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RESEARCH ARTICLE

NOTES ON THE DISTRIBUTION OF *AMBYSTOMA OPACUM* (GRAVENHORST, 1807) IN MARYLAND

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ABSTRACT

Based largely on preserved specimens, the distribution of the marbled salamander, *Ambystoma opacum* (Gravenhorst, 1807), is discussed and mapped for Maryland and the District of Columbia. This differs from the accounts of previous authors who did not provide documentation and relied on hearsay or photographs not in the public domain, or the current trend of documenting distributions solely through photography. An emphasis is placed on the Piedmont physiographic province, which forms a range limit for this species in Maryland, contrasting sharply with its extensive distribution in states far to the northeast.

Keywords: Marbled salamander, Piedmont.

INTRODUCTION

In Maryland, the marbled salamander, *Ambystoma opacum* (Gravenhorst, 1807), occurs in 22 of its 23 counties, Baltimore City, as well as the District of Columbia, which is here considered part of Maryland (Cooper, 1965; Harris, 1975). Understandably but incorrectly, the species has always been mapped as occurring throughout the Piedmont Plateau physiographic province in this state (Bishop, 1943; Conant, 1958, 1975; Anderson, 1967; Conant & Collins, 1991, 1998; Petranksa, 1998; Powell et al., 2016). *Plethodon glutinosus* (Green, 1818), *Bufo fowleri* Hinckley, 1882, *Acris crepitans* Baird, 1854, *Pseudacris feriarum* (Baird, 1856), *Sternotherus odoratus* (Latreille in Sonnini & Latreille, 1801), *Sceloporus undulatus* (Bosc & Daudin in Sonnini & Latreille, 1801), *Plestiodon fasciatus* (Linnaeus, 1758), *Carphophis amoenus* (Say, 1825), *Storeria dekayi* (Holbrook, 1839), *Storeria occipitomaculata* (Storer, 1839), *Virginia valeriae* (Baird &

Girard, 1853), and *Agkistrodon contortrix* (Linnaeus, 1766) are other species that have been treated in this manner. *Glyptemys insculpta* (Le Conte, 1830) could also be added to this list, except for its treatment in Powell et al. (2016). The reasons for this are based on one or more of the following: (1) inadequate field work, (2) a few museum specimens occurring on the periphery of this province, (3) the distributional matrices of Cooper (1960, 1965), which were no more detailed than county, and (4) the distributional surveys of Harris (1969, 1975), which relied heavily on personal communications and thus are not available for scrutiny.

My field work from 1974–2012 and scattered trips thereafter in the Maryland Piedmont (roughly 800 trips), supplemented by museum records and literature reports indicate that the above species have marginal or discontinuous distributions in this area. This note discusses and maps the specimen-based distribution of marbled salamanders throughout the state, with an emphasis on the Piedmont (Fig. 1). Historical sources, including discarded specimens, field notes and other files, have also been cited. A recent book, *The Maryland Amphibian and Reptile Atlas* (Cunningham & Nazdrowicz, 2018), reprinted Harris's (1975) maps as benchmarks to their findings but did so without assessing his localities. As previously noted (Miller, 2019), this is poor practice, and the jurisdiction-by-jurisdiction account below demonstrates the hazards of this. Further complications arise in the online publication iNaturalist, which attempts to document distributions through photography coupled with latitude and longitude coordinates. Often these coordinates are intentionally vague, rendering the locality useless, and yet the site is mapped nonetheless. Photographic documentation for distributional purposes undoubtedly has its advantages, especially for oversized species and species of special concern; however, the creeping use of photography as a replacement for specimens should pose a concern to serious students of natural history. An overreliance on photography would also run contrary to centuries of museum practice which rely on specimens for many purposes beyond distribution. In addition, there is the problem of the ephemeral nature of online publications. When I contacted seven posters of potentially important records on iNaturalist for *A. opacum* requesting them to confirm their claims, only three responded and only one was helpful. With the exception of one Coastal Plain site in Cecil County, I have limited my interest in Cunningham & Nazdrowicz (2018) and iNaturalist to unusual localities mapped in the Piedmont Plateau physiographic province and the Blue Ridge physiographic province.

Numerous new localities are reported and mapped herein in addition to Harris (1975). Specimens cited are in the following collections: American Museum of Natural History (AMNH), Baltimore Zoo (BZ; now mostly in NHSM, others in TSU), Carnegie Museum of Natural History (CM), Field Museum of Natural History (FMNH), Florida Museum of Natural History, University of Florida (UF), Monte L. Bean Life Science Museum, Brigham Young University (BYU), Museum of Southwestern Biology, University of New Mexico (MSB), National Museum of Natural History (USNM), Natural History Society of Maryland (NHSM), Natural History Society of Maryland/Herbert S. Harris, Jr. (NHSM/HSJ), North Carolina Museum of Natural Sciences (NCSM), Towson University (TSU) and University of Texas at El Paso (UTEP).

DISCUSSION

Allegany County: Harris (1975) mapped three sites in this montane county; only two were documented at the time: near Flintstone: Town Creek (CM 12591, 26 August 1934) and near Oldtown: Chesapeake and Ohio Canal (NHSM 3380, – October 1959). Four (TSU, USNM) have been added since. A word needs to be said about amphibian surveys of the Chesapeake and Ohio

Canal conducted in the late 1990s by Don C. Forester (Frederick and Montgomery Counties) and Edward L. Thompson (Allegany and Washington Counties). These surveys have been listed, for example, in Cunningham & Nazdrowicz (2018). I was unable to obtain copies of these reports from the authors (Forester said he never received one), the Chesapeake and Ohio Canal National Historical Park, the National Park Service, or the Maryland Department of Natural Resources. One individual at the DNR stated that they contained “sensitive location information” which presumably was not safe in my hands. As such, I do not consider these to be works in the public domain and therefore take no responsibility for them.

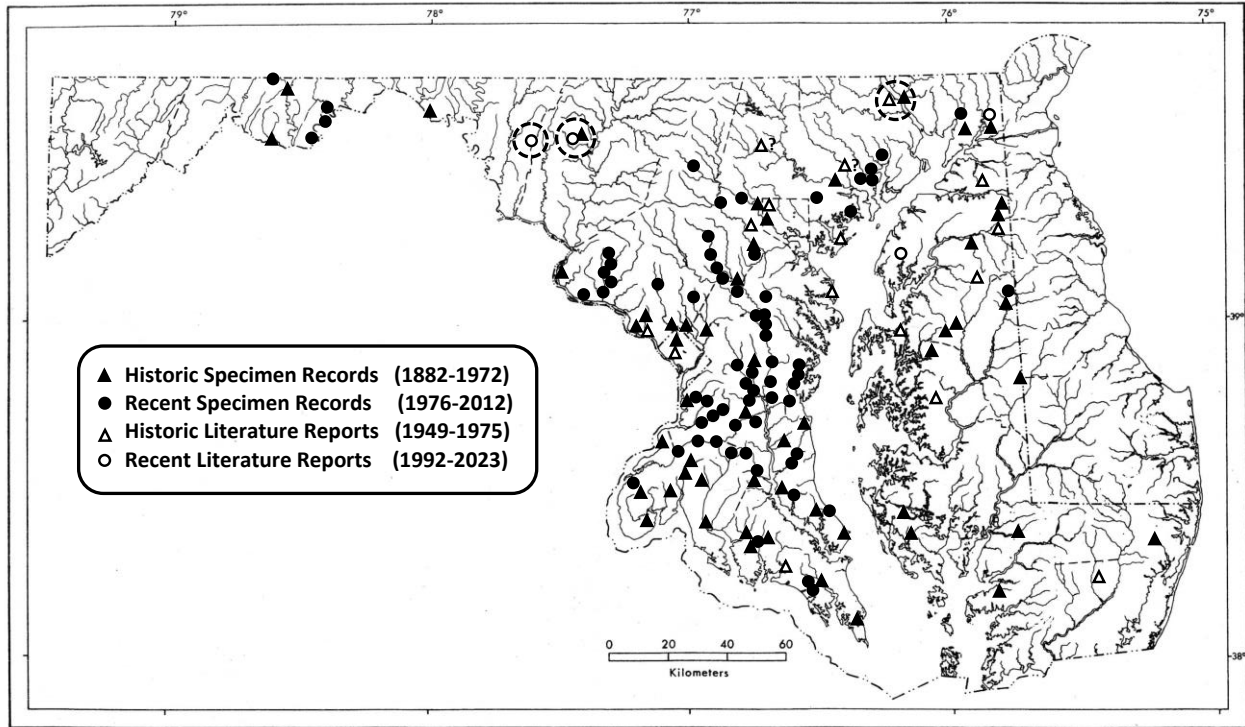


Figure 1. Map of Maryland, Delaware and the District of Columbia showing locality records for the marbled salamander, *Ambystoma opacum*, in Maryland and DC. Isolated Piedmont and Blue Ridge sites are encompassed by broken circles.

Anne Arundel County: Harris (1975) plotted three sites in this Coastal Plain county; two are vouchered: Odenton (BYU, TSU, UF) and Priest Bridge (NHSM, TSU, USNM). An undocumented locality is based on an individual from along Mountain Road (MD Route 177), near Gibson Island, 21 September 1974, collected by David M. Hillis and me. Between 1974 and 2009 I made 69 trips into this county and collected the species at 11 sites.

Baltimore City: The only extant specimen (NHSM 285, date unknown, but ca. 1940) known from this jurisdiction was collected in the Piedmont “along Gwynn’s Falls Park” (Mansueti, 1941). This record was overlooked by Harris (1969, 1975) (Miller, 2015). A trip I made to this area on 17 April 2016 downstream from Gwynn’s Falls at Windsor Mill Road disclosed only a potential but superficial breeding site along the stream at the Hilton Parkway overpass. However, for anyone interested in determining if this species still occurs in Baltimore, the area along Gwynn’s Falls upstream from Windsor Mill Road should be searched. A second locality for Baltimore is recorded

in the Journal of Field Notes, Department of Herpetology, NHSM and the collection catalogue of Robert S. Simmons, and were overlooked by Miller (2015). This was two temporary ponds located at the intersection of Taney Road and the former Western Run Parkway. The former source records larvae on 2 February 1947 by John E. Norman and 20 April 1947, collector not stated. Simmons found a 4.25-inch (10.8 cm) specimen (RSS S46) in October 1952, but it has been discarded. The ponds were destroyed long ago during the widening of Cross Country Boulevard (J. E. Norman, personal communication, 1994 or 1995).

Baltimore County: Among the undocumented reports of *A. opacum* in this largely Piedmont county, the first was provided by Reed (1957). In a record overlooked or ignored by Harris (1969, 1975), Reed reported this species from the former YMCA Camp Black Rock, which was located along Blackrock Run, 1.6 km N Butler. (The camp was dissolved and became a private estate by 1985.) This was based on a specimen in the collection of Ralph F. Daffin (RFD 360, 10 July 1955). No specimen or jar label exists and the date is unusual. However, on 19 September 2023, I discovered a potentially suitable reproductive site for this species along Blackrock Run on former camp property, but no evidence of its presence. This locality, the northernmost for the county, is indicated on the map with a question mark. In another report not included by Harris (1969, 1975), Reed (1957) published another Daffin report (RFD 1022-1037, 27 February 1957) for “Balliston” (Barrison) Point Road. This was a series of larvae that has been discarded. The locality is on the Coastal Plain of Back River Neck and I regard it as uncontroversial.

Harris (1969, 1975) mapped at least two and perhaps as many as four sites in the Piedmont of Baltimore County that I cannot account for. One locality may be an inaccurate plotting of vicinity of the Gunpowder Falls at US Route 1 (NHSM 118, 9 November 1941; see Buxbaum & Mansueti, 1942). The other appears to be from along the Little Gunpowder Falls, 2.0 km NE Fork. On 4 April 1996, I discovered a partially wooded pool and associated slough at this locality, at which time I noted that it was spring fed and possibly permanent. *Rana sylvatica* (Le Conte, 1825) egg clutches were common, although there was no indication of *Ambystoma maculatum* (Shaw, 1802), a common associate of *A. opacum*, and a species that is vastly more common in the Maryland Piedmont than *A. opacum* (TSU records; personal observations). A few *Pseudacris crucifer* (Wied-Neuwied, 1838) were also calling. I did not make a return trip to look for *A. opacum* until 16 September 2008 at which time I found the area unrecognizable. The pool, slough and woodland were gone. I have provisionally included this site and mapped it with a question mark. As for Harris’s remaining two localities, adjacent to each other and due north of Baltimore, there is no basis for them in the public domain and I suspect they are miscommunications with others and represent *A. maculatum*. I have lived and done field work in this area for 50 years and am confident that *A. opacum* does not occur here. If Harris’s files become available to researchers, perhaps these sites and numerous others can be evaluated.

An unreported Piedmont site is “near the intersection of Johnnycake Road and North Rolling Road, Woodlawn.” This is from the data card to BZ 631 for a specimen collected on 2 August 1971, with the notation: “Found in swimming pool; unable to crawl up plastic sides.” No specimen exists, but I see no reason to question the locality. Incidental to reporting a missing albino *Storeria dekayi* from the Baltimore Zoo collection, Groves (1984) noted that about 30 small preserved snakes were stolen from the zoo in 1978. Perhaps BZ 631 was among them, although the data card for the snake is also missing. A title search of the collector’s property strongly suggests that a breeding site exists or once existed along Cedar Branch between Crosby Road and

Johnnycake Road. This is 3.8 km SW Woodlawn. Due to numerous residences in the area today, I did not attempt to search the area.

Hillis (1977), in his study near Bare Hills on reproduction in *A. maculatum*, listed seven other species that used his study pond. One of these was *A. opacum*. This was based on a personal communication from Bradley E. Lear (D. M. Hillis, personal communication, 1977, 2014). Lear (personal communication, 2014) has never seen the species in Maryland. Hillis's site, an artifact of the construction of the long-defunct Green Spring Branch of the Northern Central Railroad, seems an ideal, if artificial, locality for marbled salamanders, but my examination of the site in the late 1970s for adults was not successful, and the nighttime field work of Forester et al. (1989) on *P. crucifer* at this locality did not disclose the presence of larvae (D. C. Forester, personal communication, ca. 1990).

The most unusual locality I encountered for this species from anywhere in Maryland was from "Prettyboy Reservoir Park" and was posted on iNaturalist. Documentation was two pictures of submerged eggs from 2 March 2023. Although viable eggs, presumably not submerged, have been found in the field in Maryland and the District of Columbia as late as March (Noble & Brady, 1933), this recent report strains credulity. Furthermore, according to the USGS Lineboro quadrangle (1974), the site, as pinpointed by the poster, may not be on Prettyboy Reservoir property, but rather on denuded private property. The written locality data, so often very poor on iNaturalist, list this site as Manchester (Carroll County) when Hoffmanville (Baltimore County) would have been precise. The two towns are 9.7 km apart. I emailed the poster, but never heard from her. There are no other reports anywhere near this site and it has not been accepted here. I made 494 trips in Baltimore County (1974–2023), but found the species at only three sites in the Piedmont (one near Hernwood and two on McDonogh School property) and one on the Coastal Plain (near Chase).

Calvert County: Harris (1975) plotted four sites in this Coastal Plain county; three appear to be based on Hardy & Mansueti (1962). The fourth is unknown to me. Mansueti (1955), Wells (1968) and Hardy (1964) also reported the species from sites listed by Hardy & Mansueti.

Norden (2005) surveyed the herpetofauna of Cove Point, Calvert County, making 19 trips in 1999–2000 (no specific dates given), summarized the field work and observations of others, and provided a list of specimens he assumed to be extant. This work had been published earlier (Norden, 2001), but this was not mentioned. Both versions contain many errors, including his account of *A. opacum*. He stated that this species breeds in vernal pools. Since marbled salamanders reproduce in the late summer and early fall in Maryland, they are not associated with the spring. Norden cited two specimens in the collection of the Natural History Society of Maryland: NHSM 963 has the wrong collectors listed and NHSM 2312 is not in the collection. Norden also stated that this species was collected at Cove Point on 15 April 1972 on a Maryland Herpetological Society field trip. There are no specimens in NHSM or NHSM/HSB corroborating this. A historic record for Cove Point is present in R. S. Simmons' catalogue: "Found 2 beneath driftwood behind lighthouse, 11 May 1950." One adult (RSS S41) was collected, but has been discarded.

Caroline County: Harris, in his revisions to Cooper (1965), listed the first report for this Coastal Plain county, stating: "Frank Groves collected recently transformed individuals near Denton." No date was provided, there are no BZ data cards, and there are no preserved specimens. However, Groves did collect *A. opacum* 10 miles (16.1 km) SE Denton: MD Route 404 (NHSM 4824, 15

July 1957) Even here there is a problem—taken literally the data place the collection site at least 1.6 km inside Delaware. Nonetheless, I have mapped it as a Maryland record, assuming the mileage to be merely an estimate. *Carphophis amoenus* (NHSM 2386, 15 July 1957) and *Diadophis punctatus* (Linnaeus, 1766) (NHSM 2404–2405, 15 July 1957; NHSM 2406, 18 July 1957) were also collected by Groves at this unfortunately vague locality. Both snakes are the sole records mapped by Harris (1975) for Caroline County and they are both plotted in or near Denton. [There is, however, a *Diadophis* from 1.0 mile (1.6 km) N Denton in the Field Museum (FMNH 44976, 9 September 1945). However, based on Harris’s acknowledgments there is no evidence that he consulted this collection.] Given the likelihood of miscommunication with Groves, I have not accepted Harris’s near Denton locality. Other sites mapped by Harris for *A. opacum* (Baltimore Corner, Federalsburg and another Denton locality) have no documentation in the public domain.

Carroll County: Miller (1984) reported the first and so far only locality for this Piedmont county. This was near Bird Hill (TSU 5950, 26 September 1983). A return trip to this site on 6 March 2004 revealed that beaver had cut a channel from the breeding depression to Morgan Run, possibly eliminating the species. In Cunningham & Nazdrowicz (2018), county records post-Harris (1975) are typically mentioned in the species accounts. However, Therres (2018) overlooked this one, although Miller (1984) was cited in Cunningham & Schwartz. More important, Therres (2018) stated: “In Maryland, Marbled Salamanders occur statewide except for the Appalachian Plateaus (H. S. Harris 1975).” Harris actually wrote: “Except for the Alleghany Plateau, distribution *appears* to be statewide [emphasis added].” Therres then attempted to account for the spotty upland distribution of this species in Maryland, stating: “the Marbled Salamander appears to be found primarily in soil types dominated by moderately coarse-textured soils and does not generally occur in areas with medium-textured soil types (F. P. Miller 1967). These coarse-textured soils are most likely conducive to the fossorial behavior of this salamander.” I do not believe this is a sound explanation. First, at certain points in the ontogenies of *A. maculatum* and *A. opacum*, two species that often share the same reproductive and terrestrial habitats in Maryland, both will be of similar size and presumably similar strength. Although neither species appears capable of digging burrows, only enlarging existing structures (Semlitsch, 1983), *A. maculatum* has a widespread distribution in the Maryland uplands (Harris, 1975; Thompson & Gates, 1982; TSU records; personal observations). Conversely, *A. maculatum* is not documented from Caroline County and nearly the entire lower Eastern Shore (Dorchester, Somerset, Wicomico and Worcester Counties—Harris, 1975), an area that possesses soil supposedly agreeable to it according to Therres. *A. opacum*, however, has a general distribution in this area in soil supposedly not agreeable to it (Harris, 1975; map herein). Cunningham & Nazdrowicz (2018) and iNaturalist are also supportive of this position.

The Carroll County site, although seemingly isolated, has not been encircled on the map. It appears to be part of a continuous, if intermittent, distribution in the Patapsco River drainage. The creation of Liberty Reservoir, started in 1951 and completed in 1954, presumably destroyed many reproductive and terrestrial sites for *Ambystoma*, *Hemidactylium scutatum* (Temminck & Schlegel in Von Siebold, 1838), *Notophthalmus viridescens* (Rafinesque, 1820), *R. sylvatica* and numerous other species. I made 68 trips into this county from 1979–2004.

Cecil County: Harris (1975) mapped only one locality for this county, in the Piedmont at Conowingo (encircled on the map). This may have been based on Reed (1956, 1957) or on a personal communication from R. S. Simmons, who, in his catalogue, wrote: “Found several larvae

in pool beside road [US Route 222; now MD Route 222].” This was in June 1949 at which time he collected two specimens each measuring 2.5 inches (6.35 cm). Both have been discarded. However, a specimen, unknown to Harris, does exist for Conowingo (TSU 68, 20 September 1953). I made five trips along the Susquehanna River below Conowingo Reservoir Dam (19 March 1984, 27 September 1984, 22 March 2012, 20 April 2012, 17 September 2012), but was not successful in finding *A. opacum*. This was surprising given that the area is essentially unchanged since it was first brought to the attention of herpers by Cooper (1947, 1949). Four other sites, three on the Coastal Plain and one from a transitional area, are known from the county. The earliest of these is Perch Creek (MSB 28140, 2 October 1938). An overlooked coastal plain locality by Harris is Elk Neck (AMNH 60348, 6 September 1953). [A second Elk Neck site also exists (MSB 28141, 1 May 1951).] Simmons’ catalogue records a coastal plain site for Cecilton, 15 October 1952 (RSS S40), with the notation: “Found several around dried pond margin. Length: 3 ¾ inches” (9.5 cm). This specimen has also been discarded. A report and photograph from 9 March 2022 listed on iNaturalist recorded this species from both Elkton and Rising Sun, and was mapped, vaguely, from the latter town. The two towns are 22 km apart. My attempt to correct this contradiction was only partly successful. The correct locality is an unknown (to me) point along Old Elk Neck Road, Elk Neck. This road is 14 km long. iNaturalist considers this report “Research Grade.” The only report I have accepted from iNaturalist is a Coastal Plain locality 2.1 km SSE Elkton, 15 February 2023 (John Canoles, personal communication, 2024). I made 67 trips into Cecil County (1984–2012), but found the species only once, near Mechanic Valley (TSU 9186-9187, 18 September 1995).

Charles County: Harris (1975) plotted four or five sites in this Coastal Plain county. Most of these can be accounted for (CM, NHSM/HSH, USNM, UTEP). Overlooked was Fenwick (USNM 141263, 14 May 1950). Recent field work in Charles County has been negligible, but has resulted in the collection of the species at five sites (1984–2008), all along the northern periphery of the county.

District of Columbia: Noble & Brady (1933) reported the species from “Glover estate, Georgetown, D. C.” and made several references to Rock Creek and Rock Creek Park. Harris (1975) mapped one site for this jurisdiction, which is bisected by the Fall Line. This is probably based on one larva from Pinehurst Parkway Park formerly in the collection of J. A. Fowler, which is now CM 137945, 29 April 1945. The American Museum has numerous larvae from 1930 (AMNH 36863-36913, 37189, 37296-37301), but locality data no more specific than DC.

Dorchester County: In reporting the first record for *Rana virgatipes* Cope, 1891 in Maryland [ca. 5.0 miles (8.0 km) S Church Creek: near Gum Swamp, 10 April 1947], Conant (1947) noted that *A. opacum* had been collected “nearby.” This may be the source for the one locality plotted by Harris (1975) in this Coastal Plain county. Specimens from this site are MSB 28142, 11 April 1941 and 28143-28145, 11 October 1940. The only other vouchered site in this county is from 1.1 miles (1.8 km) NNE Lakesville: MD Route 336 (USNM 365605-365606, 8 March 1965). Other specimens (discarded), from the Blackwater National Wildlife Refuge, were in the collections of R. S. Simmons (RSS S111, 18 October 1955) and R. F. Daffin (RFD 1246-1248, 16 March 1957). The former noted: “Beneath debris at sawmill with ova.” The developmental stage of the Daffin specimens was not recorded. A journal of an unknown NHSM member, but probably Joseph Gentile given his remarks on mammals throughout the notebook, recorded the following: “The following day [probably 4 June 1949] we visited the Blackwater Game Refuge, a large marsh fed

by a river. ... The first area visited was an old sawmill near the entrance. The mill is directly on the river. ... [Second area was not clearly stated.] A short while later two marbled salamanders were found under cover in the marsh.”

Frederick County: Cooper (1960, 1965), in his distributional matrices, indicated that marbled salamanders occur in this county and all physiographic provinces in Maryland, with the exception of the Allegheny Plateau. Harris (1969) mapped two sites, one in the Piedmont and the other in the Blue Ridge. The latter “record” appears to date from Cooper (1960, 1965), but I cannot find the basis for it. In 1975 Harris added a third site for the Piedmont of this county. *Ambystoma opacum* has been documented from only one of these sites. NHSM 4827, 17 September 1960 is from near Thurmont, and there are three specimens bearing the data: “10 miles S Emmitsburg at Thurmont” (NHSM/HSB 129, 3 May 1959 and NHSM/HSB 130-131, 8 May 1960). Thurmont is actually 7.0 miles (11.3 km) SW Emmitsburg, but there was no need to make reference to the latter town. Furthermore, the actual collection site is 4.3 km SSW Thurmont (H. S. Harris, Jr., personal communication, ca. 1980) in a wooded area possessing a large number of odd excavations that the USGS Catocin Furnace quadrangle (1979) shows as permanent ponds. My experience in the northern end of this tract (3.5 km SSW Thurmont, 4 October 1984) suggested that none of them are permanent. On this date I found one unattended clutch of eggs in this area.

There are two current reports, both based on photographs of adults, of *A. opacum* in the Blue Ridge of Frederick County, one in Cunningham & Nazdrowicz (2018) and the other on iNaturalist. Eric C. Kindahl found the species 7.4 km SW Thurmont on 19 April 2012. This site was mapped in Cunningham & Nazdrowicz and is plotted herein. The latter report, from Catocin Mountain Park, dates from 2 October 2020. The poster mapped a vague locality and did not respond to my query requesting clarification so I have not accepted it. She also listed the park as being in Smithsburg (Washington County), when Thurmont (Frederick County) would have been correct.

I made only 28 trips (1976–2007) into this herpetologically unattractive county. Although the Blue Ridge portion of the county has its appeal, deforestation in the Piedmont has been extensive (O’Philips, 2004; personal observations), possibly accounting for the isolation of the Thurmont site (encircled on the map). However, on 21 September 2005 I checked two seemingly ideal sites for marbled salamanders, both in the vicinity of Tuscarora (Piedmont) and in close proximity to the Potomac River, neither of which had the species.

Harford County: Stine (1953), in a popular article, superficially mapped the distributions of the four species of ambystomatids that occur in Maryland. For *A. opacum*, unlike the other three species, he used a hollow circle for this county (also Anne Arundel, Dorchester and Wicomico), but did not explain what this means, and he did not use empty circles for the other three species. Harris (1975) plotted three sites for Harford County: two in the Piedmont along the Susquehanna River and one on the Coastal Plain on Gunpowder Neck. I can account for only one of them, an entry in the catalogue of R. S. Simmons for “near Darlington” dated – June 1953 and stating: “In small transient pool near river [Susquehanna River] ... Many [larvae] present ... [*Ambystoma maculatum*] [larvae] also abundant.” The vagueness of this locality (encircled on the map) precluded any possibility of locating it.

Two unusual localities with pictures were posted on iNaturalist for this species in the Piedmont of Harford County. One was from downtown Bel Air, 3 May 2021, where there is no suitable habitat, and the other was from Palmer State Park, 25 October 2023, which borders Deer

Creek. I emailed both posters requesting confirmation and details, but neither responded. On 25 April 1988 I discovered a suitable breeding depression for marbled salamanders along Deer Creek 1.5 km upstream from Stafford Bridge. This is 14 km downstream from Palmer State Park and is inconspicuous and somewhat difficult to access. *Ambystoma maculatum* and *R. sylvatica* utilize the site. It was searched on 19 September 1996, but *A. opacum* was not present. I have rejected the Bel Air site. The Palmer State Park site may be valid but is not accepted here pending corroboration. I made 92 trips into Harford County between 1976–2004, but found marbled salamanders at only five sites: three isolated depressions on the Coastal plain and two in the Piedmont associated with Gray’s Run.

Howard County: This county lies overwhelmingly in the Piedmont, with a small strip lying in the Coastal Plain. Prior to my field work (75 trips, 1982–2017), this species was known from only two localities: Annapolis Junction (USNM 32483, 22 September 1903) and Avalon, Patapsco State Park (e.g., NHSM 1935-1936, 12 June 1947). The former site was overlooked by Harris (1975). Towson University students collected the species at one locality (Deep Run) and I documented the species’ occurrence at five sites: four along the Middle Patuxent River and one along Hammond Branch. A site mapped in Cunningham & Nazdrowicz (2018) for northwestern Howard County and the only site known for the vicinity of the Patuxent River in this county (or adjacent Montgomery County) is not accepted here. This was for a larva collected and released along “Warfield Branch” (no such stream), off Jennings Chapel Road, ca. 1.0 mile (1.6 km) NW JCT MD Route 97, 6 July 2010. Based on other data I received from Susan A. Muller, the collection site appears to be 1.5 km NW Roxbury Mills. Three pictures I was sent were too indistinct to be useful and the date is quite late for a larval marbled salamander in central Maryland (Worthington, 1968, 1969). The specimen is presumably *A. maculatum*. The construction of Rocky Gorge Reservoir (created in 1952) and especially Triadelphia Reservoir (created in 1943), both impoundments on the Patuxent River, presumably had deleterious effects on small wetland species such as *Ambystoma opacum*.

Kent County: Harris (1975) mapped two localities for this Coastal Plain county. Potential sources were personal communications from James A. Fowler for specimens now in CM: near Golts [CM 137969 (3 larvae), 22 February 1952] and 2.0 miles (3.2 km) E Massey [CM 137968 (8 larvae), 22 February 1952]. A second source may have been R. S. Simmons who listed larvae in his catalogue from “several ponds” at Massey (RSS S37, 27 May 1952) and four adults also from unspecified sites at Massey (RSS S38, 15 October 1952). All of these specimens have been discarded. A third source may have been localities listed by Reed (1957) for Golts, 2.0 miles E Massey, and 2.0 miles E Millington. All appear to have been larvae in the collections of R. F. Daffin and/or Donald W. Linzey dating from 1957. The Daffin specimens have been discarded. The only metamorphosed specimens from the county are from Golts (NCSM 61956, 11 August 1972; NCSM 61957, 24 September 1972.) McLeod & Gates (1998) listed the species from Remington Farms.

Montgomery County: Harris (1975) plotted four localities in this Piedmont county, all of which can be accounted for (TSU, USNM). Three are along the Potomac River and one along Rock Creek. A literature report was provided by Brady (1937) for Plummer’s Island and adjacent property. I made 84 trips into Montgomery County from 1983–2006, collecting the species at 11 sites. Penetration into the county from the Potomac River was largely in the Seneca Creek system

(eight sites), with single localities discovered along Paint Branch, Rock Creek and the Potomac River.

Petranka (1998) claimed that Worthington (1968) stated that a nesting female will remain with a clutch for at least two months in Maryland. Worthington reported finding a female with somewhat advanced eggs on 3 October 1964 and that the eggs were still present on 26 November, but, contrary to Petranka, did not mention whether the female was still present. Data on this subject are nearly nonexistent in Maryland; however, a note by J. A. Fowler accompanying a female he collected at Martinsburg (USNM 308883, 15 November 1941) stated: “On ‘nest’ with eggs in dry pond bottom in woods.” This indicates that some females will remain with their clutches for roughly a two-month period in Maryland, and presumably longer.

Prince George’s County: Harris (1975) mapped seven or eight localities in this Coastal Plain county. I can account for only three of them (USNM). I made 61 trips into this county from 1976–2012 and collected the species at 16 sites.

Queen Anne’s County: Harris (1975) plotted two localities in this Coastal Plain county. One may derive from R. S. Simmons: near Barclay (RSS S73). On 22 February 1952 he “Found many larvae in field pond” and in his catalogue he provided lengths for six larvae, which have been discarded. Reed (1957) listed three localities in the collections of R. F. Daffin and D. W. Linzey: 6.7 miles (10.8 km) N Barclay, 26 January 1957; 10.7 miles (17.2 km) N Price, 2 February 1957; and US Route 50, 0.5 mile “W” (SW) JCT MD Route 71 (subsumed by US Route 301), 16 March 1957. All of Daffin’s specimens (and presumably those of Linzey) are based on larvae (Daffin’s have been discarded), and I have confirmed these sites from jar labels from Daffin’s collection, although there are some discrepancies with Reed’s listings. The first two localities appear to be the same site, but have been subsumed on the map herein by specimens from 3.0 miles (4.8 km) SW Millington (MSB 28146-28147, 29 May 1954). I cannot determine the basis for Harris’s other locality. Specimens are known from two other sites: Ruthsburg (FMNH 208549-208551, 8 March 1964) and Starr (USNM 364346, 12 March 1961).

Somerset County: Only one historical site is known from this Coastal Plain county: 1.0 mile (1.6 km) E Monie (NHSM/HSB 403, 24 April 1966) and was reported by Nemuras et al. (1966) and mapped by Harris (1969, 1975).

St. Mary’s County: Harris (1975) plotted three localities in this Coastal Plain county. One of them appears to be based on a site near Leonardtown (Cooper, 1953); the other two sites have no documentation. Reed (1957) erroneously listed USNM 12598 (St. Jerome Creek, 27 February 1882) from Worcester County. This is the oldest specimen known from Maryland, although there were originally four (Cope, 1889).

Talbot County: Harris (1975) mapped three sites in this Coastal Plain county. One is probably a personal communication from Roger Conant for 1.5 miles (2.4 km) S Wye Mills (MSB 28148-28149, 7 April 1939 and 11 April 1941 respectively). Another may be from Reed (1957) for Seth Demonstration Forest, based on larvae formerly in the collection of R. F. Daffin (RFD 1203-1221, 16 March 1957). The third site has no basis in the public domain.

Washington County: Harris (1975) plotted three sites in this montane county, all along the Potomac River in the Valley and Ridge physiographic province. Only one is vouchered: Ernstville Road (CM, various dates). One verified report of this species exists for the Blue Ridge and is from Greenbrier State Park. Brian L. Hebb emailed me a photograph of an adult that was caught and released on 13 March 2011. This was the basis for the locality mapped in Cunningham & Nazdrowicz (2018). An iNaturalist report and photograph from the park dating from 17 July 2020 also exists. I did not contact the poster.

Wicomico County: Harris (1975) mapped two sites in this Coastal Plain county. One is presumably Quantico (CM, various dates). I cannot account for the other.

Worcester County: Harris (1975) plotted three sites in this Coastal Plain county. One is presumably Berlin (USNM 75257-75258, no date). Czarnowsky (1975) provided a literature report. I cannot account for the other.

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Appendix. Specimens cited.**Specimens examined**

Allegany County: NHSM 3380; TSU 703, 5078, 6336, 8843.

Anne Arundel County: NHSM 864, 1838-1839, 1926, 3441; TSU 7940-7942, 8131-8133, 8135, 8428, 8502-8504, 10342-10345, 10394-10396, 10530, 10534-10535, 10537-10538, 10563; UF 22242-22244.

Baltimore City: NHSM 285.

Baltimore County: NHSM 118, 639, 4826; NHSM/SHS 482; TSU 2019, 2502-2504, 3056, 3060, 5955.

Calvert County: MCZ 149789-149791; NCSM 61958-61959, 61972, 62004; NHSM 963, 2709; TSU 1642, 10570; UF 10615.

Caroline County: NHSM 4824; TSU 9931.

Carroll County: TSU 5950.

Cecil County: AMNH 60348; TSU 68, 9186-9187.

Charles County: NHSM/SHS 389; TSU 6570, 8723-8724, 10260-10262, 10330-10332, 10383-10384; UTEP 9783-9787, 9791-9792.

Frederick County: NHSM 4827; NHSM/SHS 129-131.

Harford County: TSU 8536, 8675-8676, 8833, 9301-9302, 9303-9305.

Howard County: NHSM 1935-1936; NHSM/SHS 75, 82, 432, “5059”; TSU 1746 (3), 1859, 1862, 5952, 6656-6658, 6670, 7915, 8253-8254.

Kent County: NCSM 61956-61957.

Montgomery County: TSU 850, 942-952, 7918, 9747-9748, 9874-9875, 9876-9877, 9948, 9954-9955, 9962, 9963, 9967-9969, 10159-10160, 10163-10164; USNM 308883.

Prince George’s County: TSU 904, 906, 8429, 10100-10101, 10169-10170, 10173-10174, 10178-10180, 10182-10184, 10188-10189, 10191-10192, 10195-10196, 10240, 10318-10320, 10327-10329, 10334-10335, 10337-10339, 10373-10374, 10438-10439, 10524-10525; USNM 308885-308888, 308889, 308890, 308891-308897, 308899-308901.

Somerset County: NHSM/SHS 403.

St. Mary’s County: NHSM 4825; TSU 135-136, 7069, 7075-7079, 7087, 7270, 8032; UTEP 9782.

Specimens unexamined

Allegany County: CM 12951; USNM 240946-240947, 240948-240956.

Anne Arundel County: BYU 23195-23197; USNM 368229, 578557-578559.

Calvert County: USNM 220177, 368642, 368648.

Caroline County: USNM 364949-364950.

Cecil County: MSB 28140, 28141.

Charles County: CM 137946, 137950; USNM 127413, 104322, 141263, 369503, 369770, 370159, 370309-370312, 370325-370326.

District of Columbia: CM 137945.

Dorchester County: MSB 28142-28145.

Kent County: CM 137968, 137969.

Montgomery County: CM 137961-137962; USNM 19051, 51778, 141264, 141939, 308882, 317932-317973, 374351.

Prince George’s County: CM 28289, 137957-137958, 137963-137967; USNM 371819.

Queen Anne's County: MSB 28146-28147; USNM 364346.

St. Mary's County: CM 137975; USNM 12598, 368864-368865, 369104.

Talbot County: MSB 28148-28149.

Washington County: CM 33666-33668, 137970-137974.

Wicomico County: CM 26524, 31378, 31390, 36427, 93164.