

FISH AND MAMMALS
OF THE
DELAWARE WATER GAP
NATIONAL RECREATION AREA

The following annotated list was compiled by
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20 June 1978 (Signed) Raymond J. Stein
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Fifty-five (55) species of fish and Forty-three (43) species of mammals have been found to reside in the 28,000 hectares (70,000 acres) that make up the Delaware Water Gap National Recreation Area. An additional thirteen (13) species of mammals are thought, by some authorities, to possibly exist there, but have not been found in the course of this survey and have hence been put on a HYPOTHETICAL LIST which has been placed after the regular mammal list.

The field methods employed in this survey, which began in June of 1977, included sampling the fish and small mammal populations by standard field techniques. For the fish, collections were made by: (1) seining, and dip netting in the river, creeks, ponds and lakes plus (2) fish trapping with funnel traps in creeks and ponds of the Recreation Area. In addition to field collecting, (3) fisherman creel checks were made. For the mammals, (1) snap traps baited with peanut butter and raisins and Havahart traps employing peanut butter and bacon were set for small mammals in varied environmental situations and habitats, (2) visual observations of mammals and their tracks were made, (3) all mammal road kills were examined, (4) owl pellets were collected and analyzed for their bone and fur content and, (5) bats were collected with a hand net in some of the Recreation Areas old mines and buildings. Many of the specimens collected for this project have been preserved as voucher specimens and catalogued into the collections of the New Jersey State Museum.

A survey of the scientific literature of the area complemented the field work and the associated laboratory analysis and identification. A complete list of all books, articles, and publications used for this project is included at the end of this report.

The following staff members of the New Jersey State Museum participated in the field, and/or laboratory portion of this project: Raymond J. Stein, Curator, Science; David Parris, Assistant Curator, Natural Science; William Eames, Assistant Curator, Natural Science/Education; Shirley Albright, Science Registrar; and Stephen Garots, Taxidermist. Kathy Ingoglia, a Rutgers University student and part-time museum employee, did much of the small mammal trapping and some of the fish collecting. Steve Nyman, a Rutgers University graduate student, helped with a number of field projects and provided a number of small mammal specimens. Dorothy Hughes and other workers from the Raccoon Ridge Bird Observatory provided us with a number of specimens and much helpful information. Finally, all of the National Park Service officials at the Delaware Water Gap National Recreation Area have been most cooperative and helpful. Two who must be individually cited for providing a variety of services, help and information are Phil Campbell, N.J. District Ranger, and Dave Harman, Sub-District Ranger. I am also indebted for helpful advice and criticism from Hil Zich, Robert Stewart and Mike Welshko, all of the N.J. State Fisheries Laboratory in Lebanon, N.J. who reviewed the Fishes Section and Russell Spinks of the Wildlife Management Section of the N.J. Division of Fish, Game and Shellfisheries who reviewed the Mammals Section.

THE FISHES

JAWLESS FISHES-CLASS AGNATHA

LAMPREYS: ORDER PETROMYZONES

SEA LAMPREY Petromyzon marinus: Common but seldom seen as they pass through the area only during the spawning run. These parasitic creatures which superficially resemble eels but have a funnel-like mouth without jaws, do not attach themselves to fish in the river but only to marine species. The adults die after spawning and the young larva are food for many river game fish.

AMERICAN BROOK LAMPREY Lampetra lamottei: Common. A small 6-7 inch non-parasitic lamprey found in the small streams of the area.

BONYFISHES-CLASS OSTEICHTHYES

BOWFINS: AMIIFORMES

BOWFIN Amia calva: Found in sluggish waters of the river and lakes of the area. This olive green fish is easily identified by its long dorsal fin which reaches almost to the tail. A full grown adult may reach a length of 2 feet.

SHAD AND THEIR RELATIVES: ORDER CLUPEIFORMES

ALEWIFE Alosa pseudoharengus: The river spawners of this species of small herring are rare or extinct in the area but a landlocked variety of this fish, a survivor of a stocking experiment in Pennsylvania's Bushkill drainage, persist and is occasionally found in the river as well as ponds. This landlocked herring is somewhat smaller than the sea-run race measuring only 6 inches long.

BLUEBACK HERRING Alosa aestivalis: This anadromus fish is very similar to the alewife in appearance but is slightly thinner. It is found, on occasion, in the river and its tributaries.

AMERICAN SHAD Alosa sapidissima: Common. The decrease in pollution in the Delaware River has seen a return of the good spring shad spawning runs in the river. This favorite of the river fisherman averages slightly under 2 feet in length and weighs about 4 pounds.

SALMONS AND THEIR RELATIVES: ORDER SALMONIFORMES

BROWN TROUT Salmo trutta: Common. This species, which is stocked and may breed in some streams of the area, was originally imported from Europe to the U.S. in 1883. A basic yellow-brown, this fish is more adaptable to the increase in fishing pressure and other changes in habitat destruction that have caused the near extinction of many of our native trout.

RAINBOW TROUT Salmo gairdneri: Commonly stocked in the area and spawns successfully in a few streams of the area. This native of the coastal watershed of Pacific America is a beautiful fish with pronounced pepper-like spots on the back, sides, and vertical fins; and a wide rosy-red lateral band running from the eyes almost to the tail.

BROOK TROUT Salvelinus fontinalis: Common as a stocked fish this beautiful native trout has all but disappeared as a successful spawner except in small headwater streams. The current improvement of the quality of the streams and reforestation may bring this brilliant but not gaudy native back as a breeding fish. A rich greyish-blue body with mottled back and irregular pale spots and pin-points of red and blue plus a median line down the side and an orange to red band along the lower side mark this beautiful, once native, fish.

REDFIN PICKEREL Esox americanus: Common in the ponds and slow streams of the area but uncommon in the river. This small pickerel has back and sides marked with dark wavy or wormy streaks and seldom reaches a length exceeding 12 inches.

CHAIN PICKEREL Esox niger: Common in the lakes and ponds but uncommon in the river. The back and sides of this voracious feeder are marked with a horizontal chain pattern. Specimens of this native fish often exceed 24 inches.

MUSKELLUNGE Esox masquinongy: Uncommon. This huge pike was introduced in the river by a Pennsylvania stocking program in 1965. Although this species may never become abundant in the river, it seems to have taken hold. A few are taken each year with the local record being 41 1/2 inches, 19 pounds. Dark vertical bars or no body marks at all identify this from its local relatives.

CARP, MINNOWS, SUCKERS AND THEIR RELATIVES: ORDER CYPRINIFORMES

CARP Cyprinus carpio: Common. The two barbels on each side of the upper jaw identify this large scaled native of the Orient that has become well established in the river, as it has over most of the continental U.S. Its size (up to 30 inches) and weight (up to 20 pounds) make it a favorite of some river fishermen. The carp is the largest minnow in the river.

GOLDFISH Carassius auratus: Uncommon. A small population of this fish is maintained in the river and some shallow ponds of the area, all are escaped domestics or their offspring. They are essentially like the carp in appearance but lack the barbels on the upper jaw and have an anterior spine in the dorsal fin and anal fin. In size, 12 inches is the maximum and the color varies from gold to brown.

GOLDEN SHINER Notemigonus crysoleucas: Very common in the slow moving lakes, streams, and the river. It is golden only in breeding season, otherwise greenish with just a trace of gold on the sides. Commonly 5 to 8 inches long, rarely to 10. An extremely important forage fish in the region. It has survived the past depredations of man upon the river because of its ability to withstand water with a low oxygen content.

FALLFISH Semotilus corporalis: Common in the upland streams and the river. It is similar to the creek chub in appearance but lacks the black spot in

the dorsal fin. It is very large for a minnow, sometimes growing to 18 inches.

CREEK CHUB Semotilus atromaculatus: Found in both the river and its tributaries. Blueish above and light below with a black spot in the bottom front portion of the dorsal fin. The males often have a rosy coloration on the sides in breeding season. Grows up to 10 inches.

BLACKNOSE DACE Rhinichthys atratulus: Common in fast, clear streams, rare in the river. A small fish never exceeding 4 inches, blackish above and silver below with a lateral band.

LONGNOSE DACE Rhinichthys cataractae: Common in fast, clear streams, uncommon in the river. Appearance much like the Blacknose dace but sides are slightly mottled and the snout is elongated. Up to 5 inches in length.

CUTLIPS MINNOW Exoglossum maxillingua: Common in the river and the lower portions of its tributaries. A dusky olive coloration above and lighter below are characteristic of this 6 inch long fish. The unusual jaw structure (central part of lower lips protrudes like a tongue) can be seen only when one turns the fish over.

COMELY SHINER Notropis amenus: Common in the river and the lower portions of its tributaries. This thin-bodied 4 inch long species has pale green sides with a faint lateral band. There is some pigment on the lower lip.

COMMON OR CREEK SHINER Notropis cornutus: Common in the fast water sections of the river and its tributaries. Similar in general appearance to the Comely Shiner, but somewhat heavier, this 5 inch fish has no lateral line.

SATINFIN SHINER Notropis analostanus: Common in slower portions of the river and its tributaries. A 4 inch long silvery fish with a lateral line present.

IRONCOLOR SHINER Notropis chalybaeus: A small 2 inch fish, silver above and dark below with a dark black lateral line extending through the snout and eye. Found in the tributaries to the river.

SPOTTAIL SHINER Notropis hudsonis: Common in the weed beds and slow shallows of the river. A thin 4 inch long fish with pale silvery coloration, a dusky lateral band, and a faint spot just before the tail rays sometimes present.

BRIDLED SHINER Notropis bifrenatus: Uncommon in the shallow portions of the river and its tributaries. A thin 2 inch long fish with a dark black lateral line on a straw color body.

SWALLOWTAIL SHINER Notropis procne: Common in the weed beds and slow shallows of the river. A 2 1/2 inch long fish with an olive toned body and a dark lateral band.

FATHEAD MINNOW Pimephales promelas: A 2 1/2 inch olive minnow with an incomplete lateral line and a dark horizontal bar across the dorsal fin. Found sparingly in the river and its tributaries.

STONEROLLER Camptostoma anomalum: Found only in the rapids of the river.

A small 8 inch sucker-like brownish minnow. Dorsal and anal fins have dark cross bars.

QUILLBACK CARPSUCKER Carpoides cyprinus: Common in the river. An olive to silver color fish with an elongated forward section of the dorsal fin that is as long as the base of the fin. A somewhat humped back fish that may weigh 6 pounds and reach a length of 20 inches.

CREEK CHUBSUCKER Erimyzon oblongus: Uncommon in the river, also in a few upland lakes. These 10 inch long silver fish have a strikingly distinct black lateral band. They superficially resemble carp but are not closely related.

WHITE OR COMMON SUCKER Catostomus commersoni: Very common in the river and all lakes and streams of the area. This olive-colored fish is identified easily by its typical sucker body shape and mouth parts. It grows to 20 inches long and may weigh up to 7 or 8 pounds.

CATFISHES: ORDER SILURIFORMES

CHANNEL CATFISH Ictalurus punctatus: Common. This fish has been stocked in the river. It is a long slender catfish with a deeply forked tail; blueish on the back and white on the sides and belly. It is the best game fish of the catfish group and can weigh up to 20 pounds.

WHITE CATFISH Ictalurus catus: Uncommon but found occasionally in rivers and lakes. Introduced. Blueish above and silvery on sides and belly. Reaches a length of 2 feet.

YELLOW BULLHEAD Ictalurus natalis: Rare. A few found in river and lakes. Introduced. Back and sides shades of black or brown, belly yellow. Reaches a length of 18 inches.

BROWN BULLHEAD Ictalurus nebulosus: Very common in river and lakes of the area. A native of the area that grows to a length of 18 inches. The back and sides are dark brown and sometimes mottled, the belly is yellow or gray.

TADPOLE MADTOM Noturus gyrinus: A 5 inch yellowish brown to gray fish found in the river and tributaries.

MARGINED MADTOM Schilbeodes insignis: Common in river and swift moving streams of the area. This "mini" catfish attains a length of only 5 or 6 inches. It is a dusky brown or gray and its fins usually have black margins.

THE EELS: ORDER ANGUILLIFORMES

AMERICAN EEL Anguilla rostrata: Very common throughout the river and all streams and lakes of the area. Their snake-like 2 foot long body, lack of spines in the fins and practically invisible scales make their identification easy. Eels are catadromous, that is, they live as adults in fresh water but spawn in the ocean.

KILLIFISHES: ORDER CYPRINODONTIFORMES

BANDED KILLIFISH Fundulus diaphanus: Common in the shallows of the river along the shore line. This small fish, 3-4 inches long, has an olive back, silvery sides marked with about 20 cross bars, and a projecting lower jaw.

BASSES, SUNFISHES & PERCHES: ORDER PERCIFORMES

STRIPED BASS Roccus saxatilis: Rare or absent in the upper portion of the river, this great game fish used to run above the Water Gap to spawn. Cleaning up the river may permit the return of this handsome, large (up to 100 pounds) silvery-sided fish with about 7 dark lateral stripes.

WHITE PERCH Roccus americanus: Rare. Like its larger relative, the striped bass, this fish used to run the river above the Water Gap to spawn. The silver sides are nearly plain but may have very faint lateral streaks. A small landlocked population exists in several lakes close to but not within the Recreation Area.

SMALLMOUTH BASS Micropterus dolomieu: Very common in the river and its tributaries. Uncommon to rare in upland lakes of the area. This introduced species is thought by many to be the finest game fish of the Recreation Area. This fish, which grows to about 20 inches and can weigh up to 6 pounds, differs from the largemouth in having faint vertical bars on the sides.

LARGEMOUTH BASS Micropterus salmoides: Uncommon in the river but common in the lakes of the region, this species, which was also introduced, slightly exceeds the Smallmouth in size and weight but does not equal its reputation as a "fighter". It is olive to dark green above with a silvery belly and a dark lateral band. Its upper jaw extends past the eye.

PUMPKINSEED Lepomis gibbosus: Common in the lakes of the area but uncommon in the river. This 8 inch fish is brilliantly colored with orange and blue. The lower part of the opercular lobe has spot of red or orange.

REDBREST SUNFISH Lepomis auritus: Very common in the river and tributaries and some lakes of the area. An 8 inch fish with an olive body and an orange belly, has an unusually long opercular lobe.

BLUEGILL Lepomis macrochirus: Common in the river, tributaries and some lakes of the area. This 10 inch fish, and introduced species, is olive-green with some blue and orange on the body, some vertical bars on the body, a dark spot near the posterior base of the dorsal fin, and a black opercular lobe.

BLUESPOTTED SUNFISH Enneacanthus gloriosus: Uncommonly found in some of the lakes of the area and rarely in the river's tributaries. This 2 1/2 inch long fish has a dark olive body with bright blue spots on the sides and fins, and a pearly spot in front of the opercular spot.

ROCK BASS Ambloplites rupestris: Very common in the river and some lakes of the area. One of the largest of the sunfish (up to 12 inches), has an olive body with mottles, each scale has a dark spot which together forms rows of dots.

BLACK CRAPPIE Pomoxis nigromaculatus: Common in the river and lakes. This introduced species may grow to 12 inches. It has a silvery body mottled heavily with dark green or black, vertical fins and tail are spotted.

WALLEYE Stizostedion vitreum: Common in the river. This introduced game fish may attain a length of 3 feet and a weight of 12 pounds. Its long, thin olive body plus the dark spot at the posterior end of the spiny dorsal fin and the presence of many "canine" or fang-like teeth identify this fine fish.

YELLOW PERCH Perca flavescens: Very common in lakes and slow streams of the area, common in the river. This fish is easily identified by its typical perch shape and its yellow body color with 6 to 7 dark vertical bars.

SHIELD DARTER Percina peltata: Commonly found only in the rapids and fast shallows of the river. This 3 inch fish is identified by its blunt head and the dark saddles and squarish blotches on a pale yellowish body.

TESSALATED DARTER Etheostoma olmstedii: Common in the river, its tributaries and streams of the area. The grayish brown sides of this 3 inch fish has a row of "w" shaped blotches running longitudinally along its slender body. Has a blunt head like the shield darter.

SLIMY SCULPIN Cottus cognatus: Uncommonly found in pure, clear, cold streams and springs of the area. This 3-5 inch fish superficially resembles the darters but has a slightly heavier body. The body is olive brown with dark blotches, the eyes placed well toward the top of the head.

THE MAMMALS

POUCHED MAMMALS: ORDER MARSUPIALIA

OPOSSUM Didelphis virginiana: Very common. At the turn of the century this adaptable mammal was found only as far north as Southern N.J. and Pa., but it is now established as one of the commonest middle-sized mammals of the Recreation Area. The sharp snout, gray-white coat, "hand-like" feet, and rat-like scaly prehensile tail easily identify this housecat-sized mammal. It is the only marsupial in the United States.

INSECT EATERS: ORDER INSECTIVORA

MASKED SHREW Sorex cinereus: Common. This tiny 2-2 1/2 inch grayish-brown mammal is found in moist habitats of the area which include forests, open country and brushland. It eats more than its own weight each day and is active both day and night.

SMOKY SHREW Sorex fumeus: Common. This uniformly dull brown shrew reaches a length of 3 inches. It prefers hemlock groves of the area where it is found on leaf molds and in burrows.

LEAST SHREW Cryptotis parva: Common. This 2 1/2 inch shrew is easily distinguished from other species by its cinnamon color and very short tail. It is active both night and day in open grassy fields.

SHORTTAIL SHREW Blarina brevicauda: Very common. This lead-colored shrew is easily identified by its lack of external ears and by its large (for a shrew) body size, 3-4 inches. It frequents a variety of habitats including fields, forests and marshes.

STARNOSE MOLE Condylura cristata: Common. This 5 inch long dark brown or black mole is easily identified by the 22 small, fleshy, tentacle-like projections on its nose. It is active both night and day in the black damp or wet soil near lakes, ponds or streams.

EASTERN MOLE Scalopus aquaticus: Common. At 5-6 1/2 inches this species is somewhat larger than the starnose mole and lacks the projections on its nose. It prefers the moist sandy soil of fields and meadows. Like all moles its forefeet are spade-like.

BATS: ORDER CHIROPTERA

LITTLE BROWN MYOTIS Myotis lucifugus: Common. This little bat has a 1 1/2 inch long forearm and a glossy sheen created by back hairs which have long, glossy tips. It is frequently found roosting in caves, mine shafts, and buildings of the area.

SILVER-HAIRED BAT Lasionycteris noctivagans: Undetermined. The forearm measures 1 2/3 inches long on this blackish-brown bat with hairs in the midback region tipped with white. This bat is migratory, and frequents forested areas. It is no doubt present in the Recreation Area during

summer months but its status is unknown.

EASTERN PIPISTREL Pipistrellus subflavus: Common. The forearm measures 1 1/5 inch. The color of this small bat is dull yellow to brown. It frequently roosts in caves, mine shafts, and buildings of the area.

BIG BROWN BAT Eptesicus fuscus: Uncommon. Forearm measures 1 4/5 to 2 inches long. The body and wing color pale to dark brown. The large size and color identifies this bat which is present, although not abundant in the Recreation Area.

RED BAT Lasiurus borealis: Common. Forearm measures 1 1/2 - 1 2/3 inches long. This bat prefers a woodland habitat and is easily identified by its rusty red color. Close examination reveals the hairs to be tipped with white. Migratory, present in the Recreation Area only during the summer months.

HOARY BAT Lasiurus cinereus: Uncommon. Forearm measures 2 inches or more long on this large mahogany-brown bat. Close examination reveals the body hairs to be tipped with white. It is found in the wooded areas of the Recreation Area but never in great numbers.

MAMMALS WITH LARGE CEREBRAL HEMISPHERES: ORDER PRIMATES

HUMANS Homo sapiens: Common. This large (100-250 pound) mammal walks upright and has only a sparse covering of hair, excepting for the head where the hair covering can vary in color and thickness. It can be found in almost any habitat of the Recreation Area and like other mammals requires pure water and food, clean air, and open space. Unlike most other mammals it often makes extensive changes in the environment which can be detrimental to other forms of life.

FLESH EATERS: ORDER CARNIVORA

BLACK BEAR Ursus americanus: Rare. The largest carnivore in the Recreation Area can measure up to 6 feet long and weigh as much as 400 pounds. While usually black, a cinnamon variety or coloration also exists. The Black Bear has not been common in the Upper Delaware Region for more than a hundred years, but it has never been completely extirpated. A number of individuals are seen on both the N.J. and Pa. sections of the area each year. Their population is very low.

RACCOON Procyon lotor: Very common. The bandit's mask over the eyes and the ringed tail easily identify this small dog-sized mammal that weighs up to 35 pounds. It is among the most adaptable of the medium-sized mammals and although it is classed as a carnivore it is omnivorous which enables it to endure and prosper where others fail.

LONGTAIL WEASEL Mustela frenata: Common. This 9 to 10 inch weasel with a 4-6 inch long tail is found in almost all habitats of the area. Unlike the ermine most of the area's weasels remain brown in the winter.

MINK Mustela vison: Common. Although longer, 13-17 inches, the mink resembles a uniformly dark brown weasel. Its aquatic habits generally keep

it close to the river, streams, ponds or lakes, but it is a great wanderer and can be found almost anywhere within the Recreation Area. However, it is secretive and thus seldom seen.

RIVER OTTER Lutra canadensis: Although formerly uncommon, the largest member of the weasel family in this area is making somewhat of a comeback in the area. Families of these graceful aquatic, brown, 26-30 inches long, thick-tailed mammals have been seen with some frequency in the upland lakes during the past few years. They also wander through the streams and river areas in winter where their snow and ice slides can occasionally be found.

STRIPED SKUNK Mephitis mephitis: Very common. This 6 to 14 pound beauty needs little or no description, either visual or olfactory. Its nocturnal habits prevent it from being the most seen cat-sized animal in the area. Like the raccoon, its omnivorous habits make it a sure bet for survival.

COYOTE Canis latrans: Rare but present. A small number of these "varmints" have been seen each year in the Recreation Area during recent times. Many wildlife experts believe that these clever 20-50 pound gray or reddish-gray creatures are moving in from the west and north and may some day become established in the Northeast, perhaps filling in the ecological niche vacated many years ago by the Wolf and Mountain Lion.

RED FOX Vulpes vulpes: Common. Another adaptable carnivore, this red-coated 10-15 pound bushy-tailed critter is found in almost all habitats of the area, although it prefers a mixture of forest and open country. It is considerably smaller than the coyote and has a white tip at the end of its tail.

GRAY FOX Urocyon cinereoargenteus: Common. Slightly smaller than the red fox, the 7-13 pound gray fox usually has a grayish to salt-and-pepper coat, and a bushy tail without a white tip. Like the reds, they can be found in all habitats of the area, but prefer more open forests and rocky country.

BOBCAT Lynx rufus: Rare. Like the black bear, the Bobcat was never extirpated from the area but it is very rare. Only a few of these 15-35 pound short-tailed and tuft-eared cats are seen each year, mainly on the Pennsylvania side of the river. In 1978 N.J. began a small scale experimental stocking program of these reddish-coated slightly-spotted cats. The releases were made in State Game lands very close to the Recreation Area.

GNAWING MAMMALS: ORDER RODENTIA

WOODCHUCK Marmota monax: Very common. This 5 to 10 pound brown mammal can be seen in every open woodland, grassy field or ravine setting and along every roadside. Almost as many are seen dead on the road as alive. The Woodchuck or Ground Hog is actually a large ground squirrel and is famous for its hibernating habits. Its holes provide homes for many other creatures.

EASTERN CHIPMUNK Tamias striatus: Very common. This small, 5-6 inch, ground squirrel has facial and back stripes on a brown head and body. It is often seen scampering across the roads with its tail held straight up. Its habitat preferences are deciduous forests and brushy areas.

EASTERN GRAY SQUIRREL Sciurus carolinensis: Very common. This 8-10 inch rodent is the dominant squirrel of the hardwood and river plain area, but it is found in almost all wooded sections of the area. The gray coat and very bushy tail make identification simple.

RED SQUIRREL Tamiasciurus hudsonicus: Common. The reddish coat and smaller size, 7-8 inch body, and ear tufts make this squirrel easy to distinguish from its larger relative. It prefers pine, spruce or mixed hardwood stands, but is also found in swampy areas.

SOUTHERN FLYING SQUIRREL Glaucomys volans: Common. Because of its strictly nocturnal habits the 5 1/2 inch long flying squirrel is seldom seen gliding from branch to branch or tree to rooftop, however, it is common throughout all wooded regions of the Recreation Area. The small size, folded layer of loose skin along each side of the body and olive-brown fur makes identification simple, if one could only see in the dark.

BEAVER Castor canadensis: Common. Although once exterminated from the area a program of reintroduction has brought this 30 to 60 pound mammal back into the area's waterways. The largest rodent of the area, it is easily identified by huge front teeth, chestnut-colored fur and a flat, scaly paddle-shaped tail. Because of their nocturnal habits the beaver is seldom seen, but stick-and-mud dams and stumps showing tooth marks reveal their presence.

WHITE-FOOTED MOUSE Peromyscus leucopus: Very common. This small (3 1/2-4 1/4 inch) mouse has a brown to red brown body with white feet and belly. The tail of this species is just a bit shorter than the body. It is the common mouse in the woods and fields of the area, frequently being found in many of the old barns, houses and outbuildings.

EASTERN WOODRAT Neotoma floridana: Uncommon but usually found in colonies when present in our area. The 8-9 inch body of this grayish-brown rat with a white or gray belly and a tail that is brown above and white or gray beneath identify this mammal. Its colonies are located in a few rocky areas and caves of the Recreation Area.

BOREAL REDBACK VOLE Clethrionomys gapperi: Common. This 3 1/2-4 1/2 inch vole has a distinctive reddish back and a 1 1/2 to 2 inch tail. There is a gray phase occasionally found that can confuse identification. This species is found in damp situations of the coniferous and mixed coniferous and deciduous forests of the area.

MEADOW VOLE Microtus pennsylvanicus: Very common. This 3 1/2-5 inch vole with a long, soft, gray coat that is sometimes tinged with brown, has a bicolored tail roughly half of the length of its body. It is found in almost all habitats of the area that contain high grasses or dense vegetation, sometimes even in forested areas that lack good ground cover. It is one of the most common small mammals of the Recreation Area.

PINE VOLE Pitymys pinetorum: Common. Also known as the Woodland Vole, this creature resembles the Boreal Redback Vole but has a much shorter tail. It is a creature of the forest floor's leaf litter and is less common in the pines than its name would lead you to believe.

MUSKRAT Ondatra zibethica: Very common. This 10-14 inch long mammal with rich dense brown fur and a naked scaly tail that is flattened from side to

side is found commonly in the river and in almost all ponds, lakes, marshes and streams of the Recreation Area. It builds conical houses in shallow water and also burrows in banks.

NORWAY RAT Rattus norvegicus: Common in the fields, forests and buildings of the area. This colonial arrival has a 7-10 inch long gray-brown body and a long scaly tail. This imported pest is also occasionally found living along streams and the river and is a proficient swimmer. Its preferred habitats are usually associated with man.

HOUSE MOUSE Mus musculus: Common. This small (3 1/4 - 3 3/4 inch long) gray-brown mouse with a scaly tail is an import like its cousin, the Norway Rat, and prefers to live in buildings associated with people.

MEADOW JUMPING MOUSE Zapus hudsonius: Common. The 4 to 5 1/2 inch tail of this little olive or yellow mouse is scantily haired and longer than the 3 to 3 1/2 inch head and body. It has long hind feet and legs and is a frequent inhabitant of both upland and lowland meadows and fields of the area.

PORCUPINE Erethizon dorsatum: Uncommon. This 18-22 inch rodent is covered with a coat of long sharp quills. It was at one time extinct or nearly extinct in the area, however it has made a strong comeback in the past 30-40 years and may soon be common again. It is usually found in forests near the ridges and in trees more than on the ground. Many dogs that reside in the Recreation Area have received their quota of quills in the nose.

PIKAS, HARES & RABBITS: ORDER LAGOMORPHA

SNOWSHOE HARE Lepus americanus: Uncommon on the Pennsylvania side of the Recreation Area and rare or extinct on the New Jersey side. This small (13-18 inch) hare was once found throughout the region in upland swamps, thickets, and forests. It completely disappeared from New Jersey's Sussex and Warren counties in the early 1900's.

EASTERN COTTONTAIL Sylvilagus floridanus: Very common. The brownish body and cottony white tail of this 14-17 inch rabbit make it easy to identify as it bounds across weed patches and over strips of forest, swamp edges and other areas of heavy brush in the Recreation Area.

EVEN-TOED HOOFED MAMMALS: ORDER ARTIODACTYLA

WHITETAIL DEER Odocoileus virginianus: Very common. The only abundant large mammal of the Recreation Area, other than humans, is this graceful 100 to 400 pound deer. Although nearly extinct at the turn of the century, the Whitetail has made a remarkable comeback and now may soon overpopulate the area. Both the Pennsylvania and New Jersey sections of the Recreation Area harbor great populations of Whitetails. A large white flag wagging quickly and disappearing into cover indicates that you have seen our deer on the move.

THE MAMMALS

HYPOTHETICAL LIST

INSECT EATERS: ORDER INSECTIVORA

LONGTAIL SHREW Sorex dispar: Undetermined. This shrew is a uniform dark grayish color and just a bit larger than the masked shrew. It has been found in boreal situations near the Recreation Area in both N.J. and Pa.

NORTHERN WATER SHREW Sorex palustris: Undetermined. A large (3-3 1/2 inch) black to gray shrew found along streams and bogs of mountainous areas. It has never been recorded in the Recreation Area but there are a number of habitats which should suit it.

HAIRYTALE MOLE Parascalops breweri: Undetermined. There are no records of the 5 1/2 inch mole from the Recreation Area. It could be found here in sandy loams along the river's floodplains. Its distinctly haired tail makes identification easy as the Eastern mole has a naked tail.

BATS: ORDER CHIROPTERA

KEEN MYOTIS Myotis keeni: Undetermined. The forearm measures 1 2/5 to 1 3/5 inches long and the ears are unusually large on this little dark brown bat. It has been recorded from nearby localities in Sussex Co., N.J. but not from within the Recreation Area.

INDIANA MYOTIS Myotis sodalis: Undetermined. The forearm measures 1 2/5 - 1 3/5 long on this species which is very difficult to identify from other small brown bats in the field. One uncertain record exists for a northern Morris County, N.J. locality 30 miles east of the Recreation Area. Its presence in the region is doubtful.

SMALL-FOOTED MYOTIS Myotis subulatus: Undetermined. The forearm measures 1 1/5 to 1 2/5 inches long in this smallest of the eastern myotis. It has a black facial mask and long yellowish silky body fur. This species often is found roosting with lucifugus but has not, to date, been recorded in the Recreation Area.

FLESH EATERS: ORDER CARNIVORA

SHORTTAIL WEASEL Mustela erminea: Undetermined. The thin 6 to 9 inch long body and black tips on a short tail identifies the Ermine where coat is brown in summer and white in winter. Practically everyone who studies mammals agrees that the Ermine should be found in the Recreation Area but there are no museum records or other documentations to prove that it is definitely here.

GNAWING MAMMALS: RODENTIA

NORTHERN FLYING SQUIRREL Glaucomys sabrinus: Undetermined. Although slightly longer in body length (5 1/2 to 6 1/2 inches) than the Southern Flying Squirrel, this species is otherwise very similar in appearance and habits. Most authorities state that they should range into the Recreation Area but no specimens have been recorded here.

DEER MOUSE Peromyscus maniculatus: Undetermined. Only an expert can tell this species from their near relative Peromyscus leucopus. To date maniculatus has not been found in the Recreation Area. It may be here but firm evidence is lacking.

SOUTHERN BOG LEMMING Synaptomys cooperi: Undetermined. This small (3 1/2 to 4 1/2 inch) lemming with a brownish gray body, nearly concealed ears, and a tail less than 1 inch long is no doubt present in the bogs and damp meadow of the area but to date no specimens have been recorded in our survey.

YELLOWNOSE VOLE Microtus chrotorrhinus: Undetermined. Range maps indicate that this small (4-4 1/2 inches) vole inhabits the region slightly West of the Recreation Area. Extensive field research may someday turn up specimens of this gray-brown vole with the rich yellow nose.

WOODLAND JUMPING MOUSE Napaeozapus insignis: Undetermined. This creature is slightly larger than the Meadow Jumping Mouse and has bright yellow sides with a brownish back. It has not been recorded in the Recreation Area but may be present in forested or bushy areas that are near water.

PIKAS, HARES & RABBITS: ORDER LAGOMORPHA

NEW ENGLAND COTTONTAIL Sylvilagus transitionalis: Undetermined. Although range maps place this species in the Recreation Area, its existence here has never been proven. In appearance it is almost identical with the Eastern cottontail but does have a dark patch between the ears.

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