

# Land Snails and Slugs of Cove Point, Calvert County, Maryland

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## Introduction

### *Study Site*

Cove Point, located at approximately 38°23' north latitude, 76°24' west longitude in Calvert County, Maryland contains 406 ha owned by the Cove Point Liquefied Natural Gas (LNG) Limited Partnership. This area is bordered to the southwest by Cove Point Road, to the east by the Chesapeake Bay, and extends north almost to the main stem of Grays Creek. The barrier wetland lying within the truncated cusped foreland of Cove Point Cape is approximately 77 ha. Of the 329 ha of upland, 44 are covered by the LNG industrial complex. The remaining upland area (285 ha) is comprised mostly of young mixed deciduous and coniferous forest, managed meadows and lawns, ponds, creek and seeps. The creeks are highly affected by stream capture. At least 698 vascular plant species have been documented from this area (Steury, 2002). The upland canopy is dominated by rock chestnut oak (*Quercus prinus*), although black oak (*Quercus velutina*), scarlet oak (*Quercus coccinea*), mockernut hickory (*Carya tomentosa*), and pale hickory (*Carya pallida*) were also common along with the conifers Virginia pine (*Pinus virginiana*) and loblolly pine (*Pinus taeda*). American holly (*Ilex opaca*) occurred in the midstory while the shrub layer was dominated patches of mountain laurel (*Kalmia latifolia*), blueberry (*Vaccinium corymbosum* and *V. pallidum*) and huckleberry (*Gaulthieria procumbens*).

### *Climate*

Cove Point lies in the Temperate Continental climate zone. There is no distinct dry season and summers are hot and winters are mild. The mean daily maximum temperature is 19.6° C and the mean daily minimum temperature 6.9° C between 1951 and 1980. Mean annual precipitation is approximately 108 cm. Snowfall measuring 0.25 cm or more occurs on an average of 72 days per year with a mean annual accumulation of 46.7 cm. Average frost penetration is about 12.7 cm along the coast of southern Maryland.

### *Soils*

Upland soils are primarily composed of Evesboro loamy sand and Sassafra fine sandy loam. Soils are very deep and excessively well drained. They contain low available moisture and are strongly to extremely acidic. Soils of Cove Point wetlands are mixed alluvial and consist of areas of saturated sand, peat, or muck. Elevations at Cove Point range from sea level to 34 m above sea level.

### *Methods*

Surveys lasting approximately six hours were conducted on 22 and 23 April, 18 and 19 May, and 15 and 16 June, 2015. Surveys were conducted using 3x magnifying lenses to look under woody debris, rocks, leaf litter, and loose bark of rotting fallen trees. Additionally, leaf litter samples were collected by filling one to three paper grocery bags (typically 14-18 liters) at each site and habitat type. Leaf litter samples were left in paper bags until dry, sieved in a hand spun centrifuge (pore sizes 5 x 2 mm to 5 x 20 mm), and examined under a dissecting microscope. Voucher specimens of all snail species were retained and will be deposited in the collection at the Carnegie Museum of Natural History in Pittsburgh, Pennsylvania.

### *Results*

The dry, sandy, acidic soils at Cove Point are not conducive to a high species richness of snails. Many land snails are calcifiles and snail diversity and richness is often highest on circumneutral soils. However, a total of 27 species (22 snails and 5 slugs) in 19 genera and 12 families was recorded from Cove Point in six days of search effort (Table 1). Two slug species (*Ambigolimax valentiana* and *Limax maximus*) are non-native. Only one of each of these two species was observed. Eleven species represent first records for Calvert County based on records in Grimm (1971) and Hubricht (1985). Two immature specimens (one empty shell and one live snail) of an *Inflexarius* sp. found at Cove Point represent the first records of this genus in Maryland. Both were found along the road near Gate 6, an area with abundant imported blue stone rip-rap placed along the road bank. The nearest known stations for *Inflexarius* sps. are in central Virginia, and this species may have been introduced at Cove Point. A search inside the fence under the stones along the bank slope near Gate 6 may eventually provide a mature specimen of this snail. The most abundant land snail at Cove Point is the Atlantic three-tooth (*Triodopsis juxtidentis*). *Catinella oklahomarum*, a snail associated with xeric, upland areas is characteristic of a habitat specific snail associated with upland surface areas at Cove Point. The most productive land snail habitats at Cove Point were along the western and southern edges of Cove Point Marsh and in deep pockets of moist, decaying, leaf litter accumulated in narrow ravine bottoms or tree fall divots. Six species found at Cove Point (*Catinella oklahomarum*, *Glyphyalinia rhoadsi*, *Helicodiscus notius*, *Inflexarius* sp., *Triodopsis fallax*, and *Triodopsis obsoleta*) were not found during a recent survey of land snails and slugs at National Parks near the District of Columbia, which documented 64 species over a two year period (Steury & Pearce, 2014)

### Annotated List of Species

#### SUCCINEIDAE

*Catinella oklahomarum* (Webb, 1953) – Three fresh empty shells of this species were found on dry sandy loam soil in upland woods dominated by deciduous tree species.

## STROBILOPSIDAE

*Strobilops aeneus* Pilsbry, 1926 – One empty shell of this species was found in a deep pocket of moist leaf litter. It is distinguished from its congeners at Cove Point by having an angular periphery of the last whorl.

*Strobilops labyrinthicus* (Say, 1817) – This is a fairly common species on Cove Point upland sites. It was found in deep pockets of moist leaf litter near the edge of sandy pine woods, under wet leaf litter at the edge of a stream, and under loose bark of a rotting pine log. It is distinguished from its congeners at Cove Point by having a rounded periphery of the last whorl and weak riblets on the shell base, especially near the aperture. Surprisingly, Grimm (1971), did not report this species for Calvert County, but did record the other two *Strobilops* species found during this survey from the county.

*Strobilops texasianus* Pilsbry & Ferriss, 1906 – Two specimens attributable to this species were found in a deep pocket of moist leaf litter. They were found in association with *S. labyrinthicus*. The species is distinguished from other *Strobilops* species at Cove Point by having a rounded periphery of the last whorl and strong riblets on the base of the shell that extend to the aperture. The riblets on the dorsal shell surface are also more robust than those in *S. labyrinthicus*.

## VERTIGINIDAE

*Gastrocopta contracta* (Say, 1822) – One live specimen of *G. contracta* was found in a deep pocket of moist leaf litter. It was found in association with *G. pentodon*.

*Gastrocopta pentodon* (Say, 1821) – This was the most common pupillid land snail found at Cove Point although it was common at only one site where it was found in a deep pocket of moist leaf litter.

*Gastrocopta procera* (Gould, 1840) – Three live specimens of *G. procera* were found under a rotting log along the southern edge of Cove Point Marsh.

## PUNCTIDAE

*Punctum minutissimum* (I. Lea, 1841) – At less than two mm wide at maturity, this is the smallest land snail found at Cove Point. Two specimens were found in a deep pocket of moist leaf litter.

## HELICODISCIDAE

*Helicodiscus notius* Hubricht, 1962 – This is a common snail at Cove Point and was found in a variety of moist habits including deep pockets of leaf litter and under rotting

logs in swamps. Some taxonomists consider *H. notius* to be a synonym of *H. parallelus*. *H. notius* differs from *H. parallelus* in having strong spiral ridges on the shell's nuclear whorl. The numerous specimens found at Cove Point all possessed strong spiral ridges on the nuclear whorl.

#### GASTRODONTIDAE

*Striatura meridionalis* (Pilsbry & Ferriss, 1906) – One specimen of this species was found crawling on a wet leaf deep in a pocket of leaf litter.

*Ventridens ligera* (Say, 1821) – This was an uncommon but widespread species at Cove Point. It was found on soil or under logs in dry sandy loam upland woods.

*Zonitoides arboreus* (Say, 1816) – As at most sites within its primary range this species is a common snail at Cove Point. It was found in leaf litter, under loose bark of dead trees, under logs in dry upland sites, and in swamps.

#### ZONITIDAE

*Glyphyalinia cryptomphala* (Clapp, 1915) – Only one specimen of this species was found under a log in a swamp along the southern edge of Cove Point Marsh. The umbilicus of this species is covered by the reflected lip of the aperture.

*Glyphyalinia indentata* (Say, 1823) – Four specimens of *G. indentata* were found in deep moist leaf litter or under logs in upland woods. The reflected lip of the aperture covers only about ¼ of the perforate umbilicus in this species.

*Glyphyalinia rhoadsi* (Pilsbry, 1899) – The only specimen of *G. rhoadsi* was found in a deep pocket of moist leaf litter. The umbilicus of this species is wide, nearly 1/5 the width of the shell base.

#### PRISTILOMATIDAE

*Hawaiiia minuscula* (A. Binney, 1841) – *H. minuscula* was found under logs along the southern edge of Cove Point Marsh and in deep moist leaf in upland woods.

#### LIMACIDAE

*Ambigolimax valentiana* (Férussac, 1823) – The single specimen of this non-native slug was found under a log along the southern edge of Cove Point Marsh.

*Limax maximus* Linné, 1758 – The only specimen of this large non-native slug was found under a log in a seasonally dry stream gully in upland woods.

## AGRIOLIMACIDAE

*Deroceras laeve* (Müller, 1774) – Two of these native slugs were found under a rock at the edge of a drainage pond.

## PHILOMYCIDAE

*Philomycus carolinianus* (Bosc, 1802) – Three of these native slugs were found under logs in upland woods.

*Megapallifera mutabilis* (Hubricht, 1951) – One specimen of this slug was observed climbing a tree to one meter in the swamp on the southern edge of Cove Point Marsh.

## POLYGYRIDAE

*Inflectarius* sp. – Two immature specimens (one empty shell and one live snail) attributable to this genus were found at Cove Point on 22 April 2015. These represent the first records of this genus in Maryland. The nearest known stations for this genus are in central Virginia, so it was likely introduced by human activity at Cove Point. They were found in a deep concrete ditch filled with moist leaf litter near Gate 6. The roadside bank slope near this area is covered in blue stone rip-rap which may have been the source of this introduction. One hour of search effort at this site on 16 June failed to uncover any additional specimens. Of the three species of *Inflectarius* known from Virginia, *I. inflectus* is closest in range to Maryland, the most wide spread and abundant of the three species in its native range, and has shell characteristics which fit well with the juvenile specimens found at Cove Point; including sparse, flat, stiff, periostracal processes (hairs) on most whorls, a strongly papillose shell base, and a high shoulder on the ultimate whorl. The empty shell found at Cove Point measured 7.3 mm maximum width at 3 3/4 whorls and the live snail 6.9 mm at 3 1/2 whorls.

*Mesodon thyroideus* (Say, 1816) – This large land snail was uncommon but wide spread at Cove Point. It was found on dry sandy loam upland woods under logs or shallow leaf litter. Empty shells were found on the beach dune.

*Neohelix albolabris* (Say, 1816) – This is the largest land snail found at Cove Point. Two empty shells were found, one under a log along the western edge of Cove Point Marsh and one on the barrier sand dune.

*Triodopsis fallax* (Say, 1825) – Three specimens of *T. fallax* were found at Cove Point. It was associated with *T. juxtidentis*. Two live snails were found under woody debris and thatch along the southern edge of Cove Point Marsh and one empty shell was found on the barrier sand dune.

*Triodopsis juxtidentis* (Pilsbry, 1894) – This species is the most commonly observed land snail at Cove Point. It was found on soil under logs, under bark of rotting logs, and in leaf litter. Large numbers of empty shells, bleached but unbroken, were found on the barrier sand dune. These are presumably the result of snails that wander from the swamps onto the dune at night and are desiccated in the full sun of the next day.

*Triodopsis obsoleta* (Pilsbry, 1894) – Two specimens of *T. obsoleta* were found at Cove Point. One empty shell under a log along the western shore of Cove Point Marsh and one live snail near the southern marsh edge.

### **Literature Cited**

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