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## Observations of puddling butterflies in Maryland, USA

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**ABSTRACT:** Six butterfly species in four families were observed puddling on damp soil, scat and carrion in various locations in Montgomery County, Maryland and on small islands in the Potomac River. Four species preferred damp soil to nearby mud, but the reason for this behavior is unknown. The presence of butterflies on small islands in the Potomac River is documented for the first time.

### INTRODUCTION

Feeding of butterflies and moths on mud, scat and carrion, referred to as puddling, is a well-known phenomenon (Downes, 1973; Adler, 1982). Despite the presence of a rich literature on various aspects of puddling, a recent review concluded that numerous questions about puddling, including exactly why butterflies puddle and the evolutionary causes of the taxonomic variation observed among puddling species, remain unanswered (Lamie et al., 2025). I have previously reported the puddling Red-spotted Purple (*Limenitis arthemis*) on scat in Maryland (Örstan, 2021). I present here observations of additional species of butterflies puddling on different substrates.

### METHODOLOGY

I chanced upon the butterflies listed below when I did not have an ordinary camera with me and documented them with an iPhone. In most instances, I took both photographs and videos, especially focusing on the proboscises of the butterflies. I have used two criteria to ascertain that a butterfly on a substrate (other than a flower) was puddling rather than simply sunning or resting. First, and perhaps the most significant criterion, was the documentation from photographs or videos that the butterfly's proboscis was uncoiled and that it was either inserted into or in contact with the surface of the substrate (Downes, 1973). It was also helpful to observe the movements of the proboscis (Krenn, 2010). The second criterion involved the monitoring of a butterfly's behavior to determine whether, after having left its spot usually as a result of my close approach, it returned to the same location. The return of a butterfly indicated that the particular substrate it had originally been on was indeed attracting the butterfly.

## PUDDLING SPECIES OBSERVED

### **Eastern Comma, *Polygonia comma*** (Harris, 1842) (Nymphalidae)

I observed one individual on a small island (39.0676° N, 77.4200° W) in the Potomac River around 12:40 on 3 October 2023. The elongated island was about 5 m by 45 m. The butterfly moved between damp remains of stranded aquatic plants and pebbles covered with wet mud near the shore (**Fig. 1**). Videos showed its proboscis making the typical movements observed in puddling butterflies (Krenn, 2010) that consisted of back and forth and lateral sweeps and dabbing with the dorsal surface of the tip of the proboscis (**Fig. 2**).

### **Red Admiral, *Vanessa atalanta*** (Linnaeus, 1758) (Nymphalidae)

I observed one individual at the shore of Little Seneca Lake (39.1876° N, 77.3108° W), Boyds at 11:15 on 11 August 2023. The butterfly was on damp soil approximately 1 m from the edge of water (**Fig. 3**). During my presence it changed its location a few times, but it did not land on the mud bordering the water. Videos show the butterfly probing the surface of the soil with the dorsal surface of the tip of its proboscis (**Fig. 4**). Also present was an Eastern Tiger Swallowtail (see below).

I saw another *V. atalanta* on a piece of scat on a paved trail in Germantown (39.2081° N, 77.2601° W) at 08:20 on 8 July 2025. Photographs showed the tip of the proboscis inserted into the scat (**Fig. 5**). The scat contained what appeared to be fur and large seeds. It had probably been left the night before by an omnivore, perhaps a raccoon. The surrounding area was a mixed habitat of meadows and woodland.

### **Eastern Tiger Swallowtail *Pterourus glaucus*** (Linnaeus, 1758) (Papilionidae)

I observed puddling individuals of *P. glaucus* on three occasions.

A dead opossum was on a grassy area under pine trees behind a residential neighborhood in Germantown (39.2076° N, 77.2555° W) in the morning of 5 August 2016. Other than what seemed to be a gash visible around its neck, the opossum's body was intact. At that time there were only a few flies but no butterflies on the carcass. The next morning at 07:45 the opossum's body had been torn open and its organs exposed. A *P. glaucus* was flying around the body and landing repeatedly on the fur but not on the exposed organs. Photographs show the butterfly's proboscis inserted in the fur (**Fig. 6**).

On the second occasion, I observed a group of *P. glaucus* on damp mud near the Hawlings River in Rachel Carson Conservation Park (39.2122 N, 77.0810 W) around 14:10 on 28 July 2021. The butterflies were in a partially shaded spot approximately 3 m from the edge of the water (**Fig. 7**). I counted 16 individuals in photos and videos. The open wings of two butterflies visible in videos indicated that they were males.

I also saw a *P. glaucus* at the shore of Little Seneca Lake (39.1876° N 77.3108° W), Boyds at 11:15 on 11 August 2023. Video of the butterfly shows its proboscis inserted between small rock fragments on damp soil (**Fig. 8**). Also present was a Red Admiral (see above).

### **Zebra Swallowtail *Eurytides marcellus*** (Cramer, 1777) (Papilionidae)

One individual was on the wet surface of the Point of Rocks boat ramp by the Potomac River (39.2731° N, 77.5417° W) at 12:30 on 14 August 2025. The butterfly, apparently disturbed by my presence, repeatedly left and returned to the wet area instead of the dry half of the ramp (**Fig. 9**). A short video shows the butterfly's unrolled proboscis contacting the thin layer of soil in the depressions of the paved surface of the ramp (**Fig. 10**).

**Huron Sachem** *Atalopedes huron* (W. H. Edwards, 1863) (Hesperiidae)

A male was on the damp remains of aquatic plants stranded on a small island (39.3101° N, 77.6464° W) in the Potomac River west of Brunswick around 12:40 on 22 August 2025 (**Fig. 11**). The island was about 9 m by 16 m. Videos show its proboscis inserted into clumps of plant remains (**Fig. 12**). There were other species of butterflies on the island, but I did not have a chance to photograph them.

**Summer Azure** *Celastrina neglecta* (W. H. Edwards, 1862) (Lycaenidae)

I observed one *C. neglecta* on mud covered pebbles at the Virginia shore (39.3012° N, 77.5618° W) of the Potomac River south of the Lander boat ramp early in the afternoon on 1 June 2024. The butterfly seemed to have been attracted to a white substance, possibly bird excrement, covering the rocks (**Fig. 13**).

Another *C. neglecta* was on pieces of scat on a paved trail in Germantown (39.2074° N, 77.2550° W) at 08:50 on 7 July 2023. The video of the butterfly shows its unrolled proboscis on the surface of the scat (**Fig. 14**). The scat contained fur and had probably been left the night before by a carnivore, possibly a fox. The surrounding area was a mixed habitat of meadows and woodland behind a residential neighborhood where foxes were occasionally observed.

## DISCUSSION

Two of the observations given here were made on small islands in the Potomac River. One of the islands where I observed a puddling *A. huron* was one of a group of small islands surrounded by shoals close to the Virginia shore. At the time of my visit the only live plants on the island were young sycamore (*Platanus occidentalis*) trees and American water-willows (*Justicia americana*) lacking flowers. Thus, *A. huron* (and a few other unrecorded species) were probably there mainly to puddle on the damp plant remains. The second island where I observed a puddling *P. comma* was along the south shore of the much larger Van Deventer Island. It too had on it a sycamore tree and a dense growth of shrubbery. The images in Google Earth show that the surface areas of these islands are variable depending on the water level in the river and that they may also become completely submerged during floods. Nevertheless, the presence of small trees on the islands indicate that they remain above the water most of the year and especially in the summer and early fall when butterflies are active. The only published records of butterflies from the islands of the Potomac River appear to be from Plummers Island located along the Maryland shore at Cabin John (Clark, 1932; Vann, 2008). I intend to visit these and other small islands in the Potomac River in the future to continue to document any butterflies that may be visiting them.

The propensity of *P. glaucus* to feed at carrion that is at an advanced stage of decay has been noted in the literature (Clark, 1932; Payne & King, 1969). The individual I observed was on the carcass of an opossum that had died more than a day earlier. About 90 minutes after my observation of the butterfly several vultures had started feeding on the carcass and the butterfly had left. To observe butterflies feeding at carrion, especially at the ones large enough to attract vultures, one seems to have a relatively short period after the odor from the carcass becomes pronounced and before the vultures arrive.

The observations of butterflies puddling on damp soil rather than on nearby wet mud is noteworthy (**Figs. 3, 7, 9**). To understand how butterflies can feed on dry materials, Downes (1973) gave captive butterflies dry food and observed that first, saliva was released from the proboscis to wet the food and presumably to dissolve the salts and other nutrients, and then, the enriched saliva was withdrawn back into the proboscis. But it is not clear why butterflies when they have a choice seem to prefer damp soil to wet mud where the use of saliva would not be required. These aspects of the feeding of butterflies do not seem to have attracted much attention since Downes (1973), even though they certainly deserve to be studied further.

## LITERATURE

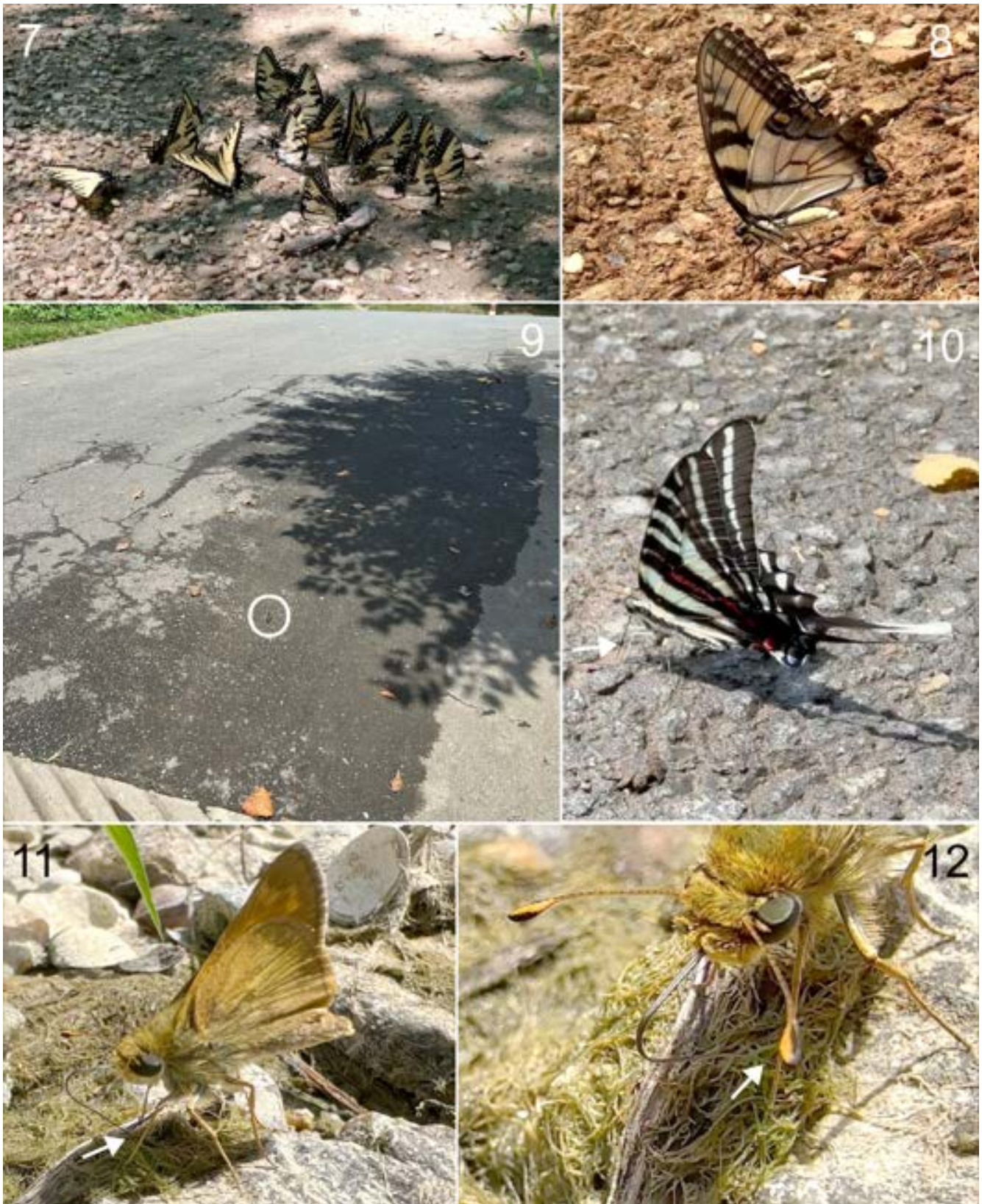
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**Map showing observation localities.** 1. Small island west of Brunswick. 2. Virginia shore, Potomac River. 3. Point of Rocks boat ramp. 4. Small island next to Van Deventer Island. 5. South shore of Little Seneca Lake. 6. Trails, Germantown. 7. Bank of Hawlings River, Rachel Carson Conservation Park.



**Fig. 1.** *Polygonia comma* on stranded aquatic plants. **Fig. 2.** Close up of the head of *P. comma*. **Fig. 3.** *Vanessa atalanta* (white circle) on lake shore. **Fig. 4.** Close up of the head of *V. atalanta*. **Fig. 5.** *Vanessa atalanta* on scat. **Fig. 6.** *Pterourus glaucus* on a dead opossum. Note the blow flies on exposed organs. White arrows point at the butterflies' proboscises.



**Fig. 7.** *Pterourus glaucus* on damp mud. **Fig. 8.** *Pterourus glaucus* on damp soil. **Fig. 9.** *Eurytides marcellus* (white circle) on wet boat ramp. **Fig. 10.** Close up of *E. marcellus*. **Fig. 11.** *Atalopedes huron* on stranded aquatic plants. **Fig. 12.** Close up of the head of *A. huron*. White arrows point at the butterflies' proboscises.



**Fig. 13.** *Celastrina neglecta* on a rock covered possibly with bird excrement. **Fig. 14.** *Celastrina neglecta* on scat. White arrows point to the butterflies' proboscises.

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