

Fishing for Diversity:

Part 2. Aquatic Community Surveys and Habitat Characterization in Parkers Creek

In the last issue of *The Watershed Observer*, we discussed the importance of biodiversity to ACLT and steps we took to document it in 2017. Part 1 of this article introduced our study to identify various aquatic species in tidal Parkers Creek and this article discusses the results and takeaway messages.

In the months of March, June, August, and October 2017, fish diversity was sampled at 12 different sites within Parkers Creek. From the 12 sites sampled (5 trap and 7 seine), 25 species of fish, shellfish, and jellyfish were found (Table 1).

Parkers Creek	S = 25
Species	N
Atlantic Menhaden (<i>Brevoortia tyrannus</i>)	2
Atlantic Blue Crab <i>Callinectes sapidus</i>)	59
Atlantic Sea Nettle <i>Chrysaora quequincirra</i>)	9
Spotted Sea Trout (<i>Cynoscion nebulosus</i>)	3
Sheepshead Minnow (<i>Cyprinodon variegatus</i>)	1
Chreek Chubsucker (<i>Erimyzon oblongus</i>)	1
Mummichog (<i>Fundulus heteroclitus</i>)	498
Striped Killifish (<i>Fundulus majalis</i>)	42
Naked Goby (<i>Gobiosoma bosc</i>)	8
Spot (<i>Leiostomus xanthurus</i>)	7
Green Sunfish (<i>Lepomis cyanellus</i>)	17
Pumpkinseed (<i>Lepomis gibbosus</i>)	24
Inland Silverside (<i>Menidia beryllina</i>)	2
Atlantic Silverside (<i>Menidia menidia</i>)	20
Atlantic Croaker (<i>Micropogonias undulates</i>)	14
White Perch (<i>Morone americana</i>)	15
Striped Bass (<i>Morone saxatilis</i>)	2
Grass Shrimp (<i>Palaemonetes</i>)	302
Atlantic Mud Crab (<i>Panopeus herbstii</i>)	1
Summer Flounder (<i>Paralichthys dentatus</i>)	2
Black Drum (<i>Pogonias cromis</i>)	19
Red Drum (<i>Sciaenops ocellatus</i>)	8
Creek Chub (<i>Semotilus atromaculatus</i>)	4
Atlantic Needlefish (<i>Strongylura marina</i>)	1
Hogchoker (<i>Trinectes maculatus</i>)	4

Table 1. Species caught in Tidal Parkers Creek. N = number of individuals and S = species richness.

The evenness of this community was calculated at 0.53, with 1 being completely even and 0 having no even spread of individuals across species. The vast majority of individuals caught were mummichogs, an important fish species for the Bay's various ecosystems. Mummichogs and other bait fish, such as menhaden, are crucial links in the trophic web. So important, that many fisheries services are protecting forage species in order to maintain a robust commercial fishery (Wheeler, 2016). In addition to this, 5 species of Sciaenid (family of fish commonly known as drums), 2 species of temperate bass (striped bass and white perch), and 1 species of flounder were captured. Most people recognize these fish from their plates or from good times had fishing in the Bay. Five species were sampled at our beach site (Table 2) and 9 species were collected from the two tributaries while electrofishing (Table 3). Unfortunately, the infamous northern snakehead (*Channa argus*) was one of these species. Water quality (Table 4) and vegetation analysis proved to benefit our understanding of the Parkers Creek ecosystem. Near the mouth of the creek, the major flora was consistently that of *Spartina* grasses, high-tide bush, and the occasional patch of *Phragmites*. As you work your way upstream, the flora changes into salt-intolerant cattails (*Typha spp.*), and arrow arum, and eventually progresses into riparian forest of Red Maple, Sassafras, Black Locust, *Viburnum*, and slightly larger patches of *Phragmites*. Water quality mirrors this change in flora as salinity averages ranged from 8.52 parts per thousand (ppt) at the mouth of the creek to 3.47 ppt at the

Beach	S = 5
Species	N
Atlantic Sea Nettle (<i>Chrysaora quequincirra</i>)	16
Striped Killifish (<i>Fundulus majalis</i>)	1
Inland Silverside (<i>Menidia beryllina</i>)	3
Atlantic Silverside (<i>Menidia menidia</i>)	61
Red Drum (<i>Sciaenops ocellatus</i>)	2

Table 2. Species caught during seine haul off of beach near mouth of Parkers Creek. N= # of individuals and S= species richness

PC Tributaries (Horse Swamp and NS Trail)	S = 9
Species	N
Pumpkinseed (<i>Lepomis gibbosus</i>)	15
Eastern Mosquito Fish (<i>Gambusia holbrooki</i>)	123
Eastern Mudminnow (<i>Umbra pygmaea</i>)	356
Golden Shiner (<i>Notemigonus crysoleucas</i>)	6
Northern Snakehead (<i>Channa argus</i>)	3
Green Sunfish (<i>Lepomis cyanellus</i>)	43
Creek Chubsucker (<i>Erimyzon oblongus</i>)	5
Brown Bullhead (<i>Ameiurus nebulosus</i>)	1
American Eel (<i>Anguilla rostrata</i>)	50

Table 3. Species caught during tributary electrofishing in July 2017. N= # of individuals and S= species richness

Water Quality Parameters							
Site	Salinity (ppt)	Conductivity (mS)	Saturated DO (%)	DO (mg/L)	pH	Depth (m)	Water Clarity (Kd)
1 (Mouth)	8.52	14.61	107.52	8.79	7.88	0.78	3.08
2	8.08	13.88	106.48	8.74	7.79	0.88	3.87
3	6.12	10.74	82.05	7.00	7.27	1.62	4.33
4	5.46	9.64	81.80	6.97	7.17	0.87	6.22
5	5.09	9.03	82.33	6.90	7.19	1.58	3.50
6	4.28	7.66	86.42	7.35	7.20	1.32	3.60
7	3.46	6.30	96.60	8.09	7.22	0.73	4.26
$\bar{x}$	5.86	10.26	91.89	7.69	7.39	1.11	4.12
s	1.87	3.07	11.54	0.83	0.31	0.38	1.02

Table 4. Water quality data collected during each of the seine surveys and averaged.

furthest upstream seine net site (roughly halfway upstream). As the salinity in the water decreases the plant communities change, and the fish communities mirror this transition as well. Further upstream, species such as the pumpkinseed (*L. gibbosus*), green sunfish (*L. cyanellus*), creek chubsucker (*E. oblongus*), and creek chub (*S. atromaculatus*) made their presence known. These are all predominately freshwater fish, and this community structure differed greatly from the drums, basses, and killifish observed closer toward the mouth of the creek.

Now, this data raises some questions. What does all of this mean in relation to the health of Parkers Creek? Can we claim Parkers Creek has a strong diversity of fish? I find it is best that we remain conservative in our claims until further analysis is completed. In order to gauge the depth of diversity within Parkers Creek, a comparison with species data collected from other Calvert Creeks (using similar methodology) should be made.

Yet, we have gained much from this project. A robust baseline of fish species has been documented, including all of the protocols utilized, for future reference and surveying. A monitoring program can be established where these surveys are completed in succession in order to gain insight into how these communities are changing, for better or for worse. Additionally, the environmental data collected during this survey creates another type of baseline. If the fish assemblages do change significantly in the years to come, the habitat will provide clues as to why these fish communities might be shifting. And, while we should not make bold claims of what the creek does hold, we can safely assume that many species of fish, whether they are forage species or of commercial and recreational importance, are finding refuge in Parkers Creek. Small bait fish, such as the Atlantic silverside (*M. menidia*) seek shelter in the creek from larger predatory fish. Likewise, the young-of-the-year of recreationally and commercially important species such as the American striped bass, red and black drum, croaker, white perch, etc. are all finding solace in this tidal creek ecosystem until they are large enough to fend for themselves in the vast waters of the Chesapeake Bay.

ACLT would like to thank several organizations in helping to bring this project to fruition: the Lora Harris Lab staff from the Chesapeake Biological Laboratory for their dedication to collecting and processing water quality samples; Robert Aguilar, Dr. Denise Breitburg, and the Smithsonian Environmental Research Center for making electrofishing a possibility as well as lending equipment and advice; Dr. Ronald Klau- da for his unconditional advising; and, of course, ACLT's dedicated volunteer force who truly made this an enjoyable and unforgettable experience.

Michael Molina
ACLT Assistant Land Manager

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