Blue Catfish Candidacy for the ERP Assessment

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SEDAR 102 WP-04: Blue Catfish Candidacy for the ERP Assessment

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Introduction

The Workgroup explored the potential of adding the introduced blue catfish (Ictalurus furcatus) as a discrete predator group. Blue catfish are native to the Mississippi, Missouri, and Ohio River basins of the central and southern United States. In 1974, ~300,000 juveniles were introduced into coastal rivers of Virginia, specifically the James and Rappahannock rivers. In 1985, they were added to the York River system (Mattaponi, Pamunkey, and York rivers).10- to 15-years later it was found that they had expanded rapidly from tidal freshwater regions (average annual salinity <0.5 psu) into oligohaline (0.5–5 psu) and mesohaline (5–18 psu) waters of Chesapeake Bay tributaries. Freshwater discharge events and the species' salinity tolerance, may be primary mechanisms for expansion beyond areas originally stocked. The blue catfish in the Chesapeake Bay and surrounding tributaries now supports recreational trophy fisheries, for-hire fisheries, and commercial fisheries with competing management objectives. Blue catfish are considered opportunistic, generalist feeders, consuming fish, crabs, and plant material. They have been found to be more piscivorous in winter months (Nov- Mar) (Edds et al. 2002). Additionally, during years of high recruitment, YOY blue catfish may be driven into more saline habitats due to resource competition. Because of these reasons, blue catfish may represent a relatively new, and potentially significant, source of mortality for economically and ecologically important estuarine fishes such as juvenile American shad Atlantic menhaden, and river herring (Chandler 1998).

Review of Existing Literature

In a study by Schloesser et al. 2011, researchers collected monthly samples of up to 5 random specimens of blue catfish per stratum from 324 sites in the James, York, and Rappahannock rivers between spring 2004 and fall 2007. Stomach contents of blue catfish ranging in size from 48 to 590 mm FL (N = 1,030) were subsampled. Here, catfish were divided into two size bins, small (<300 mm FL) and medium (300–600 mm FL) as it has been shown that blue catfish display increased piscivory at 300 mm. Schloesser et al. 2011 also collected samples from the tidal Potomac River (N = 139;101–1100 mm FL) to assess the frequency of occurrence of prey items among three size bins small (<300 mm FL), medium (300–600 mm FL), and large (>600 mm FL). In the James, York, and Rappahannock rivers, medium blue catfish showed spatial variability in major diet components. Atlantic menhaden was the main prey by weight in the Rappahannock River (28.1%) and an important component in the James River (11.6%) but contributed little to diet in the York River (2.6%). No Atlantic menhaden were found in the Potomac River samples.

Later studies by Schmitt et al. 2017, investigated prey species of both blue catfish and another introduced species, flat head catfish using DNA and morphometric methods. Fish were collected by electrofishing in March-May out of the James River and a total of 2,495 catfish - 2,164 blue cats and 331 flat heads were collected. Flathead catfish were exclusively piscivorous at all sizes while blue catfish ate more mollusks, vegetation, invertebrates at smaller sizes then began eating fish once they reached 500 mm. Neither blue catfish, or flat head catfish were found to contain menhaden, while blue catfish heavily preyed on gizzard shad. In 2018, Schmitt et al. concluded that previous diet studies of blue catfish in the Chesapeake Bay were limited by sample size, spatiotemporal scope, or include only small individuals. This is problematic because prey assemblages vary seasonally and spatially in the Chesapeake Bay and blue catfish regularly exceed 40 kg in Virginia's tidal rivers. The study assessed sample size sufficiency for blue catfish and found that large numbers of stomachs (≈ 1500) were needed for diet description due to the diversity of resources consumed. Considering this, the authors concluded that most of the previous diet work in Chesapeake Bay is unlikely to provide a realistic picture of the full dietary breadth of this species.

As such, Schmitt et al. 2018 characterized the feeding ecology of blue catfish by determining individual diet specialization, trophic position, and generalist versus specialist feeding strategies; explored spatiotemporal patterns in prey consumption, size-based variation in diet, and assess sample size sufficiency to ensure a robust diet characterization; and collected blue catfish stomachs across broad spatiotemporal scales in three large subestuaries of the Chesapeake Bay, so that inference could be drawn for the Chesapeake Bay region. Stomach contents were extracted from a total of 16,110 blue catfish stomachs from the James, Pamunkey, Mattaponi, and Rappahannock rivers. Blue catfish had a broad diet consisting of mollusks, vegetation, crustaceans, insects, muskrats, frogs, snakes, turtles, birds, jellyfish, worms, various berries, and a myriad of fish species. The authors did find that larger catfish did indeed become more piscivorous, but those piscivorous length groupings only represented 20% of their samples from the James River, less than 4% of samples from the Rappahannock River, and less than 2% of samples from the Pamunkey and Mattaponi Rivers. Even so, the authors stated that those data were likely to overestimate proportions of piscivorous fish, since they actively targeted larger fish. The diet of these larger catfish was mostly comprised of gizzard shad, threadfin shad, and white perch, all of which are abundant species in the Chesapeake Bay. Blue catfish in this study only consumed menhaden in the fall and mostly in Mattaponi River with the fall frequency of occurrence for the rivers as 0.42%;1.12%; 3.45%; and 5% for the James, Rappahannock, Pamunkey and Mattaponi respectively.

Conclusions

While the Workgroup explored the possibility of using field and lab studies to generate consumption rates for menhaden, the literature suggests that blue catfish occupy much lower trophic levels than has been suggested previously. Blue catfish consumption of menhaden varied greatly spatiotemporally and due to the limited range of the species in the overall coastal model range, blue catfish were excluded as a distinct predator grouping. In the future, if management objectives lean toward spatial modeling in the Chesapeake Bay, blue catfish should be reconsidered as a defined predator grouping.

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