SIGNIFICANCE OF THE FISHES COLLECTED BY GILL NET IN THE TIVOLI SOUTH BAY ECOSYSTEM

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ABSTRACT

This study documents the presence of large fishes along the periphery of water-chestnut (*Trapa natans*) beds in Tivoli South Bay, a tidal freshwater Hudson River marsh. Fishes were caught during gill net collections of carp. The species observed in summer of 1992 were: white sucker (*Catostomus commersoni*), gizzard shad (*Dorosoma cepedianum*), largemouth bass (*Micropterus salmoides*), white perch (*Morone americana*), rudd (*Scardinius erythrophthalmus*), white catfish *(Ictalurus catus*), and a goldfish-carp hybrid (*Carassius auratus* X *Cyprinus carpio*). Significance of each species to the South Bay ecosystem is discussed.

Substantial populations of large fishes appear to be associated with water-chestnut beds. We have yet to sample this component of the ecosystem adequately but our observations suggest that quantitative sampling of these fishes should be a research priority.

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INTRODUCTION

Several studies have documented the composition of the fish fauna in Tivoli South Bay. Larval fishes have been examined (summarized in Schmidt et al. 1992) and juveniles inhabiting the water-chestnut beds were documented by Pelczarski and Schmidt (1991). Incidental observations on the water-chestnut margins have slowly contributed to a picture of the seasonal changes in the fish fauna. Most of the observations thus far have been made on small organisms. The large fish component of South bay, other than the obvious presence of breeding carp, is still poorly known.

During the summer of 1992, Chuck Montgomery (a Polgar Fellow) sampled the adult carp population in South Bay with experimental gill nets. The by-catch consisted of large fishes of several species that may be significant in the South Bay ecosystem. The purpose of this paper is to list the species collected and briefly discuss their significance to Tivoli South Bay.

METHODS

Fishes were collected from early June through the end of July, 1992 in experimental gill nets in Tivoli South Bay, a tidal freshwater marsh dominated by water-chestnut (*Trapa natans*). These nets were set specifically to catch carp (*Cyprinus carpio*) but, like all gill nets, the gear is not species specific and other species were taken. See Montgomery and Schmidt (this volume) for a description of the study area, gear, and schedule of deployment.

Species of fish were identified in the field. Most of the specimens were released at the site of capture.

RESULTS AND DISCUSSION

White sucker (*Catostomus commersoni*)

White suckers were caught early in the study in the vicinity of the Saw Kill mouth. All specimens were adults. White suckers are an enigmatic species in the Hudson estuary. They are large fish (maximum size is 64-71 cm, total length- Smith 1985) and are moderately abundant in the Hudson. Carlson (1986) reported catching as many white suckers in his survey of the upper Hudson (RM 105-153) as he did striped bass. Little information is available on Hudson River populations of this species.

Schmidt (1986) reported white suckers sporadically in Tivoli North Bay, most of which were subadult individuals although two specimens over 40 cm TL were collected. Carlson (1986) stated that white suckers preferred offshore areas in currents or tributaries. Schmidt and Limburg (1989) collected eggs and yolk sac larvae of white suckers in most of the tributaries they sampled including the Saw Kill. Schmidt et al. (1992) reported white sucker eggs or larvae drifting out of the Saw Kill from late March through the end of May at 10^3-10^4 individuals per week; 31% of the larval fish drift in the Saw Kill in 1988. Very few yolk sac larvae are in the Long River ichthyoplankton collection catalogued in the American Museum of Natural History although post yolk sac larvae are relatively common. Schmidt and Limburg (1989) suggested that this species is potamadromous in the Hudson estuary, spawning exclusively in tributaries but growing

up in the main estuary.

Carlson (1986) did not collect white suckers in vegetated backwaters. Pelczarski and Schmidt (1991) did not collect any suckers in pop nets in the South Bay water-chestnut beds. Juvenile white suckers are present in the clear channels around the water-chestnut bed margins where they may be important in the food web.

White suckers do move through South Bay in the early spring (March-May) and spawn in the lower Saw Kill (Schmidt and Limburg 1989). Collecting in the summer and fall with a shocker and/or seine (eg. Schmidt 1991) has not turned up any adult suckers, so the adults do not remain in the tributary mouth after spawning. Our gill net catches show that the adults are present in South Bay until the water-chestnut begins to thicken and then they leave the area, presumably for deeper water.

The biology of this species is poorly known in the Hudson River. Their abundance and size indicates that white suckers may be a significant species in the Hudson estuary.

Gizzard shad (*Dorosoma cepedianum*)

Gizzard shad have received little attention in the Hudson but their population appears to be increasing in the river and they are being seen more frequently in seine surveys (C. Nieman, pers. comm.). Carlson (1986) considered them year-round residents in the upper Hudson estuary and they were collected as frequently as white suckers and striped bass in his study. We collected one large adult in Tivoli South Bay.

Smith (1985) reported that all known specimens in the Hudson were subadults thus raising the interesting idea that the gizzard shad in the estuary were all "expatriates"

from the Mohawk River. Our specimen was clearly an adult individual, certainly larger than the 10-14 inch adult size reported by Miller (1960). We know of no reports of *Dorosoma* larvae in the Hudson estuary, but we feel this is simply a matter of time before they are collected.

We should expect that this fish will become abundant in the next decade. Both juvenile and adult gizzard shad feed on plankton (Smith 1985). Several important Hudson River fishes, at least as juveniles, also feed on plankton- striped bass, river herrings, and American shad among others. A large gizzard shad population in conjunction with an expanding zebra mussel population may alter the abundance and composition of zooplankton to the potential detriment of other planktivorous species.

Largemouth bass (*Micropterus salmoides*)

Largemouth bass are a prime game fish in New York State and the Hudson River largemouth population has attracted a lot of tournament fishing interest in the last several years. Green (1991) reported that 50-60 bass tournaments are held annually on the tidal Hudson estuary.

Carlson (1990) reported that the largemouth bass population remained fairly constant between 1985-1988 but the Hudson River Black Bass Management Work Group has reported a 50% decline in abundance by 1991 (Anonymous 1992). This decline may be related to fishing pressure even though most largemouth catches are during tournaments and the fish are released alive.

We collected two adult largemouth bass in Tivoli South Bay in July. Carlson (1989) classified largemouth bass as preferring vegetated backwaters, primarily among *Myriophyllum spicatum* beds (Carlson 1990). The role that water-chestnut stands may play as habitat for adult largemouth bass appears to be unexplored. Certainly, the edges of the water-chestnut stands would seem to be ideal holding areas for "sit and wait" predators like largemouth bass.

White perch (*Morone americana*)

White perch are one of the most abundant species of fish in the Hudson estuary. It is therefore no surprise to see this species in the South Bay community. We caught few specimens of white perch but our mesh was rather large to be effective in entangling this species, thus our samples probably underrepresented their abundance.

White perch spawn in the Saw Kill (Schmidt and Limburg 1989), part of the large percentage of the population that spawns in the tributaries of the upper estuary (Normandeau 1985). Schmidt and Limburg (1989) considered this species at least partially potamadromous. White perch are regularly observed in the Saw Kill mouth and around the periphery of the water-chestnut beds but were rarely collected in pop net samples in the plant beds themselves (Pelczarski and Schmidt 1991). Other researchers have reported substantial numbers of white perch in water-chestnut beds (J. Waldman, pers. comm.) and Wells et al. (1992) suggested that expansion of water-chestnut in recent years has provided a substantial refuge for juvenile white perch. It may be that we have yet to adequately sample this species in South Bay.

Rudd (*Scardinius erythrophthalmus*)

The rudd is a large herbivorous European minnow. It is superficially similar to the native golden shiner (*Notemigonus crysoleucas*), especially the juveniles, but rudd have bright red dorsal, caudal, anal, and pelvic fins. Rudd have been in the Hudson River drainage for at least 60 years. They were reported from the Roeliff Jansen Kill in Columbia County by Greeley (1937). Several specimens were collected in the Hudson estuary in 1990-1991 (R. Daniels, pers. comm.).

We collected one juvenile rudd in Tivoli South Bay. The specimen was floating dead on the surface and clearly had been used as live bait, having a large hook tear on its back behind the dorsal fin.

This species has potential for causing problems in the Hudson ecosystem. Large rudd are herbivores, preferring vascular aquatic plants (Priejs and Jackowska 1978, Kennedy and Fitzmaurice 1974). Adult rudd from Robinson Lake in Columbia County, New York contained new shoot tips of *Ceratophyllum demersum* (Wallhäuser 1991). Rudd are reproducing in Robinson Lake and have been for at least the past 60 years (Wallhäuser 1991).

Submersed vascular aquatic plants in the Hudson estuary are a valuable resource. In recent years these native aquatic plants have been excluded from some habitats by the introduced *Myriophyllum* and *Trapa*. The presence of a documented herbivorous fish is not good news especially if it becomes established in the estuary. The fact that the specimen we collected had been used for bait simply demonstrates that specimens are still being stocked into the Hudson Estuary. Reports of large (>80 kg) grass carp

(*Ctenopharygodon idella*) in the Hudson estuary (Anonymous 1992) together with rudd indicate future trouble for the plant community.

White catfish (*Ictalurus catus*)

White catfish are large (adults can exceed 5 kg) and abundant fishes in the Hudson estuary. Although white catfish are also abundant in most major rivers in the Northeast, few studies have been done on their biology (Schmidt 1971, Hughes and Carlson 1986).

The Hudson River is the northern limit of the native range of white catfish (Hughes and Carlson 1986). The population in the Hudson is large and mobile, with individuals often moving large distances (Hughes and Carlson 1986), a behavior typical of the species (Pelgen 1954, McCammon and Seeley 1961). White catfish fed on benthic macroinvertebrates (e.g. Amphipoda), fishes, and filamentous green algae in the Thames River estuary, Connecticut (Schmidt 1971). Hughes and Carlson (1986) reported that the majority of spawning occurs north of RM 125. Their summer habitat is offshore shoals and channel margins or rock piles and less frequently in vegetated shallows (Hughes and Carlson 1986).

We collected large (at least 1 kg) specimens in July in South Bay. One specimen examined had eaten a large clump of filamentous green algae. Since vegetated backwaters were not considered a significant habitat for this species (Hughes and Carlson 1986), it is unlikely that water-chestnut beds are very significant to the population of white catfish in the estuary. But the presence of large omnivorous fishes, like white catfish, could be significant to the water-chestnut ecosystem if these large fishes are

abundant in the plant beds.

White catfish leave the shallower upper estuary as temperatures decline in the fall (Hughes and Carlson 1986), a phenomenon also seen in the Thames (Schmidt 1971) and Connecticut (Marcy 1976) Rivers, Connecticut. Therefore, white catfish are probably only summer and early fall visitors to South Bay.

Goldfish-Carp hybrid (*Carassius auratus* X *Cyprinus carpio*)

Early in the study we caught one specimen of a goldfish-carp hybrid near the Saw Kill mouth. This fish weighed about 11 kg. Smith (1985) said that these hybrids have a lateral scale count intermediate between the parental species and reduced, asymmetrical, or no barbels. Our specimen did have an intermediate scale count. The barbels, although present on both sides of the mouth, were small compared to carp. The hybrid had a greenish-bronze color, much darker than the carp we caught at the same time. The identification of this specimen was confirmed by C.L. Smith (American Museum of Natural History) and it has been deposited in the fish collection there.

Hybrids between these two exotic species have been reported occasionally in the Hudson estuary. We may not see too many more since the goldfish population (which once supported a commercial fishery) crashed around 1980 and goldfish have been scarce in the estuary ever since (Smith 1985).

CONCLUSIONS AND RECOMMENDATIONS

Our observations indicate that substantial numbers of large fishes utilize Tivoli South Bay. There are seasonal differences in species composition, probably dictated by the phenology and change in density of the water-chestnut over the summer. We produced this list of species with very little sampling effort and without really sampling in the water-chestnut bed itself. We suggest that more intensive and quantitative studies on the 'large fish component' of Tivoli South Bay are warranted and may produce some interesting results. It may be feasible to sample the bay with a fixed trap net, at least in the deep pools by the railroad bridge openings.

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