

The Reptiles and Amphibians of Cove Point,
Calvert County, Maryland

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Description of Study Area

Cove Point is located on the east side of Calvert County near its southern tip. It is bordered by the Chesapeake Bay to the east, Cove Point Road and the adjacent community on the south, and Calvert Cliffs State Park to the north and west. The study area includes approximately 900 acres, about 600 of which are undeveloped. A large area in the central upland portion of the tract has been developed as a liquid natural gas (LNG) storage and transportation facility. The undeveloped acreage of the study area at Cove Point is protected by a conservation easement held jointly by the Maryland Environmental Trust and The Nature Conservancy.

Two dramatically different habitat types are present. The western and northern expanses are upland forest, cut by ravines created by small streams draining the higher elevations. The soils are sandy and generally well drained, although clay is a common component. At base level in the ravines, lateral groundwater seepage is frequent, and occasional discrete springs occur. Where these uplands meet the Chesapeake Bay on the northern portion of the site, a steep, continuously eroding cliff has formed. The sediments exposed in the cliff are of Miocene to post-Miocene age, and marine fossils are present at several locations. The exposed face ranges from sand to sandy clay or sand and gravel, with a top layer of shallow organic soils and leaf litter in forested areas. A narrow sand beach is present at the base of the cliff.

The southern portion of the site is characterized by a gently sloping forested upland leading down to a more recently deposited, well drained sand flat, and extensive wetlands. The sand areas are post-Pleistocene to recent, and the area is relatively stable. Radiometric dating of peat from the marsh yielded a date of 1,700 years +/- 70 years (Beardslee 1997). The sand is typically deep and well drained, and extends from the base of the upland slope out into the bay. A lighthouse is present at the southeastern-most tip.

The Cove Point wetlands are diversified. Steury (1999) described the primary marsh in detail. It is composed of a 77-hectare wetland complex, primarily shallow, with deeper "ponds" at several locations. That marsh is separated from the bay by a narrow barrier dune/beach line. The barrier beach is broken occasionally, and during those times water flows freely into or from the interior wetland. Salinity in the wetland varies from year to year, and seasonally. Measurements made by Bushmann (2000) during the summer of 1999, showed that salinity in various parts of this marsh varied from 0 to 12 ppt. Fringe swamps wrap around the western and southern extent of this wetland. A small wooded swamp at its southern edge has been isolated by an unpaved road running from the residential community to the beach. That southernmost swamp dried completely during the summers of 1999 and 2000. Historically, several other small freshwater and brackish ponds occurred in the vicinity of the lighthouse. Those isolated ponds have been eliminated by development or other disturbance.

In addition to these natural ponds and wetlands, the study area has three man-made ponds. The two largest, Osborn Pond and Lake Levy, sit in cleared, grassy fields and were created shortly after construction of the LNG facility began in the early 1970s. Both are relatively deep, with gently sloping sides and clear or slightly turbid water with little aquatic vegetation. Both ponds have been stocked with game and forage fish. The third, Settling Pond, is small with clear water and a fringe of

aquatic vegetation. It sits adjacent to a paved road within the LNG complex. Settling Pond appears to lack predatory fish. It was created as a storm water management pond during construction of the LNG facility.

Methodology

This study of the amphibians and reptiles inhabiting Cove Point included a survey of pertinent literature, review of preserved material housed in local and regional museums, contact with naturalists/ herpetologists who have visited the site, and progressive field survey.

Maryland herpetological specimens are deposited in many institutions around the country, but the most pertinent collections are housed at the Natural History Society of Maryland (Baltimore), the National Museum of Natural History (Smithsonian Institution, Washington, DC), the Academy of Natural Sciences (Philadelphia), the Museum of Comparative Zoology (Cambridge, Massachusetts), Towson University (Towson, Maryland), and the Field Museum of Natural History (Chicago). I either examined the records or contacted the managers of each of those collections. Cove Point specimens were found at the Natural History Society of Maryland, the Smithsonian Institution, the American Museum of Natural History, and the Field Museum. Data on those specimens is presented in Appendix A.

Living naturalists who have collected at Cove Point were contacted, either by e-mail, surface mail, telephone, or in person, in order to discuss their experiences. Useful information was obtained from Mr. John Norman, Dr. John Cooper, Dr. James Fowler, and Dr. Charles Stine. Each of these individuals made herpetological observations at the study area during the 1940s or 1950s. In an effort to identify and locate other persons who may have collected there, a note was published in the newsletter of the Natural History Society of Maryland, but no responses were received. I also talked with several active Calvert County naturalists and the staff at the Battle Creek Cypress Swamp Sanctuary in an attempt to identify other local collectors, but none were located. When visiting Cove Point, I took the opportunity to discuss local herpetology with community residents, and staff at the LNG plant that I encountered. These discussions were made more productive by reference to the excellent photographs provided in Martof et al. (1980).

I visited Cove Point on nineteen occasions during 1999 and 2000. Fewer trips were made in 1999 because of extremely dry conditions during that field season. However, in total the site was surveyed at least twice each month beginning in April and continuing through November. Survey effort was directed toward all of the habitat types present within the study area, and specimens were hand collected or observed with binoculars. One or more selected portions of the study area were carefully examined on each visit. My procedure was to walk slowly through the area observing the ground, tree trunks, and lower branches. Logs and other litter were overturned, and cavities and loose bark were examined. Vocalizations and other sounds were investigated. Because of the sensitivity of Cove Point, only low impact collecting techniques were utilized. For instance, all logs or other ground litter were carefully replaced, and the bark of standing and fallen dead trees was not removed unless it could be replaced. On every visit, Cove Point Road was examined for living or dead specimens. On productive days, the car was parked and portions of the roadway surface were examined on foot. Nine visits included night driving, and five of those expeditions occurred during

or shortly following periods of rain. Since the study area is a wildlife preserve, specimens were not taken, with the exception of a dead individual of the coastal-plain milk snake (*Lampropeltis triangulum temporalis*) found dead on Cove Point Road. That specimen has been deposited at the Natural History Society of Maryland (NHSM R-4037).

Estimations of abundance are given for each species encountered. Because of the limited time available for this survey, and site limitations, these estimations were done in a very subjective fashion. I compared the number of sightings (or records) made at Cove Point to observations made by me over the years elsewhere in Maryland. For instance, three records of *Virginia valeria* may appear to indicate a species of rare occurrence. However, this small, fossorial snake is not frequently encountered unless trash piles and other ground liter is present. By my assessment, the finding of three individuals at Cove Point indicates a healthy stable population of a relatively common species.

Common and scientific names used in this report generally follow Conant and Collins (1991).

History of Herpetological Investigations at Cove Point

A good rule of thumb for naturalists is that if you want to find unusual plants and animals you should go where there are unusual conditions. Cove Point is such an area and seems to have always been of interest to local naturalists. This section reviews literature discussing amphibians and reptiles from the study area. Records provided in these publications are summarized in Table 1. The first mention of Cove Point in the herpetological literature came in 1936, when three papers were published. Noble and Hassler (1936) reported several amphibians, most notably the narrow-mouthed toad (*Gastrophryne carolinensis*). At that time, it was the first report of *Gastrophryne* from Maryland and represented the northeasternmost point in the species' range. Charles Robertson (1936), writing about the life history of the king snake (*Lampropeltis getula*), discussed a Cove Point specimen. That same year, Kelly, Davis and Robertson (1936) published their book, *Snakes of Maryland*, the first book ever written specifically about Maryland reptiles. In it, they reported four species of snakes from Cove Point.

Four significant papers were published during the 1940s. Romeo Mansueti (1940) provided a synopsis of information on the wood frog (*Rana sylvatica*) in Maryland, including a report from Cove Point. In 1942 Mansueti also published an important summary of information on the herpetology of Calvert County, specifically listing 28 species of reptiles and amphibians from Cove Point. Robert McCauley's book, *The Reptiles of Maryland and the District of Columbia*, an excellent treatment of Maryland's entire reptile fauna, appeared in 1945. In it he gave specific reports for nine species of lizards, turtles and snakes from Cove Point. John Cooper published two pertinent papers in 1947. One (Cooper 1947b), was a very detailed summary of all information on the spadefoot toad (*Scaphiopus holbrookii*) in Maryland, including the first record from Cove Point. Cooper (1947a) also published an interesting account of a herpetological field trip to Cove Point, which contained specific records for eight reptiles and amphibians.

Three additional papers appeared in the 1950s. Cooper (1950) reported a scarlet snake (*Cemophora coccinea*) from Cove Point, and included records for four frogs found on the same visit.

The other two contributions (Fowler and Stine 1953, Hardy 1953) provided no new information on Cove Point but did mention the Cove Point records for the narrow-mouthed toad. They also discussed the distribution of this amphibian in southern Maryland, speculated on how it came to be there, and reported a new record from St. Mary's County.

In 1962, Hardy and Mansueti summarized the distribution of amphibians and reptiles in Calvert County, gave new records for five species from Cove Point, reviewed the published reports for other species from the county, and discussed the sea turtles that occur in the bay along the shore. In 1970, Richard Zweifel published an interesting paper on gray tree frogs (*Hyla versicolor* and *Hyla chrysoscelis*), showing that the frogs from Cove Point were all *H. chrysoscelis*. Herbert Harris subsequently reviewed all available information on Maryland amphibians and reptiles and published (Harris 1975) a detailed "dot" map distribution survey for Maryland, showing numerous records in the vicinity of Cove Point. He also discussed a specimen of the southeastern five-lined skink (*Eumeces inexpectatus*) reported to have been collected at Cove Point. Harris, however, considered that report questionable. More recently, both Orr (1999) and Bushmann (2000) recorded observations of amphibians and reptiles made incidental to surveys of other taxa at Cove Point.

Known Cove Point Fauna

Based on the literature, examination of preserved material in pertinent museums, discussions with experienced naturalists, and my own survey, the presence of twenty species of amphibians and thirty species of reptiles has been documented at Cove Point. Each of these species is discussed below.

SALAMANDERS

Ambystoma maculatum (spotted salamander)

Spotted salamanders were not mentioned in any of the early literature on Cove Point, but the Smithsonian Institution has two preserved specimens (see Appendix) collected "about 200 feet from the lighthouse" on 14 March 1949. *Ambystoma maculatum* were also found at Cove Point recently by both Bushmann (2000) and Orr (1999). Bushmann noted adults found beneath logs on the hillside above the marsh, and Orr found an adult beneath a log in the forest by the Settling Pond. This is a salamander of wooded areas near vernal pools, its sole breeding sites (Bishop 1941), at least partly because the larva can not persist in the presence of predatory fishes. I found no vernal pool habitat in either of these areas, but it is possible that Settling Pond was a vernal pool that has been modified. It does not contain predatory fish and may still serve as a suitable breeding location for *A. maculatum*. Since the preserved specimens at the USNM were collected in mid-March, which is when this salamander breeds, we can assume that they were taken from, or in the vicinity of, breeding ponds. Those ponds are no longer present, having been destroyed by development or other disturbance.

Ambystoma opacum (marbled salamander)

Like *A. maculatum*, the marbled salamander breeds in vernal pools. It, however, has not been

found at Cove Point in recent years, although it was collected there historically. The Natural History Society of Maryland has Cove Point specimens collected in 1945 and 1946 (see Appendix). It was also reported from there by Hardy and Mansueti (1962), and both John Norman and Charles Stine (pers. comm.) remembered collecting *A. opacum* at Cove Point during the 1940s. Both collectors recalled taking them in a small vernal pool wetland by Cove Point Road, near the lighthouse. The only temporary wetland in that vicinity today, the swampy woodland between Cove Point Road and the unpaved road to the beach, is much degraded, and no *Ambystoma* were found there during 1999 or 2000.

Desmognathus fuscus (dusky salamander)

The dusky salamander is very localized in Calvert County, but there is a specimen from Cove Point at the NHSM collected by Romeo Mansueti in 1940. However, his published notes (Mansueti 1942) reveal that his *D. fuscus* were taken from an isolated spring at a site known as Curry's Farm. That locality was in forested uplands along the south side of Cove Point Road, within what is now the Cove Point community. Although the study area has many spring/seepage areas with *E. bislineata*, another stream salamander that typically occurs with *D. fuscus*, no additional localities for the dusky salamander have been found. However, it is likely that this salamander does occur in isolated springs within the study area. If so, it is a rare and localized element of the amphibian fauna.

Eurycea bislineata (northern two-lined salamander)

I found the two-lined salamander to be locally common in many of the seepage areas and streams that drain the upland areas of Cove Point. Orr (1999) also found it in study area streams. The Natural History Society of Maryland has a specimen from Cove Point collected in 1946. This small, stream dwelling species is one of the most common salamanders in Maryland but has only been reported two other times from Calvert County (Harris 1975).

Hemidactylium scutatum (four-toed salamander)

The four-toed salamander seems to be a rare species at Cove Point. During the summer of 2000 a single adult specimen was found under a log in wet woods along the stream that crosses the gas line R-O-W. The woods along this stream are swampy and support patches of sphagnum moss, a bryophyte with which the breeding of *Hemidactylium* is frequently associated (Bishop 1941).

Plethodon cinereus (red-backed salamander)

The red-backed salamander is the most abundant and widespread salamander in Maryland. It is common in forested areas at Cove Point. Both the red-backed and "lead-backed" color phases are present. The Smithsonian Institution has 25 specimens collected at Cove Point in 1969, and the Natural History Society of Maryland has two others that were taken in 1941. Mansueti (1942) also reported taking this species at Cove Point (Curry's Farm). During this survey, I found numerous individuals under logs and litter during wet periods. However, during periods of drought, *P. cinereus* was seldom found.

Pseudotriton ruber (red salamander)

The red salamander is relatively common in streams and seepage areas at Cove Point. It is also occasionally found far from standing water. In June of 2000, I found an adult individual walking across Cove Point Road during an evening rain. The American Museum of Natural History has a specimen collected at Cove Point in 1934, and the Natural History Society of Maryland has another taken in 1947. Mansueti (1942) reported observing what he believed to be larvae of *P. ruber* in a spring at Curry's Farm, and it was also reported from Cove Point by Hardy and Mansueti (1962).

FROGS AND TOADS

Acris crepitans (northern cricket frog)

Cricket frogs were found around the marsh and the upland ponds. During the summer of 2000 they were abundant at the Settling Pond. Males were frequently noted calling from the edges of these water bodies. Mansueti (1942) reported this species from Cove Point and noted that they "swarmed" along the edges of "the several ponds not far off the edge of the Chesapeake Bay near the lighthouse." Other Cove Point records were given by Noble and Hassler (1936) and Orr (1999). The American Museum of Natural History has 17 specimens collected at Cove Point in 1934, and the Natural History Society of Maryland has specimens taken in 1941, 1947 and 1948.

Bufo woodhousii (Fowler's toad)

Fowler's toad is common at Cove Point. Individuals were frequently found under litter, hopping about during the day, or crossing Cove Point Road at night. Calling males and spawning pairs were observed around the upland ponds and along the forested fringe of the marsh. Mansueti (1942) reported taking *B. woodhousii* at the lighthouse and at Curry's Farm, and it was also reported recently by Orr (1999). Fowler's toad was the only amphibian regularly found during this study beneath litter on the sand flat and behind the beach. Specimens of *B. woodhousii* from Cove Point are present at the American Museum of Natural History and the Natural History Society of Maryland.

Gastrophryne carolinensis (narrow-mouthed toad)

Narrow-mouthed toads were first found in Maryland at Cove Point by Noble and Hassler (1936). In June of 1934 they found males calling "from thick grass in a cattail pond a few hundred feet from the Cove Point lighthouse." The water in that pond was described as slightly brackish. The next published report was by Mansueti (1942), who collected a single individual on 2 June 1940, beneath a board on the edge of a grassy field at Curry's Farm, a site about one mile northwest of the lighthouse. Cooper (1947a) recorded finding four individuals on 11 August 1946, one under a board "about 40 yards from the lighthouse" and three under litter around a pig pen. In that same paper Cooper also mentioned that, although *Gastrophryne* is usually rare, "this year they have been collected in number." He goes on to state that on previous trips to Cove Point he and others "collected eight specimens while Jerry D. Hardy collected three individuals. Romeo Mansueti, Max

Hecht, Doug Oler, Franklin Atwell, James Hill, and Raymond Rapp secured about a dozen individuals." Regarding preserved material from Cove Point, specimens are present at the Natural History Society of Maryland and the American Museum of Natural History. The AMNH material includes four specimens taken by Noble and Hassler in 1934 and seven collected by Hecht and Matatas in 1946. The NHSM specimens represent individuals taken in 1934, 1945, 1946 and 1947, including a series of seven taken on 4 July 1946 by Oler, Cooper and Norman.

These three papers provide all the pertinent information that is presently available concerning the narrow-mouthed toad at Cove Point. Three others (Hardy and Mansueti 1962, Fowler and Stine 1953, Hardy 1953) summarize the previously published data and discuss the distribution of *Gastrophryne* in the area. I have found no reports of this species at Cove Point after a specimen collected on 31 May 1947 by Jim Gentile (NHSM A-1681).

Hyla cinerea (green tree frog)

The green tree frog is common at the Cove Point Marsh. Individuals were heard calling during rainy evenings in summer and were also found by day clinging to *Typha* leaves or beneath loose bark along the wooded fringe to the south. As shown in the Appendix, there are numerous specimens of this frog in collections. This may be partly due to the novelty of these beautiful frogs. However, it probably also reflects their historic abundance. *Hyla cinerea* was first reported from Cove Point by Nobel and Hassler (1936), and other reports were given by Mansueti (1942) and Cooper (1950). Several of the literature references refer to this frog as abundant at Cove Point, and John Norman (pers. comm.) made the same comment. While they are still present in good numbers, I have the clear impression that they are not as common today at Cove Point as they were in the 1930s and 40s. According to John Norman, this tree frog was most abundant in the ponds near the lighthouse, and Putens (Mansueti 1942) records them as "being very abundant" in a brackish pond in the same area. Those ponds are no longer present.

Hyla chrysoscelis (Cope's gray tree frog)

Cope's gray tree frogs are relatively common at Cove Point. The early reports typically identified local specimens as *Hyla versicolor*, and it was some years before these two species were adequately differentiated. Zwiefel (1970) noted clear differences in their vocalizations and showed that the frogs at Cove Point represented *H. chrysoscelis*, which has a faster, higher pitched trill. It is interesting to note that the first report of gray tree frogs at Cove Point by Noble and Hassler (1936) clearly described their calls as different from those of gray tree frogs (*H. versicolor*) collected farther north in the county. Numerous *H. chrysoscelis* from Cove Point are present in museum collections (Appendix). During the present study males were heard in chorus during rainy evenings, and individuals were occasionally heard calling from trees during the day. One adult was found beneath bark along the wooded fringe to the south of the marsh.

Pseudacris crucifer (spring peeper)

The spring peeper is common at Cove Point. Calling males were heard around the forested margins of the marsh and at the Settling Pond. In 1941 Mansueti (1942) heard them calling from

“the swamp behind the ponds to the left of the lighthouse.” Orr (1999) also reported them within the study area.

Pseudacris triseriata (chorus frog)

The chorus frog is a small species that is rarely encountered except for the periods in early spring when they move to vernal pools and forested swamps to breed. This species has not previously been reported from Cove Point, nor is it mentioned in any of the pertinent literature or represented in the museum collections surveyed. However, Orr (1999) heard calling males. I also noted small choruses in the wooded fringe along the marsh and heard occasional males calling from the wet field behind Lake Levy in the spring of 2000. *Pseudacris triseriata* appears to be locally common at Cove Point.

Rana clamitans (green frog)

The green frog is common at Cove Point. Individuals were occasionally observed around the marsh and the upland ponds, but they were most frequently encountered along streams. Numerous preserved specimens of *R. clamitans* from Cove Point are present at the Natural History Society of Maryland and the American Museum of Natural History. Green frogs have been reported from Cove Point by Cooper (1947a, 1950), Bushmann (2000), Nobel and Hassler (1936), and Orr (1999).

Rana catesbeiana (bullfrog)

Bullfrogs were observed or heard calling from the marsh and both of the larger upland ponds. Cooper (1947a) reported observing a large adult in a rain puddle along Cove Point Road. Specimens from Cove Point are present at the Natural History Society of Maryland, the Field Museum of Natural History and the American Museum of Natural History. Other Cove Point reports for this species were given by Bushmann (2000), Cooper (1950), and Nobel and Hassler (1936).

Rana palustris (pickerel frog)

The pickerel frog is common at Cove Point and is typically found with *Rana utricularia*. I found it around the marsh, along the lower reaches of streams draining the uplands, and occasionally on Cove Point Road during rainy evenings. *Rana palustris* has been reported from Cove Point by Cooper (1947a) and by Orr (1999). Despite its common occurrence, no pickerel frogs from the study area are present in the preserved collections examined.

Rana utricularia (southern leopard frog)

The southern leopard frog is abundant at Cove Point. Numerous individuals were observed around all of the water bodies. During the summer of 2000 they were very common in a wet, grassy area behind Lake Levy. When driving Cove Point Road during or following periods of rain, dozens could be counted. Most early accounts report this species, although frequently as *Rana pipiens*. Leopard frogs were occasionally encountered far from standing water. Numerous preserved leopard frogs from Cove Point are present at the Natural History Society of Maryland, the Field Museum,

and the American Museum of Natural History, all collected between 1934 and 1947. Leopard frogs from Cove Point have been reported by Cooper (1947a, 1950), Mansueti (1942), and Orr (1999).

Rana sylvatica (wood frog)

The wood frog is included here based on a single literature report given by Mansueti (1940). *Rana sylvatica* breeds in wooded swamps and vernal pools, typically with *Ambystoma maculatum*. The wood frog was not found during this survey. If present at Cove Point, it is uncommon to rare species.

Scaphiopus holbrookii (spadefoot toad)

The spadefoot toad has been reported from Cove Point twice, once by Cooper (1947b) and again by Reed (1956). This burrowing species is an explosive breeder, appearing only when conditions are right, then disappearing back into the soil (Wright and Wright 1949). It can occasionally be found abroad on rainy nights, but driving on Cove Point Road yielded no individuals. However, residents of the Cove Point community did describe to me "frogs" meeting the description of *Scaphiopus* that are sometimes seen on the road or dug up around their houses.

TURTLES

Clemmys guttata (spotted turtle)

The spotted turtle is included here based on a sighting reported by Bushmann (2000). He observed a single adult individual in clear, shallow water near the beach front of the large marsh. The turtle was clearly observed for several minutes. The area where this turtle was sighted is not typical habitat for *C. guttata*, although more suitable areas occur at the west end of the marsh, along the forested fringe. Several walks along that area did not, however, reveal spotted turtles. Additional survey will be required to clarify the status of *Clemmys guttata* at Cove Point.

Chelydra serpentina (snapping turtle)

The snapping turtle is a common inhabitant of all water bodies at Cove Point. Juveniles and adults were found in the upland ponds and the freshwater marsh, and at least one very large adult was observed in Lake Levy on several occasions. Mansueti (1942) noted that the lighthouse keeper's wife had juveniles from the "brackish or freshwater ponds near the lighthouse." Other Cove Point records for this common turtle have been given by Mansueti (1942), Orr (1999) and Bushmann (2000).

Chrysemys picta (Painted turtle)

The painted turtle is common in the marsh and the upland lakes and ponds. Individuals were frequently observed as they basked or swam at the surface. Juveniles and newly hatched individuals were noted during both survey years, demonstrating that successful reproduction is occurring. However, during both years numerous nests were found to have been dug out and the eggs eaten by

predators around both ponds (probably skunks or raccoons, both of which were observed in the area). Egg laying sites were found on adjacent hillsides in gravelly soil, primarily where grasses were sparsely distributed. Records from Cove Point have been given by Mansueti (1942) and Bushmann (2000).

Kinosternon subrubrum (mud turtle)

The mud turtle was infrequently encountered at Cove Point. One adult was observed sunning on a branch overhanging the north side of Lake Levy on several occasions, and adults were found in the freshwater marsh three times. Another adult was observed crawling across the sand in the open area south of the marsh. Mansueti (1942) reported a mud turtle found walking around the border of a pond by the lighthouse. The mud turtle is relatively common at Cove Point. Literature reports for Cove Point have been given by Mansueti (1942) and Orr (1999).

Malaclemys terrapin (diamondback terrapin)

The diamondback terrapin is included in this report on the basis of a sighting reported by Orr (1999). He observed a single individual in a small pond at the large marsh in September 1999. *Malaclemys* is a common inhabitant of the tidal creeks and marshes along the bayside edge of Calvert County. In fact, its apparent rarity at Cove Point is notable. It may be that the seasonal fluctuation in salinity of the marsh at Cove Point is too stressful for this species. Additional survey will be necessary to clarify the status of *M. terrapin* at Cove Point.

Pseudemys rubriventris (red-bellied turtle)

The red-bellied turtle is the most frequently observed large turtle in the ponds and marsh. Numerous individuals, ranging from juveniles to adults, were observed during every site visit. Adults were typically observed as they floated or swam slowly at the surface. The water bodies at Cove Point typically lack fallen trees, floating logs, or other good basking sites for these large freshwater turtles. Two dug-out nests were found around the upland ponds, one during 1999 and the second during 2000. In addition, two females were observed laying eggs on grassy slopes around Lake Levy in June of 2000. The Smithsonian Institution has a preserved red-bellied turtle from Cove Point collected in 1941, and the Natural History Society of Maryland has another collected in 1945. Other reports for Cove Point have been given by Mansueti (1942), McCauley (1945), Hardy and Mansueti (1962), and Orr (1999).

Sternotherus odoratus (musk turtle)

The musk turtle is uncommon at Cove Point, or at least infrequently observed. The Natural History Society of Maryland has a preserved specimen collected at Cove Point in 1942. Another individual was observed in the large marsh by Bushmann (2000). I have had very good success finding this species in ponds elsewhere in Maryland, by wading in shallow water. However, none were found at Cove Point, even during the low water periods of the summer of 1999, indicating that

it is uncommon there rather than simply under-collected.

Terrapene carolina (box turtle)

The box turtle is common at Cove Point, and individuals were observed on many visits. They were most frequently noted in forested areas, commonly in wet ravines or actively crawling about after periods of rainfall. Seven individuals were found on Cove Point Road during the study period, all but one killed by motor vehicles. One adult female was found laying eggs on the hillside above the marsh in June of 2000. Of 14 living box turtles noted (number based on clear differences in size and carapace pigmentation), all were adult and nine were females. The Natural History Society of Maryland has a box turtle collected at Cove Point in 1939. Literature reports of box turtles from Cove Point have been given by Mansueti (1942) and Orr (1999).

Trachemys scripta (red-eared slider)

The red-eared slider is not native to Maryland but has been introduced as a result of the persistent release of unwanted pets. A large adult was observed on several occasions in Lake Levy. It was undoubtedly a released individual, and there is no indication that *T. scripta* is reproducing locally. Now that red-eared sliders are rarely sold in pet stores, no further introductions are anticipated and this species will probably become extirpated at Cove Point.

LIZARDS

Cnemidophorus sexlineatus (six-lined racerunner)

The six-lined racerunner reaches the extreme northeastern extent of its range along the western shore of the Chesapeake Bay in Maryland. There it is typically a species of dry areas with loose, frequently sandy soil and short grass, where it is often observed actively foraging during daylight hours (McClellan et al. 1943). Numerous specimens of *C. sexlineatus* are present at the Natural History Society of Maryland, the American Museum of Natural History, and the Smithsonian Institution, all collected between 1934 and 1948. Literature records for Cove Point have been given by Mansueti (1942), McClellan et al. (1943), McCauley (1945), Cooper (1947a), and Orr 1999.

Today *Cnemidophorus* is locally common at Cove Point along the sandy beach, particularly in the wide area between the lighthouse and the freshwater wetland. Lizards were observed in that area whenever it was visited, and their distinctive tracks were occasionally noted along the back of the beach all the way to the pier. However, in discussing this species with naturalists who worked at Cove Point in earlier years, it became clear that it is less common today than it was previously. John Norman (pers. comm.) told me that in the 1940s *Cnemidophorus* was most abundant along the beach west of the lighthouse and south of Cove Point Road. Habitat in that area has been largely destroyed by residential housing, and racerunners are rare or absent there today. The existing sand and beach areas support a smaller but apparently stable population of these interesting lizards.

Eumeces fasciatus (five-lined skink)

The five-lined skink is a common species at Cove Point. It occurs most abundantly in forested areas but was noted throughout the site. This species is very frequently found beneath the bark of fallen logs or standing dead trees. However, because such habitat is relatively uncommon in the study area, care was taken to avoid tearing apart logs and stumps. Still, *E. fasciatus* was observed on all visits to Cove Point. On two instances in the summer of 2000, adult females were found brooding eggs under bark, once adjacent to Lake Levy and once along the gas pipeline cut. The American Museum of Natural History has a preserved specimen from Cove Point taken in 1935, and the Natural History Society of Maryland has another collected in 1958. The residents of the adjacent residential area along Cove Point Road are quite familiar with *E. fasciatus* and report seeing them frequently in yards and around their houses. Literature reports for this species at Cove Point have been given by Mansueti (1942), McClellan et al. (1943), McCauley (1945), and Orr (1999).

Eumeces laticeps (broad-headed skink)

Eumeces laticeps was first reported from Cove Point by Mansueti (1942), although the actual site (Curry's Farm) was not part of the present study area. Mansueti's record was repeated by McClellan et al. (1943). Another Cove Point report was given by McCauley (1945). Cooper (1947) also reported sightings in the vicinity of Cove Point that were related to him by the son of the lighthouse keeper. The Smithsonian Institution has a preserved specimen collected at Cove Point in 1948. Two broad-headed skinks were encountered during this survey, both during the summer of 2000. A large adult male was observed several times on an oak tree in open woods along the gas line cut, and a newly hatched juvenile was found under a log in the same vicinity. *Eumeces laticeps* seems to be relatively common at Cove Point.

Sceloporus undulatus (fence lizard)

The fence lizard is locally common in the forested portions of the study area, particularly in open areas. Individuals were observed at many sites scattered throughout the upland portion of the property. Many specimens from Cove Point are present at the Natural History Society of Maryland and the American Museum of Natural History, all collected between 1934 and 1947. Literature records for this species at Cove Point have been given by Mansueti (1942), McClellan et al. (1943), McCauley (1945), and Orr (1999).

Scincella lateralis (ground skink)

The ground skink is a secretive and infrequently encountered lizard. Harris (1975) showed it to be widespread in Calvert County, with several localities at or very close to Cove Point. However, there are no references in the literature, or preserved specimens to document its occurrence there. One *Scincella* was found during the summer of 2000 along the edge of the forest at Lake Levy. I was attracted to the rustling sound that it made while scurrying through thin leaf litter. This small lizard appears to be uncommon at Cove Point.

SNAKES

Agkistrodon contortrix (copperhead)

Copperheads are common at Cove Point. The Natural History Society of Maryland has a Cove Point specimen collected in 1948, and Mansueti (1942) reported two individuals observed basking on a rotted stump on 2 June 1940. Orr (1999) also gave Cove Point reports. Three individuals were observed during the present study, two in the upland forest, and the third crossing Cove Point Road near the entrance to the LNG facility. Several residents of the Cove Point community were familiar with copperheads and were able to correctly identify photographs of this species. However, there are no reports of anyone in the community having been bitten.

Carphophis amoenus (worm snake)

The Natural History Society of Maryland has two worm snakes from Cove Point, collected in 1940 and 1947. Other Cove Point records have been given by Mansueti (1942) and Kelly, Davis, and Robertson (1936). The worm snake reported by Mansueti was found with part of its tail protruding from a rotting log in a forested area. Two worm snakes were found during the present study, one under fallen bark along the south side of the marsh and the other under the bark of a fallen tree by Lake Levy. The worm snake seems to be relatively common at Cove Point.

Cemophora coccinea (scarlet snake)

The scarlet snake is one of Maryland's least frequently encountered reptiles. It occurs sporadically throughout the coastal plain, and a specimen was found at Cove Point by John Cooper (Cooper 1950). That specimen, which is in the collection of the Natural History Society of Maryland, was found dead on Cove Point Road on 7 July 1946. The rarity of records for *Cemophora* in the northeast is undoubtedly due to its pronounced burrowing habits. Still, every indication is that this is a rare species in Maryland, and its presence at Cove Point is notable.

Coluber constrictor (black racer)

The black racer is a very common species at Cove Point. It was frequently observed during the present study, typically in the open sandy areas but occasionally in the forested uplands. Individuals were found on three separate occasions during the summer of 2000 north of the lighthouse, all beneath a small piece of fallen plywood by the sign posting the beach against trespassing. Several large individuals were also observed crossing roadways and along the concrete-lined drainage courses within the LNG facility. The American Museum of Natural History has a preserved specimen from Cove Point taken in 1934, and the Natural History Society of Maryland has *C. constrictor* from Cove Point collected in 1940, 1946, and 1947. Cove Point reports have also been given by Cooper (1947a) and Orr (1999).

Diadophis punctatus (ring-necked snake)

The ring-necked snake is relatively common at Cove Point. Four living individuals were

found during this study, all under fallen logs or loose bark. A fifth individual was found dead on Cove Point Road. Residents of the Cove Point community are familiar with this small species and report finding them occasionally around their houses. One preserved specimen collected at the study area in 1946 is in the Smithsonian Institution. Kelly, Davis, and Robertson (1936) also reported a ring-necked snake from Cove Point.

Elaphe obsoleta (black rat snake)

Elaphe obsoleta is one of the most frequently encountered snakes at Cove Point. Twelve individuals were found during this study, four found dead on Cove Point Road and eight encountered in forested portions of the study area. Of those twelve, three were newly hatched juveniles. The guards at the LNG plant frequently see "black snakes" on the interior roadways. Most of their observations involve snakes that move relatively slowly and occasionally sit quietly in the road. Those individuals probably represent *E. obsoleta*, rather than the much faster *C. constrictor*.

Heterodon platirhinos (hognose snake)

The hognose snake is common at Cove Point. Six individuals were found during this survey: two in upland forest, three on the sandy lowlands, and one juvenile found dead on Cove Point Road. Several hognose snakes were encountered along the beach, and the distinctive trails left by this broad bodied snake were observed there numerous times. Cove Point residents are familiar with hognose snakes, and several reported having witnessed them "playing dead." One specimen collected at Cove Point in 1933 is at the American Museum of Natural History. Cove Point records for the hognose snake have also been given by Kelly, Davis, and Robertson (1936), and Mansueti (1942).

Lampropeltis getula (king snake)

The king snake is also a relatively common species at Cove Point. Two were encountered during this study, one juvenile on the unpaved road to the beach and a large adult in upland woods. Three specimens are present in area museums, two at the Natural History Society of Maryland collected in 1948, and one at the Smithsonian Institution collected in 1958. Literature records for Cove Point have been given by Robertson (1936); Kelly, Davis, and Robertson (1936); Mansueti (1942); McCauley (1945); and Hardy and Mansueti (1962).

Lampropeltis triangulum (milk snake)

The taxonomy of the milk snakes inhabiting Maryland's Atlantic Coastal Plain is still unsettled, but I follow Grogan and Forester (1998) in recognizing them as a distinct subspecies, *L. t. temporalis*. These secretive, fossorial snakes are very infrequently encountered, although recent records (Grogan and Forester 1998) suggest that they are more under-collected than actually rare. However, *L. triangulum* is probably an uncommon species at Cove Point. The Natural History Society of Maryland has a specimen collected in the vicinity of Cove Point on 2 October 1960 by T. Hagelin. A second Cove Point specimen (NHSM R-4037) was found during this study. That

individual, an adult, was found dead on Cove Point Road just north of the entrance to the LNG plant on 19 April 2000.

Nerodia sipedon (water snake)

The water snake is abundant at Cove Point and was observed more frequently than any other species. Considering this, it is interesting that there are no preserved specimens in area collections. This is probably due to lack of interest by collectors in this common species. During the present study, one juvenile was found dead on Cove Point Road at its terminus near the lighthouse, and individuals were observed around the marsh on every visit. Water snakes were also frequently observed around the upland ponds and along many of the streams. It undoubtedly occurs at Cove Point wherever there is surface water. Literature records for the study area have been given by Mansueti (1942) and Orr (1999).

Opheodrys aestivus (rough green snake)

The green snake is common at Cove Point. The Natural History Society of Maryland has a specimen collected in 1945. Another individual was photographed by Richard Orr on 14 October 1998. Five individuals were found during the present study: one adult observed on vegetation along the boardwalk at the north end of the marsh, a juvenile in the grass at Lake Levy, and three individuals found dead on Cove Point Road.

Storeria dekayi (Dekay's snake)

Dekay's snake is a small secretive species that typically occurs in litter piles and around human habitations. Two individuals were found during this study, one dead on the paved LNG road leading down to the boardwalk and one living individual found on Cove Point Road at night. *Storeria dekayi* is relatively common at Cove Point.

Storeria occipitomaculata (red-bellied snake)

The red-bellied snake appears to be relatively common at Cove Point. Mansueti (1942) records that Robertson collected several specimens there (Curry's Farm), and the Natural History Society of Maryland has one specimen from Cove Point collected in 1935, and two others collected in 1946. Another Cove Point report was given by McCauley (1945). According to Mansueti (1942), the specimens found by Robertson were taken "under logs in an open ravine, with sandy soil, weeds, with a few shrubs and many trees." During this study one adult was found dead on Cove Point Road.

Thamnophis sauritus (ribbon snake)

The ribbon snake is uncommon at Cove Point. It is not mentioned in the literature from the site, and only one positively identified individual was encountered during this study, an adult found sunning on the grassed slope along Lake Levy in June of 2000. A possible second individual was found dead on Cove Point Road. That snake, a juvenile, was mashed and dry and could not be identified with certainty.

Thamnophis sirtalis (garter snake)

Although the garter snake is generally common throughout Calvert County, it was not found as frequently at Cove Point as I would expect. One adult was found dead on Cove Point Road, and a second was observed in a grassy seepage area along the road leading to the boardwalk at the north end of the marsh. Cooper (1947a) reported seeing a garter snake that had been killed by the lighthouse keeper.

Virginia valeriae (smooth earth snake)

The smooth earth snake is common at Cove Point. Three individuals were found during this study, a dead individual found on Cove Point Road during 1999 and two adults found beneath a piece of partly buried silt fence in the field behind Lake Levy. The Natural History Society of Maryland has one specimen collected at Cove Point in 1935. McCauley (1945) also reported a Cove Point specimen.

Species of Possible Occurrence

Review of published information, experience with the fauna of adjacent areas (i.e., Calvert Cliffs State Park), and examination of habitat types present at Cove Point lead me to suggest that one other snake and two salamanders are likely to occur within the study area. In addition, the questionable occurrence of one snake and a lizard has been suggested. These five species are briefly discussed below.

Elaphe guttata (corn snake)

The corn snake occurs sporadically throughout Calvert County, both to the north and to the south of Cove Point, and I have seen one individual from Calvert Cliffs State Park, just north of the study site. This large, colorful constrictor is infrequently encountered but is likely to occur at Cove Point.

Eumeces inexpectatus (southeastern five-lined skink)

The southeastern five-lined skink was tentatively listed for Maryland based on a specimen reportedly collected by H. Howden at Cove Point (see Harris 1975, for discussion). That specimen, now at the Smithsonian Institution, is correctly identified and Howden is known to have collected at Cove Point, but Harris viewed the record with skepticism. Since no other specimens of *E. inexpectatus* have ever been found in Maryland, and all other *Eumeces* from Cove Point have been either *E. fasciatus* or *E. laticeps*, there is no reason to accept this skink as an element of the fauna of Cove Point.

Nerodia erythrogaster (red-bellied watersnake)

During April of 1996, both Brent Stuary and Don Gartmen (pers. comm.) observed an unusual water snake along the marsh at Cove Point. They described this individual as dark above

with no trace of dorsal banding, and reddish on the under surface. Both naturalists identified this snake as a red-bellied water snake. There is only one other reported occurrence of *N. erythrogaster* on the western shore of the Chesapeake Bay, and that report was questioned by Harris (1975). In addition, it is known that occasional Maryland individuals of the common *Nerodia sipedon* "mimic" the color pattern of the distinctive *N. erythrogaster*. Considering this, the red-bellied water snake should not be considered to be resident at Cove Point unless a specimen is positively identified. All of the numerous *Nerodia* observed during this study were typical *N. sipedon*.

Pseudotriton montanus (mud salamander)

The mud salamander is of local occurrence in Calvert County, and Harris (1975) shows no records along the bay side. However, I have collected it at Calvert Cliffs State Park just to the north of Cove Point. As noted by Fowler (1946), *P. montanus* inhabits the muddy bottoms of small seepage pools, and a survey for this species in the study area should concentrate on the patches of such habitat that occur in the forested ravines that drain the uplands.

Notophthalmus viridescens (newt)

Although the newt has not been reported from Cove Point, nor was it found during this survey, it is probably present. It is a common inhabitant of freshwater ponds and wetlands throughout Maryland, and I have found it to be common at Calvert Cliffs State Park, just north of the study area. Adult newts are to be expected in the marsh and the upland ponds.

Discussion

For an area of its size, Cove Point supports a notable diversity of amphibians and reptiles. Fifty species have been found there, including several of the rarest occurring in southern Maryland (*G. carolineinsis*, *C. coccinea*, *L. t. temporalis*). This results from the relatively pristine condition of much of the study area, and its habitat diversity, which includes upland forest, cleared rights-of-way, steep slopes, barrier beach, sand flats, temporary wetlands, streams, seepage areas, springs, ponds, and extensive marshland exhibiting varying salinity.

Of the 50 species of amphibians and reptiles documented to occur within the study area, at least 47 probably still inhabit the site, most in stable, healthy populations. In addition, at least three other species are likely to be present but have yet to be documented. One amphibian (*G. carolinensis*) has been extirpated from Cove Point as a result of habitat loss and degradation during the 1940s and 50s. Two others (*A. opacum*, *R. sylvatica*) may have met the same fate. One introduced turtle (*Trachemys scripta*) is apparently not reproducing and will likely disappear from the study area.

Many of the species here reported from the Cove Point study area are known from fewer than five specimens or reported observations. This may not reflect rarity so much as it reflects burrowing or fossorial habits and/or few places where these species are likely to be encountered. For instance, the types of places where many herps are usually found in southern Maryland (slab piles, fallen logs, dead standing trees, ground litter, abandoned house sites, old saw mill sites, etc.) are uncommon or

absent at Cove Point. While this creates a clean and aesthetically pleasing area, it does reduce the effectiveness of efforts to locate those species that do not typically bask, call, or forage at the surface.

Available evidence shows that parts of the study area have undergone significant habitat modification in the past 70 years. Some of this resulted from natural processes such as successional changes, erosion of the bayside cliffs, narrowing of the barrier beach, and storm events that wash bay water into the interior marsh. Others are due to human activities, including expansion of the Cove Point community, construction of the LNG plant, exploratory titanium mining, destruction and degradation of natural ponds and wetlands, use of the sand flats for military exercises, and introduction of *Phragmites australis*. As indicated in the species discussions given in the preceding sections, these changes have adversely impacted populations of several local amphibians and reptiles.

For instance, the narrow-mouthed toad was historically found along Cove Point Road and around several natural ponds that occurred in the vicinity of the lighthouse, or between the lighthouse and the large marsh. Those ponds were destroyed by development and/or titanium mining. Information from the literature or conveyed to me by naturalists who collected there in the 1930s and 40s, clearly indicates that *Gastrophryne* bred in those ponds and not at the large marsh. When the ponds were destroyed it was unable to reproduce successfully and died out. In addition, that entire area was highly disturbed by military landing exercises carried out during World War II (John Norman, pers. comm.), activity that unquestionably reduced the population of adult animals.

The ponds where *Gastrophryne* spawned were part of a habitat complex that supported numerous other species. Evidence shows that most local amphibians were present there, several in abundance. Naturalists who knew that area have told me that *H. cinerea* and *H. chrysoceles* breeding choruses there were the largest at Cove Point. I have also been told that it supported the highest local density of *C. sexlineatus*, and provided breeding ponds for *A. maculatum* and *A. opacum*, two salamanders of uncertain status at Cove Point today.

Despite the unfortunate loss of the Cove Point population of the narrow-mouthed toad, and the possible extirpation of several vernal pool breeding amphibians, the amphibian and reptile fauna of this site is healthy and should remain so with minimal intervention. The following section offers recommendations that would serve to improve habitat for, and increase our knowledge of, Cove Point's amphibian and reptile fauna.

Recommendations

Basking Sites

Large populations of freshwater, basking turtles (*Chrysemys* and *Pseudemys*) occur in the two upland ponds. However, basking sites are limited to the branches of a few small trees that lie along the edges. The habitat would be improved, and survey would be made easier, if floating logs were anchored at selected locations in each pond. Providing such basking places in deeper water should also reduce predation on juvenile turtles.

Nesting Sites

Available turtle nesting sites around these two ponds are poor. The soil is hard packed and gravelly, and grasses are overgrowing exposed areas. Since these conditions can be expected to reduce nesting success and concentrate nests in patches, making them more susceptible to detection by predators, nesting survival would be increased if nesting beds characterized by open expanses of sandy soil were provided.

Ground Cover

It is said that a herpetologist is never happier than when he finds a good trash pile. There is a large element of truth to this statement because many amphibians and reptiles are regularly found beneath litter (discarded cardboard, boards, old roofing material, coarse woody debris, etc.). The undeveloped portions of the Cove Point study area are notably free of such material, including fallen and standing dead trees and large branches. It is not clear if such litter results in a larger number of individuals or simply concentrates them where they may be easily found, but survey would be enhanced if more were present. For instance, the stacking of cut trees along the edges of clearings and the gas line right-of-way, could be beneficial to many species.

Exposed Sand Areas

The exposed sandy areas near the lighthouse and along the back of the beach are vital habitat for *Cnemidophorus sexlineatus*. If that habitat type dwindles due to wave action or natural succession, the population of racerunners can be expected to decrease. I recommend that the number of racerunners be tracked and habitat maintenance to protect open expanses of sand be considered as a regular management measure at Cove Point.

Additional Survey

The status of several species of amphibians (*Ambystoma maculatum*, *Ambystoma opacum*, *Rana sylvatica*, *Scaphiophus holbrookii*) and reptiles (*Clemmys guttata*, *Malaclemys terrapene*) at Cove Point is uncertain. Additional effort should be expended to determine if these species are present in healthy, stable populations. If not, consideration could be given to specific habitat manipulation and/or reintroduction.

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Table 1. Tabular summary of published records for amphibians and reptiles from Cove Point, Calvert County, Maryland. Full literature citations are given in the Literature Cited section of this report. Scientific and common names have been updated to follow Conant and Collins (1991).

Species	Citation
spotted salamander (<i>Ambystoma maculatum</i>)	Orr 1999 Bushmann 2000
marbled salamander (<i>Ambystoma opacum</i>)	Hardy and Mansueti 1962
dusky salamander (<i>Desmognathus fuscus</i>)	Mansueti 1942
two-lined salamander (<i>Eurycea bislineata</i>)	Orr 1999
red-backed salamander (<i>Plethodon cinereus</i>)	Mansueti 1942
red salamander (<i>Pseudotriton ruber</i>)	Mansueti 1942 Hardy and Mansueti 1962
cricket frog (<i>Acris crepitans</i>)	Noble and Hassler 1936 Mansueti 1942 Orr 1999
Fowler's toad (<i>Bufo woodhousii</i>)	Mansueti 1942 Orr 1999
narrow-mouthed toad (<i>Gastrophryne carolinensis</i>)	Noble and Hassler 1936 Cooper 1947a Mansueti 1942
Cope's gray tree frog (<i>Hyla chrysoscelis</i>)	Noble and Hassler 1936 Hardy and Mansueti 1962 Zweifel 1970 Orr 1999
green tree frog (<i>Hyla cinerea</i>)	Noble and Hassler 1936 Mansueti 1942 Cooper 1950
spring peeper (<i>Pseudacris crucifer</i>)	Mansueti 1942 Orr 1999
chorus frog (<i>Pseudacris triseriata</i>)	Orr 1999
bullfrog (<i>Rana catesbeiana</i>)	Noble and Hassler 1936 Cooper 1947a Cooper 1950 Orr 1999 Bushmann 2000
green frog (<i>Rana clamitans</i>)	Noble and Hassler 1936 Cooper 1947a Cooper 1950 Mansueti 1942 Orr 1999

pickerel frog (<i>Rana palustris</i>)	Cooper 1947a Orr 1999
wood frog (<i>Rana sylvatica</i>)	Mansueti 1940
southern leopard frog (<i>Rana utricularia</i>)	Cooper 1947a Cooper 1950 Mansueti 1942 Orr 1999
spadefoot toad (<i>Scaphiopus holbrookii</i>)	Cooper 1947b Reed 1956
six-lined racerunner (<i>Cnemidophorus sexlineatus</i>)	Mansueti 1942 McClellan et al 1943 McCauley 1945 Cooper 1947a Orr 1999
five-lined skink (<i>Eumeces fasciatus</i>)	Mansueti 1942 McClellan et al 1943 McCauley 1945 Orr 1999
broad-headed skink (<i>Eumeces laticeps</i>)	Mansueti 1942 McClellan et al 1943 McCauley 1945
fence lizard (<i>Sceloporus undulatus</i>)	Mansueti 1942 McClellan et al 1943 McCauley 1945 Orr 1999
copperhead (<i>Agkistrodon contortrix</i>)	Mansueti 1942 Orr 1999
worm snake (<i>Carphophis amoenus</i>)	Kelly, Davis and Robertson 1936 Mansueti 1942 McCauley 1945
scarlet snake (<i>Cemophora coccinea</i>)	Cooper 1950
black racer (<i>Coluber constrictor</i>)	Cooper 1947a Orr 1999
ring-necked snake (<i>Diadophis punctatus</i>)	Kelly, Davis and Robertson 1936
black rat snake (<i>Elaphe obsoleta</i>)	Orr 1999
hognose snake (<i>Heterodon platirhinos</i>)	Kelly, Davis and Robertson 1936 Mansueti 1942
kingsnake (<i>Lampropeltis getula</i>)	Robertson 1936 Kelly, Davis and Robertson 1936 Mansueti 1942 McCauley 1945

	Hardy and Mansueti 1962
common watersnake (<i>Nerodia sipedon</i>)	Mansueti 1942 Orr 1999
rough green snake (<i>Opheodrys aestivus</i>)	Orr 1999
red-bellied snake (<i>Storeria occipitomaculata</i>)	Mansueti 1942 McCauley 1945
garter snake (<i>Thamnophis sirtalis</i>)	Cooper 1947a
smooth earth snake (<i>Virginia valeriae</i>)	McCauley 1945
snapping turtle (<i>Chelydra serpentina</i>)	Mansueti 1942 Orr 1999 Bushmann 2000
painted turtle (<i>Chrysemys picta</i>)	Mansueti 1942 Bushmann 2000
spotted turtle (<i>Clemmys guttata</i>)	Bushmann 2000
mud turtle (<i>Kinosternon subrubrum</i>)	Mansueti 1942 Orr 1999
diamondback terrapin (<i>Malaclemys terrapin</i>)	Orr 1999
red-bellied turtle (<i>Pseudemys rubriventris</i>)	Mansueti 1942 McCauley 1945 Hardy and Mansueti 1962 Orr 1999
musk turtle (<i>Sternotherus odoratus</i>)	Bushmann 2000
box turtle (<i>Terrapene carolina</i>)	Mansueti 1942 Orr 1999

APPENDIX. List of preserved amphibians and reptiles from Cove Point in recognized museum collections. Museum collections are Natural History Society of Maryland, Baltimore (NHSM); National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM); Field Museum of Natural History, Chicago (FMNH); and the American Museum of Natural History, New York (AMNH).

<u>TAXON</u>	<u>COLLECTION #</u>	<u>COLLECTION DATE</u>	<u>COLLECTOR</u>
FROGS AND TOADS			
<i>Acris crepitans</i>	NHSM A-2721-22	9/IX/48	J. Hardy
"	NHSM A-1678	31/V/47	J. Gentile
"	NHSM A-718-19	12/IV/41	R. Mansueti
"	AMNH A-45172 to 185	10-12/VI/34	Noble and Hassler
"	AMNH A-45261 to 265	11/VI/34	W. Hassler
<i>Bufo woodhousii</i>	NHSM A-2647	23/VIII/45	J. Hardy
"	NHSM A-730	2/VI/40	R. Mansueti
"	NHSM A-994-95	4/VII/46	Cooper, Norman
"	AMNH A-45149,150	3/VI/34	Noble and Hassler
<i>Gastrophryne carolinensis</i>	NHSM A-4742	4/VII/46	J. Cooper
"	NHSM A-1460	10/V/42	W. Norman
"	NHSM A-1681	31/V/47	J. Gentile
"	NHSM A-2454-56	5/VIII/45	J. Hardy
"	NHSM A-955-61	4/VII/46	Oler, Cooper, Norman
"	AMNH A-43999-00	10-VI/34	Noble and Hassler
"	AMNH A-45290, 91	VI/34	Noble
"	AMNH A-53293 to 295	5/VII/46	Hecht, Matatas
"	AMNH A-59517	VII/46	Hecht, Matatas
"	AMNH A-113406 to 408	5/VII/46	Hecht, Matatas
<i>Hyla cinerea</i>	NHSM A-23	10/VI/34	I. Hampe
"	NHSM A-1415	7/VII/46	F. Atwell
"	NHSM A-1416	5/V/46	F. Atwell
"	NHSM A-2468 to 71	5/VIII/45	J. Hardy
"	NHSM A-964 to 985	4/VII/46	Cooper, Norman
"	FMNH 48844 to 50	6/VI/46	J. Fowler
"	AMNH A-43933 to 53	03-22/VI/34	Noble, Hassler, Johnston
"	AMNH A-45251 to 260	11/VI/34	W. Hassler
"	AMNH A-53296 to 298	6/VII/45	Hecht, Matatas
<i>Hyla chrysoscelis</i>	NHSM A-2670	16/VIII/45	J. Hardy
"	NHSM A-2672	17/VIII/45	J. Hardy
"	NHSM A-2675	"	"
"	NHSM A-2677	"	"
"	NHSM A-2680	"	"
"	NHSM A-2683 to 2685	"	"
"	NHSM A-2695 to 2697, A-2700	"	"
"	NHSM A-2719	9/IX/48	"
"	NHSM A-2586	17/VIII/4	"
"	AMNH A-43969 to 98	10-22/VI/34	Noble and Hassler
"	AMNH A-44207	15/VI/34	Noble and Hassler
<i>Rana catesbeiana</i>	NHSM A-1442	23/III/47	J. Norman

"	NHSM A-993	4/VII/46	Cooper and Norman
"	FMNH 48851	6/VI/46	J. Fowler
"	FMNH 48852	6/VI/46	J. Fowler
"	AMNH A-45151	3-24/VI/34	Noble and Hassler
<i>R. clamitans</i>	NHSM A-686	2/VI/40	R. Mansueti
"	NHSM A-246	17/VIII/45	J. Hardy
"	NHSM A-2635	17/VIII/45	J. Hardy
"	NHSM A-2638	"	"
"	NHSM A-2676	"	"
"	NHSM A-2678	"	"
"	NHSM A-2686-2687	"	"
"	NHSM A-2691, 93	"	"
"	NHSM A-1675,77	31/V/47	J. Gentile
"	NHSM A-2585	17/VIII/45	J. Hardy
"	NHSM A-987, 90-91	4/VII/46	Cooper and Norman
"	NHSM A-1000-1002	7/VII/46	J. Cooper
"	AMNH A-45152,153	3-20/VI/34	Noble and Hassler
<i>Rana utricularia</i>	NHSM A-1674,76	31/V/47	J. Gentile
"	NHSM A-2459-62	5/VIII/45	J. Hardy
"	NHSM A-986,88-89,92	4/VII/46	Cooper, Norman
"	NHSM A-998	7/VII/46	R. Mansueti
"	NHSM A-1080-1083	11/VIII/46	J. Cooper
"	FMNH 48853	6/VI/46	J. Fowler
"	AMNH A-43661	09/X/34	W. Hassler
"	AMNH A-45163 to171	3/VI/34	Noble and Hassler

SALAMANDERS

<i>Ambystoma maculatum</i>	USNM 141258, 59	14/III/49	R. Mansueti
<i>Ambystoma opacum</i>	NHSM A-2312	23/VII/45	J. Hardy
"	NHSM A-963	4/VII/46	Cooper, H. Levy
<i>Desmognathus fuscus</i>	NHSM A-687	2/VI/40	R. Mansueti
<i>Eurycea bislineata</i>	NHSM A-1417	7/VII/46	F. Atwell
<i>Plethodon cinereus</i>	NHSM A-716-717	12-IV/41	R. Mansueti
"	USNM 368809 to 12	26/III/69	Highton, and Caraceno
"	USNM 368816 to 36	26/III/69	Highton, and Caraceno
<i>Pseudotriton ruber</i>	NHSM A-1679	31-V-47	J. Gentile
"	AMNH A-46017	21/VI/34	Noble

TURTLES

<i>Kinosternon subrubrum</i>	NHSM R-764	10/V/42	J. Norman
<i>Pseudemys rubriventris</i>	NHSM R-422	2/II/45	J. Hamlet
"	USNM 139663	8/VI/41	J. Fowler
<i>Sternotherus odoratus</i>	NHSM R-1225	10/V/42	H. Howden

<i>Terrapene carolina</i>	NHSM R-147	2/VI/39	R. Mansueti
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LIZARDS

<i>Cnemidophorus sexlineatus</i>	NHSM R-9	20/VII/35	H.C.R.
"	NHSM R-26	VII/34	Cooper and Mansueti
"	NHSM R-589	7/VII/46	R. Mansueti
"	NHSM R-667	11/VIII/46	J. Cooper
"	NHSM R-784 to 792	10/V/42	Norman and Norman
"	NHSM R-1306	4/VII/46	J. Hardy
"	NHSM R-1528	13/VI/48	J. Hardy
"	NHSM R-2069, 2070	10/V/42	Norman and Norman
"	AMNH R-57839	2/VII/34	Noble
"	AMNH R057992 to 994	12/X/34	W. Hassler
"	AMNH R-57996 to 998	12/X/34	W. Hassler
"	AMNH R-58003 to 008	12/X/34	W. Hassler
"	AMNH R-58011 to 013	12/X/34	W. Hassler
"	USNM 139421 to 24	3/VII/41	J. Fowler
"	USNM 139467 to 70	10/V/42	H. Howden

<i>Eumeces fasciatus</i>	NHSM R-2379	25/V.58	Groves and Groves
"	AMNH R-60298	13/I/35	Noble and Hassler

<i>Eumeces laticeps</i>	USNM 141375	10/V/48	Not known
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<i>Sceloporus undulatus</i>	NHSM R-27	12/IV/41	R. Mansueti
"	NHSM R-269,270	7/VII/46	R. Mansueti
"	NHSM R-590	7/VII/46	R. Mansueti
"	NHSM R-893	31/V/47	Mork and Gentile
"	AMNH R-57995	12/X/34	W. Hassler
"	AMNH R-57999, 58000	12/X/34	W. Hassler
"	AMNH R-58009, 010	12/X/34	W. Hassler
"	AMNH R-60293	no date	Hassler and Johnston

SNAKES

<i>Agkistrodon contortrix</i>	NHSM R-1508	9/IX/48	J. Hardy
<i>Carphophis amoenus</i>	NHSM R-122	2/VI/40	R. Mansueti
"	NHSM R-894	3/V/47	Y. Mork & Gentile
"	USNM 368815	16/III/68	R. Highton

<i>Cemophora coccinea</i>	NHSM R-586	7/VII/46	J. Cooper
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<i>Coluber constrictor</i>	NHSM R-263	10/V/40	J. Norman
"	NHSM R-664	1/VIII/46	
"	NHSM R-1033	1947	Oler and Cooper
"	AMNH R-58065	9/X/34	W. Hassler

<i>Diadophis punctatus</i>	USNM 141399	21/IV/46	Unknown
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<i>Heterodon platirhinos</i>	AMNH R-48472	2/VII/33	Noble
<i>Lampropeltis getula</i>	NHSM R-1335	13/VI/48	J. Hardy

"	NHSM R-1509	9/IX/48	J. Hardy
"	USNM 140304	VI/58	J. Hardy
Lampropeltis triangulum	NHSM R-2555	2/X/60	T. Hagelin
"	NHSM R-4037	4/19/00	A. Norden
Opheodrys aestivus	NHSM R-1477	5/VIII/45	J. Hardy
Storeria occipitomaculata	NHSM R-5	20/VII/35	H.C.L.
"	NHSM R-84, 85	7/VII/46	
Virginia valeria	NHSM R-6	20/VII/35	H.C.L.