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IT'S RAINING STURGEONS: A LIKELY OCCURRENCE OF AVIAN PREDATION OR SCAVENGING OF ATLANTIC STURGEON (*ACIPENSER OXYRINCHUS* MITCHELL, 1815)

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ABSTRACT

Predation on the federally-endangered Atlantic Sturgeon (*Acipenser oxyrinchus*), and sturgeons generally is understudied. Most predation is presumed to occur on eggs and larvae, and be the result of interactions with other aquatic organisms, primarily other fishes. Predation on larger juvenile sturgeon by terrestrial and avian predators remains largely unknown. Here we document the recovery of a juvenile Atlantic Sturgeon carcass (512 mm total length) approximately 120 m inland from the shore of the York River in Gloucester County, Virginia. This individual showed signs of predation by a bird of prey, most likely an Osprey (*Pandion haliaetus*), although a Bald Eagle (*Haliaeetus leucocephalus*) cannot be ruled out, as they are also residents in this area. The purpose of this note is to document this occurrence and suggest further study of predation on Atlantic Sturgeon in the Chesapeake Bay.

Keywords: Acipenseridae, Chesapeake Bay, endangered species, Osprey, York River.

INTRODUCTION

The predation of sturgeons, family Acipenseridae, is largely understudied, but is presumed to be limited to eggs, larvae, and small juveniles. Once sturgeons grow to become among the largest fishes in their communities, it is assumed they become immune to non-human predation (Kujahda, 2019). The primary predators of these smaller life stages include larger fish species (e.g., Dadswell et al., 1984; French et al., 2010; Flowers et al., 2011; Steffensen et al., 2015; Heinle et al., 2020; Bunch et al., 2021), with large-bodied, non-native fishes noted as an unknown factor in

population recovery (see Hilton et al., 2016 of this and other factors impacting conservation efforts of Atlantic Sturgeon, in particular). The juvenile stages, however, also may be susceptible to predation by terrestrial animals. For example, Brabey et al. (2020) recently documented the predation of juvenile White Sturgeon (*Acipenser transmontanus*) by River Otters in the Nechako River, British Columbia by recovering radio tags and PIT tags implanted in hatchery released individuals to known otter latrines. To our knowledge, Atlantic Sturgeon have not been reported in diet studies of birds of prey, although anecdotal accounts exist suggesting that they may be included as prey items (see Discussion).

On April 17, 2020, a juvenile specimen of Atlantic Sturgeon, *Acipenser oxyrinchus oxyrinchus*, was reported to us to have been found located in a wooded front yard of a private residence in Hayes, Virginia (Gloucester County), about 120 meters from the York River. The property is located approximately eight kilometers upriver from the mouth of the York River. Upon retrieval of the specimen, the identity of the species was confirmed. Atlantic Sturgeon are distributed along the east coast of North America and northwestern Europe, and within the U.S., there are five recognized distinct population segments (DPS; Hilton et al., 2016). The Chesapeake Bay DPS of Atlantic Sturgeon is listed as Endangered under the U.S. Endangered Species Act, and is faced with numerous challenges to population recovery (Hilton et al., 2016). It is suspected that the individual recovered and documented herein was preyed upon or scavenged by a bird of prey, most likely an Osprey (*Pandion haliaetus*), which are common in this area of the Chesapeake Bay estuary. Because the natural predation of Atlantic Sturgeon is not well documented (Hilton et al., 2016) and predation by terrestrial animals has not been reported to our knowledge, this note serves to report on the possible occurrence of predation. Further, this note serves to document the occurrence of a small juvenile (i.e., prior to the coastal migratory subadult life history stage; Hilton et al., 2016) Atlantic Sturgeon in the York River in Virginia.

SPECIMEN DESCRIPTION AND OBSERVATIONS

The specimen was frozen upon retrieval from the property. Once thawed, it was measured, photographed and tissue sampled prior to fixation with 10% formalin. It is deposited in the Nunnally Ichthyology Collection at VIMS (VIMS 42803). The specimen is 512 mm total length, 465 mm fork length, and 437 mm standard length (Fig. 1). The specimen was not dissected, but it is undoubtedly immature, and based on the growth model of Balazik et al. (2012), it is likely a one or two-year old individual (i.e., likely from the 2017 or 2018 year class).

The specimen is largely intact. However, several wounds and damaged portions of the body suggest avian predation or scavenging (Fig. 2). Large portions of the gill arches from the right side are missing, including all the dorsal elements (epibranchials, infraphryngobranchials, and suprphryngobranchials) and the ceratobranchials; the cartilages of the right hypobranchials are exposed (terminology of skeletal elements follow Hilton et al., 2011). In addition, in the gill chamber of the right side, the tissue is torn, exposing the cartilage of the neurocranium.

Along the body, there are small puncture wounds, presumably caused by talons, in several locations, including immediately posterior to the left pectoral girdle and on the right side of the body between the dorsal and lateral scute rows at the level of the sixth lateral scute.

The region around the anus and pelvic fins is heavily damaged, with much of the left and all of the right pelvic fin missing. In addition, there are several puncture and tear wounds in this region, extending dorsally on the body to the level of the lateral scutes. A portion of the left pectoral fin is also missing.



Figure 1. Juvenile Atlantic Sturgeon (VIMS 42803) recovered inland from the York River and showing signs of avian predation or scavenging. A, dorsal, B, left lateral, C, right lateral, and D, ventral views. Anterior facing left in all except C, in which anterior faces right. Scale bar equals 5 cm.

DISCUSSION

Although there were no visual observations made of this Atlantic Sturgeon being preyed or scavenged upon by a bird of prey, there are two points that suggest this as the most likely explanation. First, the position of the individual was far from the shore of the York River, such that it needed to be carried away from the water (as opposed to a dead individual being washed onto land). Second, the wounds on the specimen are consistent with the talons of a large bird of prey rather than mammalian predators. An Osprey is the most likely predator, as this species is abundant in this region, with many nests in close proximity to where the Atlantic Sturgeon was found. A Bald Eagle (*Haliaeetus leucocephalus*), however, cannot be ruled out, as they are also residents in this area, and it is unknown if the sturgeon was alive or dead at the time of it being dropped; Bald Eagles are also known to cause Osprey to drop their prey (Forbush, 1927). If it was

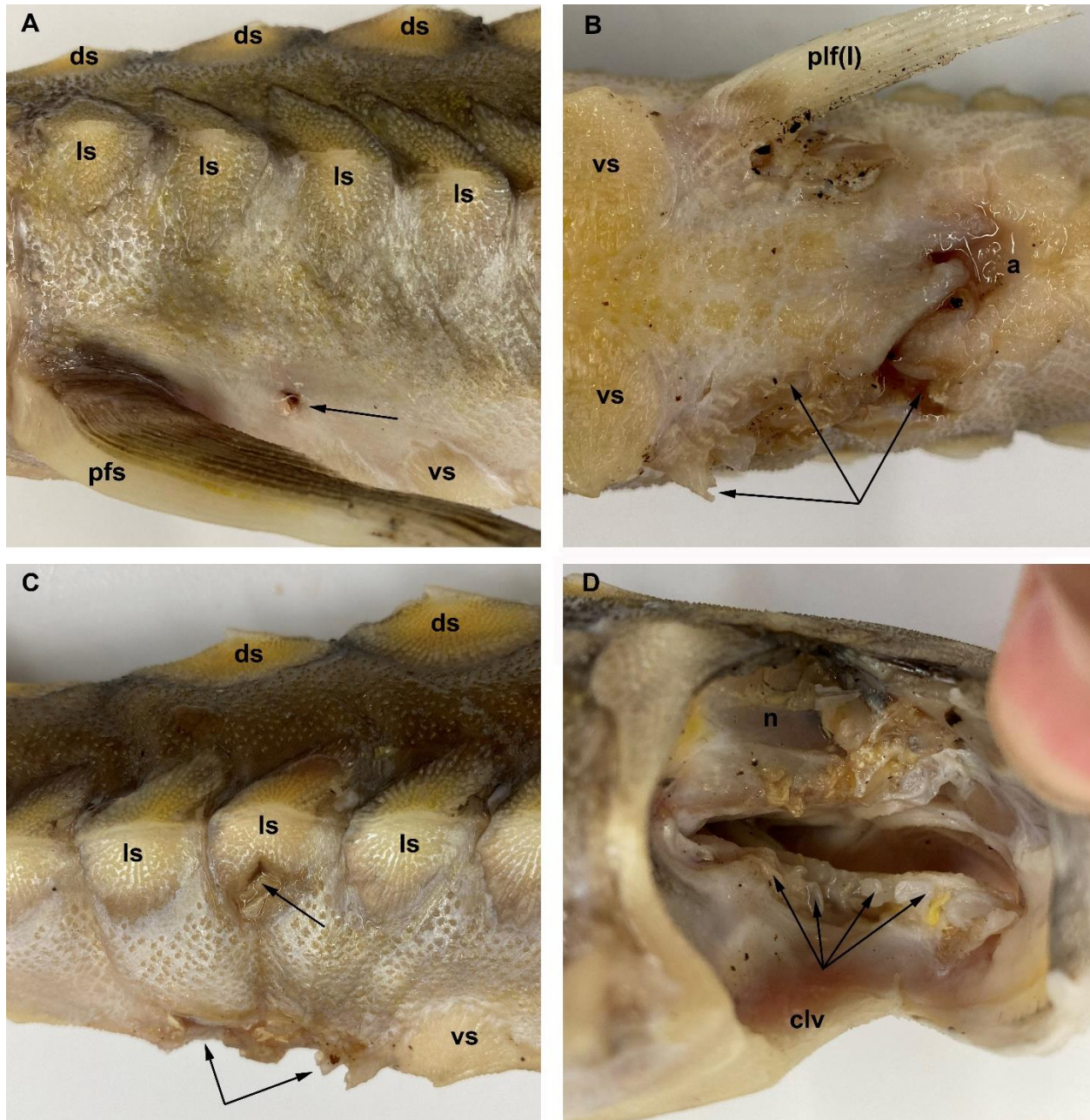


Figure 2. Details of damage from avian predation or scavenging of a juvenile Atlantic Sturgeon (VIMS 42803). A, Lateral view of puncture wound posterior to pectoral fin (arrow). B, Ventral view of damage of pelvic fins and anus (arrows). C, Lateral view of puncture and pelvic damage (arrows). D, Right opercular bones reflected showing damage to the gill arches (arrows point to exposed hypobranchial cartilages). Anterior facing left in A, B, and facing right in C, D. Abbreviations: a, anus; clv, clavicle; ds, dorsal scute; ls, lateral scute; n, neurocranium; pfs, pectoral fin spine; vs, ventral scute

dropped by an Osprey, it was likely preyed upon, as these birds are known to rarely scavenge (Poole, 1994; Clancy, 2005). Osprey have been anecdotally reported as preying upon sturgeon. Forbush (1927: 186-187) reported, “I have evidence from eye-witnesses to the effect that a Fish-hawk has struck a fish too heavy for it to lift from the water and has been drowned by its powerful victim. This might readily happen with a fish like a sturgeon or any fish with a skin so tough that

the hawk's talon driven with all the force of muscle and weight behind them could not be retracted." In a recent study of the diet of Osprey in the Chesapeake Bay region, Glass and Watts (2009) found significant differences between the higher salinity and lower salinity reaches of the Bay. This area of the York River corresponds to their higher salinity reach, where the diet of Osprey was dominated by Menhaden (*Brevoortia tyrannus*), seatrouts (*Cynosion* spp.), Spot (*Leiostomus xanthurus*), and Atlantic Croaker (*Micropogonias undulatus*). Atlantic Sturgeon were, however, not observed as contributing to the diet of Osprey in that study (Glass & Watts, 2009; see also McLean & Byrd, 1991). Therefore, if this was a case of avian predation on Atlantic Sturgeon, this is likely a rare occurrence, though all sources of mortality may have significant impacts on this population.

Atlantic Sturgeon are known to use the York River system (inclusive of the Mattaponi and Pamunkey rivers) at all life stages, including as subadults (Hilton & McGrath, unpublished data) and as spawning adults (Hager et al., 2014). Although known to spawn in the York River system (i.e., individuals track by acoustic telemetry), small juveniles (i.e., < c. 500 mm TL) have never been encountered in the York River by the long-term VIMS Juvenile Finfish Trawl Survey (annual since 1955), and the most recent capture of a small juvenile by this survey in the York River system was in the Pamunkey River in 2019 (Wendy Lowery, VIMS, pers. comm.). The James River population had a large year-class in the fall spawn of 2018, with more than 250 young-of-the-year Atlantic Sturgeon encountered in the late fall and winter of 2018-2019 (Matt Balazik, VCU, pers. comm.). It is possible that the individual reported upon herein is from the James River population, although no genetic assignment of this individual has been made.

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