Keuka Lake Forage Assessment 2019 (Survey #: 819025)
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Keuka Lake, a y-shaped, western Finger Lake nestled in between Penn Yan, Hammondsport and Branchport, occupies 11,548 acres. The lake is relatively deep, with steep sloped sides and depth averaging 101 feet with a maximum depth of 185 feet. Littoral habitat is mostly concentrated at the northern ends of y-shaped lake. The lake is unique in that it supports a 100% naturally reproducing lake trout population, as well as rainbow trout, brown trout and Atlantic salmon. Forage species that support these predators include alewives, smelt, sculpin, and various minnow and shiner species. Recent evidence suggests that the alewife population in Keuka Lake experienced a significant collapse (Hammers 2018). In 2017, only 14 alewives were collected in five horizontal net sets (bottom and surface net/set). In response, brown trout and Atlantic salmon stocking was eliminated. However, this provided a good opportunity to try and re-establish the native forage fish, cisco, which was last collected in 1997 and thought to be extirpated from the lake. Approximately 99,000 fall fingerling cisco were stocked in October 2018 and an additional 1,200 yearlings stocked in June 2019.

Table 1. Average number of fish collected from 31 sets of both horizontal and vertical gillnets from Keuka Lake, 2019. Total number in parentheses.

	Keuka	
	Bottom	Surface
Alewife	2.4 (73)	17.8 (552)
Golden shiner	0.5 (16)	10.1 (313)
Spottail shiner	0.3 (9)	2.0 (61)
Yellow perch	0.6 (18)	0.3 (8)
Pumpkinseed	0.3 (9)	0.1 (4)
Lake trout	0.3 (8)	0.0 (0)
Smallmouth bass	0.2 (6)	0.1 (3)
Rock bass	0.2 (7)	0.0 (0)
Slimy sculpin	0.2 (7)	0.0 (0)
Atlantic salmon	0.1 (2)	0.0 (0)
Bluegill	0.0 (0)	0.1 (3)
Brook silverside	0.1 (2)	0.0 (0)
Brown bullhead	0.0 (1)	0.0 (0)
Yellow bullhead	0.0 (0)	0.0 (1)
Rainbow trout	0.0 (1)	0.0 (0)
Minnow sp	0.0 (0)	0.0 (1)
Cisco	0.0 (1)	0.0 (0)

Keuka Lake was part an experimental forage assessment survey in 2017. Based on this analyses (Sethi 2017), 31 sites throughout the lake were sampled in September 2019 with horizontial gillnets. Each monofilament net is 21 feet high and 70 feet long and consists of seven mesh sizes ranging from 0.25 to 1.0 inch bar. Sets consisted of two nets, one floating and one bottom, fished in approximately 45 feet of water. Nets were fished overnight.

A total of 18 species were collected from Keuka Lake (Table 1), five more than in 2017 when only five sites were surveyed. Surface nets generally collected more fish than bottom sets, though bottom sets collected more species of fish (Table 1). Alewives were the most abundant species collected, followed by golden shiners (Table 1). Based on size distribution, several year classes of alewives were collected. Rainbow smelt were once again absent from collections. One cisco was collected during the survey. This cisco was thought to be from the fall 1999 stocking although determination through calcein mark analyses on the otolith has yet to be done for confirmation.

Based on the results of this survey, the forage population, primarily alewives, are slightly increasing but still appear to be in low abundance. Nearly 70% of all alewives were collected from four sites, therefore schools of alewives, though present, are not spatially distributed throughout the lake. When compared to other recently surveyed western Finger Lakes using similar sampling protocol, Keuka Lake alewive catch per unit effort (number/net night) remains well below other lake estimates (Region 8 files).

It is difficult to draw any conclusions from the collection of one cisco other than it appears some survived the original stocking the previous year. This was the first cisco collected in Keuka Lake by DEC since 1994. Earlier standard Finger Lakes netting in July 2019 targeting lake trout at the same locations surveyed during this project, only in deeper water, yielded no cisco. Cisco were once again stocked in fall 2019 and are anticipated to be stocked annually for at least the next five years. If cisco reintroduction is successful, and the population increases, it will be interesting to determine if current forage sampling protocol effectively targets cisco populations or if modications to the protocol will be required.

Overall, results suggest that the forage base in Keuka Lake is still low and efforts to decrease predatory pressure, such as eliminating brown trout and Atlantic salmon stocking, are still justified. This information, along with lake trout population assessment conducted earlier in the year and results from the Volunteer Cooperative Angler Diary Program will provide information needed to evaluate management of the Keuka Lake fishery. Additionally, although alewife numbers may be slightly increasing, it is still prudent to continue to reestablish a native forage base, such as cisco, which are more suited to present lake conditions.

Sethi, S.A. 2017. Finger lakes forage fish gillnet sruvey: power analysis to assess net designs. New York Cooperative Fish and Wildlife Research Unit, Cornell University. 13 pp.

Hammers, B.E. 2018. Keuka Lake salmonine management assessment, 2010-2016 update. New York State Department of Environmental Conservation, Avon, NY. 50 pp.