown wash on head and bushy tail.
Southern Flying Squirrel ( <i>Glaucomys volans</i> )	Probably abundant, but hardly ever seen because it is totally nocturnal. Inhabits hollow trees in wooded swamps of the refuge to emerge only after dark. It glides from tree to tree on a flap of skin between its front and hind legs. It has silky gray-brown fur above and white below with large, black eyes. It feeds on nuts, seeds, insects, berries, birds' eggs, and smaller rodents.

Common Name ( <i>Latin name</i> )	Description
American Beaver ( <i>Castor canadensis</i> )	First reported on the refuge in 1938, it was re-discovered during the fall of 1977 after an absence of nearly twenty years. Presently it is common in Finis, upper Shearneck, and Bear Swamp Pools. A nocturnal animal, seldom seen in the day. Feeds on leaves, branches, and tree bark and uses felled trees to build dams and lodges. Dark brown, it has large, broad, hairless tail, webbed hind feet, and is our largest rodent.
White-footed Deermouse ( <i>Peromyscus leucopus</i> )	Abundant in wooded and brushy areas. Reddish-brown or gray-brown above with very white belly. In the past, one had built a nest in the brochure box on Boardwalk Trail! Feeds on seeds, berries, and insects.
Marsh Rice Rat ( <i>Oryzomys palustris</i> )	Common in the salt marsh areas. Chiefly nocturnal and semi aquatic, they are excellent swimmers and divers, well equipped to live in habitats with varying water levels. Feeds on green vegetation and seeds, but also includes fish, crabs, and insects. Builds globular nests in the marsh above the high water level. The size of a mouse with a tail longer than the rest of its gray-washed body.
Meadow Vole ( <i>Microtus pennsylvanicus</i> )	Abundant in grassy, upland fields and among the grasses of the salt marsh. A good swimmer. Feeds on grasses, sedges, seeds, and grain. Known as the most prolific mammal, female can produce a litter every three weeks. Stocky with short tail. Important as prey for raptors and carnivores, such as northern harriers and red foxes.
Woodland Vole ( <i>Microtus pinetorum</i> )	Tunnels through the carpet of leaf mold and loose soil on the forest floor, prefers deciduous forests, so might be found along Pearson Point Trail and Bear Swamp Trail. Makes tunnels and spends much time underground. Reddish brown with large front feet for digging. A vegetarian, eats bulbs, bark, roots, seeds, and berries.
Brown Rat ( <i>Rattus norvegicus</i> )	Also known as Norway Rat. Lives around buildings, grain fields, and marsh edges. Often moves into tidal debris along beaches. This is the common rat of cities, towns, farms, and open areas. A non-native species, it was introduced in the eighteenth century by ships from Europe. It has a hairless tail, is brown to gray, and has an overall length of up to 15 inches. An omnivore, it will consume almost anything.
House Mouse ( <i>Mus musculus</i> )	Found about buildings and sometimes in weedy and grassy fields. This is the common mouse found nearly everywhere. It is an Old-World species that is found worldwide. It is brownish gray and up to 6 inches overall in length. Plant material is normal diet, but it also will eat dairy products and meat.
Meadow Jumping Mouse ( <i>Zapus hudsonius</i> )	Inhabits grassy fields. Might be mistaken for frogs as they leap through the grass. Primarily nocturnal. Feeds on seeds, fruits, and insects. Has a tricolored pattern of dark fur on top, yellow sides, and white below with large hind feet and a long tail.
Common Muskrat ( <i>Ondatra zibethicus</i> )	Common in the freshwater impoundments and in the salt marsh. Houses are frequently seen as mounds of reeds and grasses rising above the water level. Distinguished by a hairless tail that is flattened side to side. Feeds on aquatic plants, but also may take fish and frogs. More active at night. Trapped for its pelt and favored as a delicacy in some parts of Delaware.
Eastern Cottontail ( <i>Sylvilagus floridanus</i> )	Abundant. Lives in bushy areas and grassy fields. Often seen from the roads in the early morning and late afternoon. A food source for raptors such as the Red-tailed Hawk and carnivores such as the Red Fox. Feeds on grasses and weeds in summer, twigs and bark in winter. Has rusty-brown fur, a white "cotton" tail, moderately long ears.
Whitetail Deer ( <i>Odocoileus virginianus</i> )	Common in the uplands and along the marsh edges. Most active in early morning and evening. Herd on the refuge is stabilized by an annual hunting program. Our largest mammal. Color is reddish-brown in spring and summer; gray-brown in fall and winter, and underside of tail is white. A ruminant (four stomach chambers), allows diet to include wide variety of foods including grasses, leaves, twigs, fruit, acorns, hay, and other plant material.

*Thirty-five mammal species have been identified on the refuge; however, additional species native to the region probably are present but have not as yet been verified. The following list was prepared by refuge personnel with the cooperation of Frederick A. Ulmer, Jr. of the Philadelphia Zoological Garden. Common and scientific names are from Mammal Species of the World, American Society of Mammalogists, Smithsonian Institution, National Museum of Natural History, 1993.*

## Mammal Identification Key

Virginia Opossum



Cinereus Shrew



Northern Short-tailed Shrew



Least Shrew



Eastern Mole



Star-nosed Mole



Little Brown Myotis



Silver-haired Bat



Eastern Pipistrelle



Big Brown Bat



Eastern Red Bat



Hoary Bat



Northern Raccoon



Long-tailed Weasel



American Mink



House Mouse



Meadow Jumping Mouse



Common Muskrat



## Mammal Identification Key

Northern River Otter



Striped Skunk



Red Fox



Gray Fox



Harbor Seal



Woodchuck



Eastern Chipmunk



Eastern Gray Squirrel



Southern Flying Squirrel



American Beaver



White-footed Deermouse



Marsh Rice Rat



Meadow Vole



Woodland Vole



Brown Rat



Eastern Cottontail



Whitetail Deer

